Notes, Notices, Cautions, and Warnings

Throughout this guide, blocks of text may be accompanied by an icon and printed in bold type or in italic type. These blocks are notes, notices, cautions, and warnings, and they are used as follows:

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

**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 potentially hazardous situation which, if not avoided, may result in minor or moderate injury.

**WARNING:** A WARNING indicates a potentially hazardous situation which, if not avoided, could result in death or serious bodily injury.

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Preface

This guide is intended for anyone who wants to upgrade or troubleshoot a Dell PowerEdge 350 system. Before calling Dell for technical assistance, follow the recommended procedure(s) in this guide to solve most hardware and software problems yourself.

- Chapter 1, “Introduction” — Overview of the system’s service features.
- Chapter 2, “Checking the Basics” — Initial checks and procedures used to solve basic system problems and information on more detailed troubleshooting procedures to solve more complex problems.
- Chapter 3, “Messages and Codes” — System messages, POST beep codes, diagnostics messages, and alert log messages.
- Chapter 4, “Finding Software Solutions” — Software-related problems or problems after testing the system’s hardware.
- Chapter 5, “Running the Dell Diagnostics” — Hardware-related problems.
- Chapter 6, “Checking the Equipment,” and Chapter 7, “Checking Inside the System” — Troubleshooting procedures for equipment connected to the input/output (I/O) panel of the system and components inside the system, respectively. “Checking Inside the System” also provides information on removing the system cover.
- Chapter 8, “Installing System Board Options” — Installation or removal of system components, such as memory modules, microprocessors, and expansion cards.
- Chapter 9, “Installing Drives” — Installation or removal of hard-disk drives, CD-ROM drive, and diskette drive.
- Chapter 10, “Getting Help” — Help tools Dell provides to assist with system problems and explanations on how and when to call Dell for technical assistance.
- Appendix A, “Jumpers and Connectors” — Jumper settings to change when troubleshooting the system or adding internal options.
- “Abbreviations and Acronyms” — Abbreviations and acronyms used throughout this guide and in other Dell documentation for the system.
Other Documents You May Need

In addition to this Installation and Troubleshooting Guide, you may need the Dell PowerEdge 350 Systems User’s Guide, which describes system features and technical specifications, and explains how to use the System Setup program.

You may also have one or more of the following documents.

NOTE: Documentation updates are sometimes included with the system to describe changes to the system or software. Always read these updates before consulting any other documentation because the updates often contain information that supersedes the information in the other documents.

• Your Dell PowerEdge System Information document contains important safety, regulatory, and warranty information.
• The Rack Installation Guide provides detailed instructions for installing the system in a rack.
• Operating system documentation is included with the system if you ordered the operating system software from Dell. This documentation describes how to install (if necessary), configure, and use the operating system software.
• Documentation is included with any options you purchase separately from the system. This documentation includes information that you need to configure and install these options in your Dell system.
• The Dell OpenManage software documentation, which describes the features, requirements, installation, and basic operation of this optional server management software.
• Technical information files—sometimes called “readme” files—may be installed on the hard-disk drive to provide last-minute updates about technical changes to the system or advanced technical reference material intended for experienced users or technicians.

Typographical Conventions

The following list defines (where appropriate) and illustrates typographical conventions used as visual cues for specific elements of text throughout this document:

• Interface components are window titles, button and icon names, menu names and selections, and other options that appear on the monitor screen or display. They are presented in bold.
Example: Click OK.

• Keycaps are labels that appear on the keys on a keyboard. They are enclosed in angle brackets.
Example: <Enter>
Key combinations are series of keys to be pressed simultaneously (unless otherwise indicated) to perform a single function.

Example: <Ctrl><Alt><Enter>

Commands presented in lowercase bold are for reference purposes only and are not intended to be typed when referenced.

Example: “Use the format command to . . . .”

In contrast, commands presented in the Courier New font are part of an instruction and intended to be typed.

Example: “Type format a: to format the diskette in drive A.”

Filenames and directory names are presented in lowercase bold.

Examples: autoexec.bat and c:\windows

Syntax lines consist of a command and all its possible parameters. Commands are presented in lowercase bold; variable parameters (those for which you substitute a value) are presented in lowercase italics; constant parameters are presented in lowercase bold. The brackets indicate items that are optional.

Example: del [drive:] [path] filename [/p]

Command lines consist of a command and may include one or more of the command’s possible parameters. Command lines are presented in the Courier New font.

Example: del c:\myfile.doc

Screen text is a message or text that you are instructed to type as part of a command (referred to as a command line). Screen text is presented in the Courier New font.

Example: The following message appears on your screen:
No boot device available

Example: “Type md c:\programs and press <Enter>.”

Variables are placeholders for which you substitute a value. They are presented in italics.

Example: DIMM_x (where x represents the DIMM socket designation).
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CHAPTER 1

Introduction

The Dell™ PowerEdge™ 350 system is an ultra-slim, rack-mounted server that provides a robust, reliable, rack-optimized platform on which both large and small customers can deploy Internet infrastructure applications. The system includes the following service features to make troubleshooting and repair easy and effective:

- Dell Diagnostics, which checks for hardware problems (if the system can boot)
- Embedded server management hardware, which monitors temperatures and voltages throughout the system and notifies you if the system overheats, if a system cooling fan malfunctions, or if a power supply fails

The system chassis simplifies removing and replacing system components. You can perform microprocessor and memory upgrades without removing the system board.

The following upgrade options are offered for your system:

- Additional memory
- A variety of expansion card options
- Microprocessors

NOTE: The PowerEdge 350 system is a “headless” system that operates without keyboard, monitor or mouse. While it is possible to connect these peripherals to the system, it is generally not necessary unless troubleshooting the system.

Safety, Regulatory, and Warranty Information

For important safety, regulatory, and warranty information, see the Dell PowerEdge System Information document that came with your system.
CHAPTER 2
Checking the Basics

This chapter guides you through some initial checks and procedures that can solve basic system problems. It can also direct you to the appropriate chapter for detailed troubleshooting information and procedures to solve more complex problems. If your system is not working as expected, begin troubleshooting using the procedures in this chapter.

Before you start any of the procedures in this chapter, read “Safety First—For You and Your System,” in Chapter 7.

You need your system’s User’s Guide to perform the procedures in this chapter.

NOTE: When you see the question “Is the problem resolved?” in a troubleshooting procedure, perform the operation that caused the problem.

Backing Up Files

If the system is behaving erratically, back up the files on the hard-disk drives immediately. See the documentation that came with the operating system for instructions on how to back up the files.

Basic Checks

The following procedure leads you through the checks necessary to solve some basic system problems:

1. Perform the steps in the next section, “Checking Connectors and Switches.”

   Is the problem resolved?

   Yes. The power to the system was faulty, or the connections to the system were loose. You have fixed the problem.

   No. Go to step 2.
2. If a keyboard and monitor are not connected to the system, shut down the system, connect a monitor and keyboard, and restart the system.

Did you receive a system message or beep code?

Yes. See Chapter 3, “Messages and Codes.”

No. Go to step 3.

3. Did the system complete the boot routine?

Yes. Go to step 4.

No. A serious malfunction may have occurred. See Chapter 10, “Getting Help,” for information on additional resources Dell provides to help you when you have a problem with your system.

4. Run the Dell Diagnostics. See Chapter 5, “Running the Dell Diagnostics.”

If you need additional assistance, see Chapter 10, “Getting Help,” for information on additional resources Dell provides to help you when you have a problem with your system.

Checking Connectors and Switches

Loose or improperly connected cables are the most likely sources of problems for your system. A check of all the cable connections can solve these problems.

Figure 2-1 shows the system’s back-panel connectors.

![Figure 2-1. Back-Panel Connectors](image-url)
To check the external connections to your system, perform the following steps:

1. If the system is connected to a power strip (or power distribution unit), switch the power strip off and then on again.
   
   Is the power strip receiving power?
   
   Yes. Go to step 4.
   
   No. Go to step 2.

2. Plug the power strip into a different electrical outlet.
   
   Is the power strip receiving power?
   
   Yes. The original electrical outlet probably does not function. Use a different electrical outlet.
   
   No. Go to step 3.

3. Plug a different device into the electrical outlet.
   
   Does the device receive power?
   
   Yes. The power strip is probably not functioning properly. Use another power strip.
   
   No. Locate a working electrical outlet. Go to step 4.

4. Reconnect the system to the electrical outlet or power strip.
   
   Make sure that all connections fit tightly together.

5. Power on the system.
   
   Is the problem resolved?
   
   Yes. The connections were loose or there was a problem with the electrical outlet or power strip. You have fixed the problem.
   
   No. Go to step 6.

6. Power off the system and all attached devices. Disconnect all the AC power cables from their electrical outlets.

7. Reseat all power cables connected to the system, peripheral devices, and electrical outlets.

8. Reseat the keyboard and mouse interface cable connectors, if present, in the proper connectors on the back of the system (see Figure 2-1).

9. Reconnect the video-interface cable connectors, if present, to the video connector on the back of the system (see Figure 2-1) and to the connector on the back of the monitor.

   NOTE: On some monitors, the video interface cable is permanently attached.
10. Check the network connections as instructed in “Troubleshooting the Integrated NICs” in Chapter 6.

11. Power on the system and all attached devices.
   Is the problem resolved?
   Yes. You have fixed the problem.
   No. See Chapter 10, “Getting Help,” for information on additional resources Dell provides to help you when you have a problem with your system.

12. Is the monitor operating properly?
   Yes. Go to step 14.
   No. Go to “Troubleshooting the Monitor” in Chapter 6, “Checking the Equipment.”

13. Is the keyboard operating properly?
   Yes. Go to step 15.
   No. Go to “Troubleshooting the Keyboard” in Chapter 6, “Checking the Equipment.”

14. Is the mouse operating properly?
   Yes. Continue with “Look and Listen,” the next section in this chapter.
   No. Go to “Troubleshooting the Basic I/O Functions” in Chapter 6, “Checking the Equipment.”

**Look and Listen**

The front panel of your system contains switches, indicator lights, and diskette and CD-ROM drives. To view the front panel, you must remove the optional front bezel from the system.

**Removing the Optional Front Bezel**

To remove the front bezel, press the retention tab on each end of the bezel and remove the bezel from the chassis (see Figure 2-2).
Checking the Basics 2-5

Figure 2-2. Removing the Optional Front Bezel

Figure 2-3 shows the main features on the system front panel, and Figure 2-4 shows the front-panel indicators. For a description of these indicators, see Table 2-1.

Figure 2-6 shows the location of the three switches on the system front panel, and Table 2-2 describes the function of these switches.

Front-Panel Features

Figure 2-3 shows the main features on the system front panel.

Figure 2-3. Front-Panel Features
System Indicators

While troubleshooting your system, you might need to check the status of the indicators on the system’s front panel, shown in Figure 2-4 and Figure 2-5.

**Figure 2-4. Front-Panel Indicators**

**Figure 2-5. Front-Panel Indicators (Bezel Removed)**
Table 2-1 describes the appearance and function of the front-panel indicators.

### Table 2-1. Front-Panel Indicators

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Color</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power</td>
<td>Green</td>
<td>Lights up when the system is connected to an AC power source; blinks when the system is in sleep mode</td>
</tr>
<tr>
<td>System fault</td>
<td>Amber</td>
<td>Blinks during system startup, or when a system fault is detected</td>
</tr>
<tr>
<td>Hard-disk drive activity</td>
<td>Green</td>
<td>Blinks when hard-disk drive activity occurs</td>
</tr>
<tr>
<td>LAN 1 link/activity</td>
<td>Amber</td>
<td>Lights up when the LAN 1 connector is linked to an Ethernet port; blinks when activity occurs on this channel.</td>
</tr>
<tr>
<td>LAN 2 link/activity</td>
<td>Amber</td>
<td>Lights up when the LAN 2 connector is linked to an Ethernet port; blinks when activity occurs on this channel.</td>
</tr>
</tbody>
</table>

**System Switches**

Figure 2-6 shows the location of the three switches on the system front panel. To activate a switch, press the corresponding icon on the front panel as shown in Figure 2-6.

**NOTICE:** To prevent accidental system lockup, system reset, or false error messages, do not press areas of the front panel other than the three switch locations shown in Figure 2-6. Reserved test switches are located in other areas of the front panel.

![Figure 2-6. Front-Panel Switches](image)
Table 2-2 describes the function of the three front-panel switches.

**Table 2-2. Front-Panel Switches**

<table>
<thead>
<tr>
<th>Switch</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power switch</td>
<td>Powers the system on or off. <strong>NOTE: To power off the system, press and hold this switch for at least 4 seconds.</strong></td>
</tr>
<tr>
<td>Sleep switch</td>
<td>Places the system in sleep mode.</td>
</tr>
<tr>
<td>Reset switch</td>
<td>Reboots the system. If the system locks up and you cannot shut down the system normally, press the reset switch.</td>
</tr>
</tbody>
</table>

**System Setup Program**

**NOTE:** You must connect a keyboard and monitor to perform this procedure.

You can easily correct certain system problems by verifying the correct settings in the System Setup program. When you boot the system, the system checks the system configuration information and compares it with the current hardware configuration. If the system hardware configuration does not match the information recorded by the System Setup program, an error message may appear on the screen.

This problem can happen if you changed the system’s hardware configuration and forgot to run the System Setup program. To correct this problem, enter the System Setup program, correct the corresponding System Setup setting, and reboot the system. See “Using the System Setup Program,” in the User’s Guide for detailed instructions on using the System Setup program.
Your system can provide you with diagnostic, error, and status information in the form of messages that appear on the monitor screen, or beep codes that sound through the system speaker. This chapter documents the diagnostic and beep codes and system messages generated by the system basic input/output system (BIOS).

**System Messages**

System messages during the system’s power-on self-test (POST) alert you to a possible operating system problem or to a conflict between the software and hardware. Table 3-1 lists possible system messages.

NOTE: If you receive a system message that is not listed in Table 3-1, check the software documentation provided with your system for a possible explanation of the message and recommended action.

### Table 3-1. System Messages

<table>
<thead>
<tr>
<th>Message</th>
<th>Cause</th>
<th>Corrective Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>8042 Gate A20</td>
<td>Faulty keyboard controller (defective system board)</td>
<td>Replace the system board. See Chapter 10, “Getting Help,” for instructions on obtaining technical assistance.</td>
</tr>
<tr>
<td>Address Line Short!</td>
<td>Faulty memory circuitry on system board</td>
<td>Replace the system board. See Chapter 10, “Getting Help,” for instructions on obtaining technical assistance.</td>
</tr>
<tr>
<td>C: Drive Error</td>
<td>Hard-disk drive is not responding correctly to system commands</td>
<td>Run the Dell Diagnostics. See Chapter 5, “Running the Dell Diagnostics,” for instructions. Replace the hard-disk drive. See Chapter 9, “Installing Drives,” for more information.</td>
</tr>
<tr>
<td>C: Drive Failure</td>
<td>Faulty hard-disk drive</td>
<td>Replace the hard-disk drive. See Chapter 9, “Installing Drives,” for more information.</td>
</tr>
</tbody>
</table>

NOTE: For the full name of an abbreviation or acronym used in this table, see “Abbreviations and Acronyms.”
Table 3-1. System Messages (continued)

<table>
<thead>
<tr>
<th>Message</th>
<th>Cause</th>
<th>Corrective Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cache Memory Bad, Do Not Enable Cache!</td>
<td>Faulty cache memory</td>
<td>Replace the microprocessor. See Chapter 8, “Installing System Board Options,” for more information.</td>
</tr>
<tr>
<td>CH-2 Timer Error</td>
<td>Faulty system board</td>
<td>Replace the system board. See Chapter 10, “Getting Help,” for instructions on obtaining technical assistance.</td>
</tr>
<tr>
<td>CMOS Battery State Low</td>
<td>The system battery power is low</td>
<td>Replace the system battery. See Chapter 8, “Installing System Board Options,” for more information.</td>
</tr>
<tr>
<td>CMOS Time and Date Not Set</td>
<td>Defective system battery</td>
<td>Replace the system battery. See Chapter 8, “Installing System Board Options,” for more information.</td>
</tr>
<tr>
<td>D: Drive Failure</td>
<td>Faulty hard-disk drive</td>
<td>Replace the hard-disk drive. See Chapter 9, “Installing Drives,” for more information.</td>
</tr>
<tr>
<td>Diskette Boot Failure</td>
<td>No operating system on diskette</td>
<td>Use a bootable diskette.</td>
</tr>
<tr>
<td>DMA Error</td>
<td>Faulty DMA controller</td>
<td>Replace the system board. See Chapter 10, “Getting Help,” for instructions on obtaining technical assistance.</td>
</tr>
<tr>
<td>DMA 1 Error</td>
<td></td>
<td></td>
</tr>
<tr>
<td>DMA 2 Error</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FDD Controller Failure</td>
<td>Faulty diskette/tape drive controller (defective system board)</td>
<td>Replace the system board. See Chapter 10, “Getting Help,” for instructions on obtaining technical assistance.</td>
</tr>
</tbody>
</table>

NOTE: For the full name of an abbreviation or acronym used in this table, see “Abbreviations and Acronyms.”

3-2 Installation and Troubleshooting Guide
Table 3-1. System Messages (continued)

<table>
<thead>
<tr>
<th>Message</th>
<th>Cause</th>
<th>Corrective Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>HDD Controller</td>
<td>Loose cable, improperly connected hard-disk drive, or faulty IDE controller</td>
<td>Check the hard-disk drive cable connections. If the problem persists, replace the system board. See Chapter 10, “Getting Help,” for instructions on obtaining technical assistance.</td>
</tr>
<tr>
<td>failure</td>
<td></td>
<td></td>
</tr>
<tr>
<td>INTR1 Error</td>
<td>Faulty system board</td>
<td>Replace the system board. See Chapter 10, “Getting Help,” for instructions on obtaining technical assistance.</td>
</tr>
<tr>
<td>INTR2 Error</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Invalid Boot Diskette</td>
<td>No operating system on diskette</td>
<td>Use a bootable diskette.</td>
</tr>
<tr>
<td>KB/Interface error</td>
<td>Keyboard cable connector loose or improperly connected, defective keyboard, or defective keyboard/mouse controller (defective system board)</td>
<td>Check the keyboard cable connection (See Figure 2-1). Replace the keyboard. If the problem persists, replace the system board. See Chapter 10, “Getting Help,” for instructions on obtaining technical assistance.</td>
</tr>
<tr>
<td>No ROM BASIC</td>
<td>No bootable sector on diskette or CD</td>
<td>Use a different bootable diskette or CD, or remove nonbootable diskette from drive to allow system to boot from hard-disk drive</td>
</tr>
<tr>
<td>Off Board Parity</td>
<td>Faulty DIMMs or defective system board</td>
<td>Replace DIMMs. See Chapter 8, “Installing System Board Options,” for more information.</td>
</tr>
<tr>
<td>Error Addr = xxxx</td>
<td></td>
<td></td>
</tr>
<tr>
<td>On Board Parity</td>
<td>Faulty DIMMs or defective system board</td>
<td>Replace DIMMs. See Chapter 8, “Installing System Board Options,” for more information.</td>
</tr>
<tr>
<td>Error Addr = xxxx</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Parity Error</td>
<td>Faulty DIMMs or defective system board</td>
<td>Replace DIMMs. See Chapter 8, “Installing System Board Options,” for more information.</td>
</tr>
<tr>
<td>????.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

NOTE: For the full name of an abbreviation or acronym used in this table, see “Abbreviations and Acronyms.”
**POST Beep Codes**

If the monitor cannot display errors or problems, during POST the system may emit a series of beeps, or **beep code**, that identifies the problem.

<table>
<thead>
<tr>
<th>Table 3-2. System Beep Codes</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Code</strong></td>
</tr>
<tr>
<td>1</td>
</tr>
<tr>
<td>2</td>
</tr>
<tr>
<td>3</td>
</tr>
<tr>
<td>4</td>
</tr>
<tr>
<td>5</td>
</tr>
<tr>
<td>6</td>
</tr>
<tr>
<td>7</td>
</tr>
<tr>
<td>8</td>
</tr>
<tr>
<td>9</td>
</tr>
<tr>
<td>10</td>
</tr>
<tr>
<td>11</td>
</tr>
</tbody>
</table>

*NONE: For the full name of an abbreviation or acronym used in this table, see “Abbreviations and Acronyms.”*
Diagnostics Messages
When you test a device group or device in the Dell Diagnostics, an error message may result. These particular error messages are not covered in this section. Record the message on a copy of the Diagnostics Checklist in Chapter 10, “Getting Help,” and then follow the instructions in that section for obtaining technical assistance.

Alert Log Messages From the Dell OpenManage Server Agent
The optional Dell OpenManage Server Agent management application program generates alert messages that are written to the Simple Network Management Protocol (SNMP) trap log file. See your Dell OpenManage Server Agent documentation for more information.
CHAPTER 4
Finding Software Solutions

Because most systems have several application programs installed in addition to the operating system, isolating a software problem sometimes is confusing. Software errors can look like hardware malfunctions at first.

Software problems can result from the following circumstances:

• Improper installation or configuration of a program
• Input errors
• Device drivers that conflict with certain application programs
• Interrupt conflicts between devices

You can confirm that a system problem is caused by software by running the system board tests in the Dell Diagnostics (see Chapter 5, “Running the Dell Diagnostics”). If all tests in the test group are completed successfully, the problem is most likely caused by software.

This chapter provides some general guidelines for analyzing software problems. For detailed troubleshooting information on a particular program, see the documentation that accompanied the software or consult the support service for the software.

Installing and Configuring Software

Use virus-scanning software to check newly acquired application programs and files for viruses before you install the programs on the system’s hard-disk drive. Viruses can quickly use all available system memory, damage and/or destroy data stored on the hard-disk drive, and permanently affect the performance of the programs they infect. Several commercial virus-scanning programs are available for purchase.

Before you install a program, read its documentation to learn how the program works, what hardware it requires, and what its defaults are. A program usually includes installation instructions in its accompanying documentation and a software installation routine.

The software installation routine assists you in transferring the appropriate program files to the system’s hard-disk drive. Installation instructions often provide details about how to configure the operating system to successfully run the program. Always read the installation instructions before running a program’s installation routine.
When you run the installation routine, be prepared to respond to prompts for information about how the system’s operating system is configured, what type of system you have, and what peripheral devices are connected to the system.

**Using Software**

The following subsections discuss errors that can occur as a result of software operation or configuration.

**Error Messages**

Error messages are produced by the system, an application program, or the operating system. Chapter 3, “Messages and Codes,” provides information about the error messages that are generated by the system. If you receive an error message that is not listed in Chapter 3, “Messages and Codes,” check the operating system or application program documentation.

**Input Errors**

If you press a specific key or set of keys at the wrong time, a program might give you unexpected results. See the documentation that came with the application program to make sure that the values or characters you are entering are valid.

Make sure that the operating environment is set up to accommodate the programs you use. Keep in mind that whenever you change the parameters of the system’s operating environment, you can affect the successful operation of the programs. Sometimes, after modifying the operating environment, you will need to reinstall a program that no longer runs properly.

**Program Conflicts**

Some programs leave portions of their setup information behind, even though you have exited from them. As a result, other programs cannot run. Rebooting the system can confirm whether these programs are the cause of the problem.

Device drivers, which are programs that use specialized subroutines, can cause problems with the system. For example, a variation in the way the data is sent to the monitor can require a special screen driver program that expects a certain kind of video mode or monitor. In such cases, you can develop an alternate method of running that particular program—by creating a start-up file made especially for that program, for example. Call the support service for the software you are using to help you with this problem.

**Avoiding Interrupt Assignment Conflicts**

Problems can arise if two devices attempt to use the same interrupt request (IRQ) line. To avoid this type of conflict, check the peripheral component interconnect (PCI) IRQ assignment screen in the System Setup program (see the User’s Guide for instructions). Consult Table 4-1 to configure the card for one of the available IRQ lines.
### Table 4-1. IRQ Line Assignment Defaults

<table>
<thead>
<tr>
<th>IRQ Line</th>
<th>Used By/Available</th>
</tr>
</thead>
<tbody>
<tr>
<td>IRQ0</td>
<td>Used by the system timer</td>
</tr>
<tr>
<td>IRQ1</td>
<td>Used by the keyboard to signal that the output buffer is full</td>
</tr>
<tr>
<td>IRQ2</td>
<td>Used by interrupt controller 2</td>
</tr>
<tr>
<td>IRQ3</td>
<td>COM2</td>
</tr>
<tr>
<td>IRQ4</td>
<td>Used by serial port 1 (COM1 and COM3) or peripheral component interconnect (PCI) device</td>
</tr>
<tr>
<td>IRQ5</td>
<td>Available</td>
</tr>
<tr>
<td>IRQ6</td>
<td>Used by the diskette drive controller</td>
</tr>
<tr>
<td>IRQ7</td>
<td>Available</td>
</tr>
<tr>
<td>IRQ8</td>
<td>Used by the real-time clock (RTC)</td>
</tr>
<tr>
<td>IRQ9</td>
<td>Reserved for advanced configuration and power interface (ACPI)</td>
</tr>
<tr>
<td>IRQ10</td>
<td>Available</td>
</tr>
<tr>
<td>IRQ11</td>
<td>Available</td>
</tr>
<tr>
<td>IRQ12</td>
<td>Used by the Personal System/2 (PS/2) mouse port, unless the mouse is disabled in the System Setup program</td>
</tr>
<tr>
<td>IRQ13</td>
<td>Reserved for floating-point errors</td>
</tr>
<tr>
<td>IRQ14</td>
<td>Used by the hard-disk drive</td>
</tr>
<tr>
<td>IRQ15</td>
<td>Available</td>
</tr>
</tbody>
</table>

**NOTE:** For the full name of an abbreviation or acronym used in this table, see “Abbreviations and Acronyms.”
CHAPTER 5
Running the Dell Diagnostics

Unlike many diagnostic programs, the Dell Diagnostics help you check the system's hardware without any additional equipment and without destroying any data. By using the diagnostics, you can have confidence in the system's operation. If you find a problem that you cannot solve by yourself, the diagnostic tests can provide you with important information you will need when talking to Dell's technical assistance representative.

NOTICE: Use the Dell Diagnostics to test only Dell systems. If you use this program with other systems, incorrect system responses or error messages might result.

NOTE: You must connect a keyboard and monitor to run the Dell Diagnostics.

Features of the Dell Diagnostics

The Dell Diagnostics provide a series of menus and options from which you choose particular device groups or devices. You can also control the sequence in which the tests are run. The diagnostic menus also have these helpful features:

- Options that let you run tests individually or collectively
- An option that allows you to choose the number of times a test is repeated
- The ability to display or print test results or to save them in a file
- Options to temporarily suspend testing if an error is detected or to terminate testing when an adjustable error limit is reached
- Help messages that briefly describe each test and its parameters
- Status messages that inform you whether device group or device tests are completed successfully
- Error messages that appear if any problems are detected
When to Use the Dell Diagnostics

Whenever a major component or device in the system does not function properly, you might have a component failure. As long as the microprocessor and the input and output components of the system (the monitor, keyboard, and diskette drive) are working, you can use the Dell Diagnostics. If you know what component(s) you need to test, simply select the appropriate diagnostic device group(s) or subtest(s). If you are unsure about the scope of the problem, read the rest of the information in this section.

Starting the Dell Diagnostics

You must run the Dell Diagnostics from a set of diskettes that you create from the Dell OpenManage Server Assistant CD.

To run the Dell Diagnostics from the diskettes, perform the following steps:

1. Create a set of diagnostics diskettes using the Dell OpenManage Server Assistant CD.
   
   To create diagnostic diskettes from the Dell OpenManage Server Assistant CD, select Create Diskettes from the Dell OpenManage Server Assistant menu and then continue down the menu hierarchy by selecting the following categories: PowerEdge 350, Diskette Set, System Utilities, Server Diagnostics. Create five Server Diagnostics diskettes.
   
2. Boot the system from the first diagnostics diskette.
   
   If the system fails to boot, see “Getting Help,” for instructions on obtaining technical assistance.

   When you start the diagnostics a message is displayed telling you that the diagnostics are loading. The Diagnostics menu appears. The menu allows you to run all or specific diagnostic tests or to exit the Dell Diagnostics.

   **NOTE:** Before you read the rest of this section, you might want to start the Dell Diagnostics so that you can see it on your monitor screen.

   For a quick check of the system, select Test All Devices and then select Quick Tests. This option runs only the device tests that do not require user interaction and that do not take a long time to run. Dell recommends that you choose this option first to increase the chance of tracing the source of the problem quickly. For a complete check of the system, select Test All Devices and then select Extended Tests. To check a particular area of the system, choose Advanced Testing.

   Selecting Exit to MS-DOS exits the diagnostics and returns you to your operating system environment.

   To select an option from the Diagnostics menu, highlight the option and press <Enter>, or press the key that corresponds to the highlighted letter in the option you choose.
How to Use the Dell Diagnostics

When you select Advanced Testing from the Diagnostics menu, the main screen of the diagnostics appears.

Information on the main screen of the diagnostics is presented in the following areas:

- Two lines at the top of the main screen identify the diagnostics and give its version number.
- On the left side of the screen, the Device Groups area lists the diagnostic device groups in the order they will run if you select All under the Run Tests submenu. Press the up- or down-arrow key to highlight a device group.
- On the right side of the screen, the Devices for Highlighted Group area lists the specific devices within a particular test group.
- Two lines at the bottom of the screen make up the menu area. The first line lists the menu options you can select; press the left- or right-arrow key to highlight an option. The second line gives information about the highlighted option.

How to Use the Device Groups Menu

The Device Groups menu at the bottom of the screen provides options that enable you to select and run specific diagnostic tests from the diagnostics main screen. Press the left- and right-arrow keys to select the options on the menu. As you move from one menu option to another, a brief explanation of the highlighted option appears on the bottom line of the screen.

If you want more information about a device group or device, highlight the Help option and press <Enter>. After you read the information, press <Esc> to return to the previous screen.

Device Groups Menu Options

Five options are listed at the bottom of the diagnostics main screen: Run Tests, Devices, Select, Config, and Help.

There are two ways to select a menu option:

- Look on the screen to see which letter in the option is capitalized, and type that letter (for example, type r to select the Run option).
- Move the highlight to the option you want to select by pressing the left- or right-arrow key, and then press <Enter>.

Whenever one of the options is selected, additional choices become available.

The following subsections explain the menu options as listed from left to right in the Device Groups menu.
Run Tests

Run Tests displays seven options: One, All, Select, Options, Results, Errors, and Help. If you select One, all the devices within the highlighted device group are run. If you select All, all of the tests in all of the device group tests are run. (The device group tests are run in the same order as they are listed.) If you choose Select, only the selected device groups or the devices that you selected within the device groups are run. Before you test any device groups or devices, consider setting global parameters within Options. Table 5-1 lists all of the possible values for each option. Global parameters offer you greater control over how the device group tests or device tests are run and how results are reported. Help displays a series of help options, including Menu, Keys, Device Group, Device, Test, and Versions.

Table 5-1. Options

<table>
<thead>
<tr>
<th>Option</th>
<th>Possible Values</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Times to Repeat Test(s)</td>
<td>0001 through 9999 or 0000, which loops indefinitely until you press &lt;Ctrl&gt;&lt;Break&gt;. The default is 1.</td>
</tr>
<tr>
<td>Maximum Errors Allowed</td>
<td>0000 through 9999, where 0000 means that there is no error limit. The default is 1.</td>
</tr>
<tr>
<td>Pause for User Response</td>
<td>Yes, No</td>
</tr>
<tr>
<td>Message Logging</td>
<td>None, Errors, All</td>
</tr>
<tr>
<td>Message Logging File Name</td>
<td>Specifies the name of the logging file if the Message Logging option is selected. The default is A: RESULT.</td>
</tr>
<tr>
<td>Display Detailed Messages</td>
<td>Yes, No</td>
</tr>
</tbody>
</table>

Devices

Most of the device groups consist of several devices. Use the Devices option to select individual devices within the device group(s).

When you select Devices, the following options are displayed: Run Tests, Tests, Select, Parameters, and Help. Table 5-2 lists all of the possible values for each option.
Table 5-2. Devices Options

<table>
<thead>
<tr>
<th>Option</th>
<th>Functions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Run Tests</td>
<td>Displays five options: One, All, Select, Options, Results, Errors, and Help.</td>
</tr>
<tr>
<td>Tests</td>
<td>Allows you to select individual devices to tailor the testing process to your particular needs. You can choose one or more devices from the list. When you choose Tests, four options are displayed: Run Tests, Select, Parameters, and Help.</td>
</tr>
<tr>
<td>Select</td>
<td>Allows you to choose one or more devices from a particular device group. Three options are displayed: One, All, and Help.</td>
</tr>
<tr>
<td>Parameters</td>
<td>Determines how a particular test runs.</td>
</tr>
<tr>
<td>Help</td>
<td>Displays a list of help topics.</td>
</tr>
</tbody>
</table>

Select

The Select option in the Device Groups menu allows you to choose one or more devices from a particular device group. Three options are displayed: One, All, and Help.

Config

Choosing Config from the Device Groups menu displays information about the particular device that is highlighted.

Error Messages

When you run a test in the diagnostics, error messages might result. Record the messages on a copy of the Diagnostics Checklist; also see Chapter 10, “Getting Help,” for instructions on obtaining technical assistance and informing the technical assistance representative of these messages.
CHAPTER 6
Checking the Equipment

This chapter provides troubleshooting procedures for equipment that connects directly to the input/output (I/O) panel of the system, such as the monitor, keyboard, or mouse. Before you perform any of the procedures in this chapter, see “Checking Connectors and Switches” in Chapter 2. Follow the troubleshooting procedures for the equipment that is malfunctioning.

NOTES: To perform the procedures in this chapter, make sure you have the system documentation available for reference. You must connect a keyboard, mouse, and monitor to your system.

When you see the question “Is the problem resolved?” in a troubleshooting procedure, perform the operation that caused the problem.

Troubleshooting the Monitor

Troubleshooting video problems involves determining which of the following items is the source of the problem:

- Monitor and monitor interface cable
- Video memory
- Video logic of the system or a video expansion card

If information on the monitor screen is displayed incorrectly or not at all, perform the following steps to solve the problem:

1. Adjust the switches and controls including the horizontal and vertical position and size, as specified in the monitor’s documentation, to correct the video image.

   Is the problem resolved?
   
   Yes. You have fixed the problem.
   
   No. Go to step 2.
2. Run the video tests in the Dell Diagnostics.
   Is the monitor displaying text properly?
   **Yes.** Go to step 3.
   **No.** The video controller is faulty; see Chapter 10, "Getting Help," for instructions on obtaining technical assistance.

3. Run the video tests in the Dell Diagnostics.
   Did the tests run successfully?
   **Yes.** You have fixed the problem, or the problem is software-related. For information about installing video drivers, see "Using the Dell OpenManage Server Assistant CD," in the User’s Guide.
   **No.** Go to step 4.

4. Power off the system and disconnect it from the electrical outlet.

5. Swap the monitor with one of the same type that is working, and reconnect the system to the electrical outlet.

6. Run the video tests in the Dell Diagnostics again.
   Did the tests run successfully?
   **Yes.** The monitor must be replaced. See Chapter 10, “Getting Help," for instructions on obtaining technical assistance.
   **No.** The video controller is faulty; see Chapter 10, “Getting Help," for instructions on obtaining technical assistance.

**Troubleshooting the Keyboard**

This procedure determines what kind of keyboard problem you might have. If a system error message indicates a keyboard problem when you start the system or while the Dell Diagnostics is running, perform the following steps:

1. Look at the keyboard and the keyboard cable for any signs of damage.
   Press and release each key on the keyboard.
   Do the keyboard and its cable appear to be free of physical damage, and do the keys work?
   **Yes.** Go to step 3.
   **No.** Go to step 2.
2. Swap the faulty keyboard with a working keyboard. To swap a faulty keyboard, unplug the keyboard cable from the system’s back-panel and plug in a working keyboard.

Is the problem resolved?

Yes. The keyboard must be replaced. See Chapter 10, “Getting Help,” for instructions on obtaining technical assistance.

No. Go to step 3.

3. Run the keyboard test in the Dell Diagnostics.

Can you use the keyboard to select the keyboard test?

Yes. Go to step 5.

No. Go to step 4.

4. Swap the faulty keyboard with a working keyboard.

5. Did the keyboard test run successfully?

Yes. The keyboard must be replaced. See Chapter 10, “Getting Help,” for instructions on obtaining technical assistance.

No. The keyboard controller on the system board is faulty. See Chapter 10, “Getting Help,” for instructions on obtaining technical assistance.

**Troubleshooting the Basic I/O Functions**

This procedure determines whether the system’s basic I/O functions are operational. If a system error message indicates an I/O port problem or the device connected to the port does not function properly, perform the following steps:

1. Enter the System Setup program, and check the **Serial Port 1** settings.

   Is the communications port set to **Enabled**?

   Yes. Go to step 3.

   No. Go to step 2.

2. Change the **Serial Port 1** settings to **Enabled**. Reboot the system.

   Is the problem resolved?

   Yes. You have fixed the problem.

   No. Go to step 3.
3. Check the contents of the start-up files. See “Installing and Configuring Software” in Chapter 4, “Finding Software Solutions.”

   Are the port configuration commands correct?
   Yes. Go to step 5.
   No. Go to step 4.

4. Change the necessary statements in the start-up files. If the port problem is confined to a particular application program, see the application program’s documentation for specific port configuration requirements.

   Is the problem resolved?
   Yes. You have fixed the problem.
   No. Go to step 5.

5. Reboot the system from the diagnostics diskette, and run the serial ports test in the Dell Diagnostics.

   Did the tests run successfully?
   Yes. Go to step 6.

6. If the problem persists, go to the following section, “Troubleshooting a Serial I/O Device.”

**Troubleshooting a Serial I/O Device**

If the procedure in “Troubleshooting the Basic I/O Functions” indicates that the problem is with a device connected to the serial port, perform the following steps:

1. Power off the system and any peripheral device connected to the serial port.

2. Swap the interface cable that connects the device to the serial port with a known working cable.

   Is the problem resolved?
   Yes. The interface cable must be replaced. See Chapter 10, “Getting Help,” for instructions on obtaining technical assistance.
   No. Go to step 3.

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

   For example, if the serial mouse has a problem, swap it with a serial mouse that you know is working properly.
4. Power on the system and the serial device.
   Is the problem resolved?
   
   **Yes.** The serial device must be replaced. See Chapter 10, “Getting Help,” for instructions on obtaining technical assistance.
   
   **No.** See Chapter 10, “Getting Help,” for instructions on obtaining technical assistance.

**Troubleshooting USB Devices**

If a system error message indicates a problem with the universal serial bus (USB) connectors or the device connected to the port does not function properly, perform the following steps:

1. Enter the System Setup program, and check that the USB connectors are enabled.
2. Power off the system and any devices connected to the USB connectors.
   Are two USB devices connected to the system?
   
   **Yes.** Go to step 3.
   
   **No.** Go to step 5.
3. Disconnect the devices from USB connectors 1 and 2, and connect the malfunctioning device to the opposite connector.
4. Power on the system and the reconnected device.
   Is the problem resolved?
   
   **Yes.** The USB connector might be defective. See Chapter 10, “Getting Help,” for instructions on obtaining technical assistance.
   
   **No.** Go to step 5.
5. If possible, swap the interface cable that connects the device to the USB connector with a known working cable.
   Is the problem resolved?
   
   **Yes.** The interface cable must be replaced. See Chapter 10, “Getting Help,” for instructions on obtaining technical assistance.
   
   **No.** Go to step 6.
6. Power off the system and the USB device, and swap the device with a comparable working device.
7. Power on the system and the USB device.

Is the problem resolved?

Yes. The USB device must be replaced. See Chapter 10, “Getting Help,” for instructions on obtaining technical assistance.


Troubleshooting the Integrated NICs

If you encounter problems with the system’s integrated network interface controllers (NICs), the following actions may help you to diagnose the problem:

• Enter the System Setup program and confirm that the NICs are enabled.

• Check the network status indicators for each network channel on the system’s front panel (see Figure 2-4).
  The link/activity indicator lights when the system is connected to a network and blinks when activity occurs on the channel.

  NOTE: If you can connect to the network but are having problems accessing network resources, contact your network administrator.

• Check the network connections on the system’s back panel (see Figure 2-1).
  — Check the network connector for physical damage.
  — Ensure that both ends of the network cable are inserted properly.
  — Press one end of the unshielded twisted pair (UTP) Ethernet cable into the network connector until the cable snaps securely into place. Connect the other end of the cable to an RJ45 jack wall plate or to an RJ45 port on a UTP concentrator or hub, depending on your network configuration.
  — Replace the patch cable or network cable from the wall jack to the system.
  — If replacing the patch cable or network cable does not solve the problem, try moving the system to a known working location on the network.

• The network driver files may be damaged or deleted.
  Back up your hard-disk drive, then reinstall the network driver files. For more information, see the operating system software documentation.

• Run the network interface test in the Dell Diagnostics.
  For more information, see Chapter 5, “Running the Dell Diagnostics.”

If you cannot resolve the problem, see Chapter 10, “Getting Help,” for instructions on obtaining technical assistance.
**Network Cable Requirements**

**NOTICE: To avoid line interference, voice and data lines must be in separate sheaths.**

Observe the following cabling restrictions for 10BASE-T and 100BASE-TX networks:

- For 10BASE-T networks, use Category 3 or Category 5 wiring and connectors.
- For 100BASE-TX networks, use Category 5 wiring and connectors.
- The maximum cable run length (from your system to a concentrator or hub) is 100 meters (m) (328 feet (ft)).
- The maximum number of systems (not counting concentrators or hubs) on a network is 1024.
- For 10BASE-T networks, the maximum number of daisy-chained concentrators or hubs on one network segment is four.

Check with your network administrator for specific information about your network.
CHAPTER 7
Checking Inside the System

This chapter provides troubleshooting procedures for components inside the system. Before you start any of the procedures in this chapter, take the following steps:

- Perform the procedures described in “Checking Connectors and Switches” in Chapter 2.
- Read the safety instructions in “Safety First—For You and Your System” in the next section of this chapter.

You need your system’s User’s Guide to perform the procedures in this chapter.

NOTE: When you see the question “Is the problem resolved?” in a troubleshooting procedure, perform the operation that caused the problem.

Safety First—For You and Your System

The procedures in this guide require that you open the system cover and work inside the system. While working inside the system, do not attempt to service the system except as explained in this guide and elsewhere in Dell documentation. Always follow the instructions closely. See the safety instructions in your Dell PowerEdge System Information document for important safety information.

WARNING FOR YOUR PERSONAL SAFETY AND PROTECTION OF THE EQUIPMENT

Before starting to work on the system, perform the following steps in the sequence listed:

1. Power off and disconnect your system and peripherals from their power sources (unless you are installing or removing a hard-disk drive). Also, disconnect any telephone or telecommunication lines from the system.

2. Ground yourself by touching an unpainted metal surface on the chassis, such as the metal around the card-slot openings at the back of the system, before touching anything inside your system.

3. While you work, periodically touch an unpainted metal surface on the system chassis to dissipate any static electricity that might harm internal components.
In addition, Dell recommends that you periodically review the safety instructions for this system.

**Removing and Replacing the Optional Front Bezel**

You must remove the system's optional front bezel before removing the system from the rack, installing or removing a hard-disk drive, or using the diskette or CD-ROM drive.

**Removing the Optional Front Bezel**

To remove the front bezel, press the retention tab on each end of the bezel and remove the bezel from the chassis (see Figure 7-1).

![Figure 7-1. Removing the Bezel](image)

**Replacing the Optional Front Bezel**

To replace the front bezel, insert the retention tabs on each end of the bezel and press the bezel toward the chassis until it locks into place (see Figure 7-1). Ensure that the bezel is oriented so that its status indicators are positioned just above the Dell nameplate in the center of the bezel.

**Opening the System Cover**

**WARNING:** The power supply in your system may produce high voltages and energy hazards, which can cause bodily harm. Only trained service technicians are authorized to remove the cover and access any of the components inside the system chassis.
The system has a cover that provides access to the system board, memory, installed drives, and expansion cards.

To open the system cover, perform the following steps.

**CAUTION: Observe the precautions in “Safety First—For You and Your System.” Also observe the safety instructions in your System Information document.**

1. Unscrew the captive screw fasteners securing the system to the rack.
2. Slide the system out of the rack.
3. Using a Phillips screwdriver, remove the screw securing the cover to the front panel (Figure 7-2).
4. Slide the top cover back and lift the cover up and off the system chassis.

![Figure 7-2. Opening the System Cover](image)

### Replacing the System Cover

**NOTE:** When sliding the system back into the rack, ensure that none of the internal wiring or cables interferes with the cover.

To replace the cover, perform the following steps:

1. Lower the cover over the system chassis with the hole facing forward (towards the front panel).
2. Engage the notches in the cover into mating fingers on the inside of the chassis.
3. Slide the cover forward until the hole in the cover aligns with a matching hole in the front of the chassis.
4. Secure the cover with the screw you removed when you opened the cover (see Figure 7-2).

Inside the System

In Figure 7-3, the cover is removed to provide an interior view. Figure 7-3 also identifies the drive bays. Use this illustration to locate interior features and components discussed later in this guide.

Figure 7-3. Inside the System

The system board holds the system’s control circuitry and other electronic components. Several hardware options such as the microprocessor and memory are installed directly on the system board.

The expansion card riser board accommodates one full-length peripheral component interconnect (PCI) expansion card and one low-profile PCI card (occupied by the video controller).

The peripheral bays provide space for an integrated 3.5-inch diskette drive and CD-ROM drive, and two 1-inch hard-disk drives. For more information, see Chapter 9, “Installing Drives.”

The power cables leading from the power supply distribute power to the system board and all installed drives.

For drives such as the diskette drive and the CD-ROM drive, an interface connector connects each drive to the system board.
Troubleshooting a Wet System

Liquid spills, splashes, and excessive humidity can cause damage to the system. If an external device (such as an external drive) gets wet, contact the device manufacturer for instructions. If the system gets wet, perform the following steps:

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

   NOTICE: See “Protecting Against Electrostatic Discharge” in the safety instructions in your System Information document.

2. Open the system cover.

3. Let the system dry for at least 24 hours.
   Make sure that it is thoroughly dry before proceeding.

4. Remove all expansion cards installed in the system.
   See “Removing an Expansion Card” in Chapter 8.

5. Close the system cover, reconnect the system to the electrical outlet, and power on the system.
   Does the system have power?
   Yes. Go to step 6.

6. Power off the system, disconnect it from the electrical outlet, open the system cover, and reinstall all expansion cards you removed in step 4.

7. Close the system cover and reconnect the system to the electrical outlet.

8. Run the Dell Diagnostics and test the system.
   Did the tests run successfully?
   Yes. The system is operating properly.
Troubleshooting a Damaged System

If the system was dropped or damaged while being moved, you should check the system to see if it functions properly. If an external device attached to the system is dropped or damaged, contact the manufacturer of the device for instructions or see Chapter 10, “Getting Help,” for information on obtaining technical assistance from Dell.

To troubleshoot a damaged system, perform the following steps:

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

   NOTICE: See “Protecting Against Electrostatic Discharge” in the safety instructions in your System Information document.

2. Open the system cover.

3. Check the expansion-card connections to the riser board and PCI2 connector on the system board.

4. Verify all internal cable and component connections.
   Make sure that all cables are properly connected and that all components are properly seated in their connectors and sockets.

5. Close the system cover and reconnect the system to the electrical outlet.

6. Run the system board tests in the Dell Diagnostics.
   Did the tests run successfully?
   Yes. The system is operating properly.

Troubleshooting the Battery

If an error message indicates a problem with the battery, or if the System Setup program loses the system configuration information when the system is turned off, the battery may be defective.

To troubleshoot the battery, perform the following steps:

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

   NOTICE: See “Protecting Against Electrostatic Discharge” in the safety instructions in your System Information document.

2. Open the system cover.
3. Check the connection of the coin cell battery to the system board.
   See “Replacing the Battery” in Chapter 8, “Installing System Board Options,” for information on gaining access to the battery socket.

4. Is the battery firmly installed in the battery socket on the system board?
   Yes. Go to step 7.
   No. Go to step 6.

5. Reseat the battery in its socket.

6. Close the system cover and reconnect the system to the electrical outlet.
   Is the problem resolved?
   Yes. The battery was loose. You have fixed the problem.
   No. Continue with this procedure.

   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.

7. Repeat steps 1 and 2.

8. Replace the battery.
   Is the problem resolved?
   Yes. The battery’s charge was low. You have fixed the problem.

---

Troubleshooting the Power Supply

The green light-emitting diode (LED) on the control panel (see Figure 2-4) signals the system power status. The LED is normally green when the system is on and running. Replace the power supply as described in the following subsection.

WARNING: The power supply in your system may produce high voltages and energy hazards, which can cause bodily harm. Only trained service technicians are authorized to remove the cover and access any of the components inside the system chassis.
Power Supply Removal and Replacement

To remove a power supply, perform the following steps.

**CAUTION:** Observe the precautions in “Safety First—For You and Your System” presented earlier in this chapter. Also observe the safety instructions in your System Information document.

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

**NOTICE:** See “Protecting Against Electrostatic Discharge” in the safety instructions in your System Information document.

**CAUTION:** Avoid touching the output connectors on the power supply. Wait 10 to 20 seconds after disconnecting the AC power cable from its input receptacle before removing the power supply or coming into contact with its output connectors.

1. Unplug the power cord and all peripheral cables from the back of the system.
2. Remove the system cover.
3. Disconnect the DC power cable from its connector on the system board.
4. Disconnect the DC power cable from the hard-disk drives.
5. Disconnect the DC power cable from the back of the 3.5-inch diskette drive and the CD-ROM drive.
6. Remove the two screws that secure the power supply to the chassis back panel (see Figure 7-4).
7. Lift the power supply out of the chassis.
Figure 7-4. Power Supply Removal

To install a replacement power supply, perform the following steps:

1. Lower the new power supply into the chassis.
   
   Ensure that the power supply is properly seated into its slot in the chassis.

2. Secure the power supply with the two screws removed in step 6 of the previous procedure.

3. Connect the DC power cables to their connectors on the system board, hard-disk drives, and CD-ROM drive.

4. Replace the cover.

5. Connect the AC power cable to the power input receptacle on the back panel of the system.

6. Connect the free end of the AC power cable to an electrical outlet.

7. Connect all peripheral cables to the back of the system.

8. Power on the system and observe the front-panel status indicators for normal operation.
Troubleshooting a Cooling Fan

Five cooling fans are installed in the system chassis. (See Figure 7-5 for fan orientation. Fan 1 is the outermost fan in the fan assembly, located directly behind the CD-ROM drive.) If you observe that one of the cooling fans is not operating or if the Dell Diagnostics software issues a fan-related error message, perform the following steps to replace the faulty fan.

CAUTION: Observe the precautions in “Safety First—For You and Your System” presented earlier in this chapter. Also observe the safety instructions in your System Information document.

NOTICE: See “Protecting Against Electrostatic Discharge” in the safety instructions in your System Information document.

1. Power off the system, including any attached peripherals, and disconnect the AC power cable from its power source.

2. Remove the system cover.

3. Disconnect the cooling fan power cable by pressing the release tab on the power cable connector.

NOTE: Perform the next step only if you are removing fan 1, located behind the CD-ROM drive. If you are replacing any other fan, skip to step 5.

4. If you are removing fan 1, you must remove two screws that secure the fan to its bracket.

5. Lift the fan out of the system chassis (see Figure 7-5).
NOTICE: When installing a new fan, ensure that the airflow arrow on the fan is pointing to the rear of the system. If the fan is installed incorrectly, system components might be damaged due to overheating.

NOTICE: Ensure that the fan’s wiring harness is routed from the side of the fan when the fan is installed. If the fan’s wiring harness is routed from the top or the bottom of the fan, the cover will not close properly and the fan or the wiring harness might be damaged.

6. Press the new fan into its position in the chassis and connect the fan power connector to a vacant fan power connector in the system board (see Figure 7-5). Ensure that the replacement fan is oriented the same way as the original fan.

If you are replacing the fan directly behind the CD-ROM drive, secure the fan with the two screws you removed with the old fan.

7. When reinstalling the fan, be careful to avoid pinching the system interface cables.

8. Replace the cover and reconnect the system to AC power.

9. Power on the system. Do the fans operate properly?

Yes. You have fixed the problem.

Troubleshooting Expansion Cards

If an error message indicates an expansion-card problem or if an expansion card seems to perform incorrectly or not at all, the problem could be a faulty connection, a conflict with software or other hardware, or a faulty expansion card. To troubleshoot expansion cards, perform the following steps:

1. Power off the system, including any attached peripherals and disconnect the AC power cable from its power source.

   NOTICE: See “Protecting Against Electrostatic Discharge” in the safety instructions in your System Information document.

2. Open the system cover.
   See “Opening the System Cover” presented earlier in this chapter.

3. Remove the expansion card.
   See “Removing an Expansion Card” in Chapter 8.

4. If the removed expansion card was installed on the riser board, remove the riser board.
   See “Removing and Replacing the Riser Board” in Chapter 8.

5. If the expansion card uses the riser board, reinstall the riser board.
   See “Removing and Replacing the Riser Board” in Chapter 8.

6. Reinstall the expansion card.
   See “Installing an Expansion Card” in Chapter 8.

7. Close the system cover, reconnect the system to AC power, and power on the system.

   Is the problem resolved?
   Yes. The riser board or expansion card connections were loose. You have fixed the problem.

   No. Go to step 8.

8. Remove all expansion cards from the system.
   See “Removing an Expansion Card” in Chapter 8.

9. Run the system memory test in the Dell Diagnostics.

   Did the test run successfully?
   Yes. Go to step 10.

   No. See Chapter 10, “Getting Help,” for information on obtaining technical assistance.
10. Power off the system, disconnect it from AC power, and open the system cover.

11. Reinstall one of the expansion cards you removed in step 8.

12. Run the system memory test in the Dell Diagnostics.

Did the test run successfully?

Yes. Go to step 13.

No. See Chapter 10, “Getting Help,” for information on obtaining technical assistance.

13. Repeat steps 11 and 12 for the remaining expansion card that you removed in step 8.

Have you reinstalled all of the expansion cards without encountering a test failure?

Yes. You have fixed the problem.

No. See Chapter 10, “Getting Help,” for information on obtaining technical assistance.

**Troubleshooting System Memory**

A system memory problem can be a faulty dual in-line memory module (DIMM) or a faulty system board. If a random-access memory (RAM) error message appears, the system probably has a memory problem.

When you power on or reboot the system, the Caps Lock and Scroll Lock indicators on the keyboard should flash momentarily and then remain off. If the **Num Lock** category in the System Setup program is set to **On**, the Num Lock indicator should flash momentarily and then remain on; otherwise, it should remain off. Abnormal operation of these indicators can result from a defective DIMM.

To troubleshoot system memory, perform the following steps:

1. Power on the system, including any attached peripherals.

   Is there an error message indicating invalid system configuration information after the memory count is completed?

   Yes. Go to step 2.

   No. Go to step 7.
2. Enter the System Setup program to check the system memory setting.


   Does the amount of memory installed match the system memory setting?

   **Yes.** Go to step 8.

   **No.** Go to step 3.

3. Power off the system, including any attached peripherals, and disconnect the power cable from the electrical outlet.

   **NOTICE:** See “Protecting Against Electrostatic Discharge” in the safety instructions in your System Information document.

4. Open the system cover.

5. Reseat the DIMMs in their sockets.

6. Close the system cover, reconnect the system to AC power, and power on the system.

7. Enter the System Setup program and check the system memory again.

   Does the amount of memory installed match the system memory?

   **Yes.** Go to step 8.

   **No.** Go to step 9.

8. Reboot the system, and observe the monitor screen and the Num Lock, Caps Lock, and Scroll Lock indicators on the keyboard.

   Does the monitor screen remain blank, and do the Num Lock, Caps Lock, and Scroll Lock indicators on the keyboard remain on?

   **Yes.** Go to step 9.

   **No.** Go to step 14.

9. Repeat steps 3 and 4.

   **NOTE:** There are multiple configurations for the DIMMs. See “Memory Module Installation Guidelines,” in Chapter 8. The following steps are an example of one configuration.

10. Swap the DIMM in DIMM_0 with one of the same capacity.

11. Close the system cover and reconnect the system to an electrical outlet.
12. Reboot the system, and observe the monitor screen and the indicators on the keyboard.

   Is the problem resolved?
   
   Yes. You have fixed the problem.
   
   No. Go to step 13.

13. Repeat steps 10 through 12 for each DIMM installed.

   Is the problem resolved?
   
   Yes. You have fixed the problem.
   
   No. Go to step 14.

14. Run the system memory test in the Dell Diagnostics.

   Did the test run successfully?
   
   Yes. You have fixed the problem.
   

**Troubleshooting the Video Subsystem**

Troubleshooting video problems involves determining which of the following items is the source of the problem: the monitor, the monitor interface cable, the video memory, or the video logic of the system.

The following procedure troubleshoots problems with the video memory and video logic only. Before you begin, perform the procedure in “Troubleshooting the Monitor” in Chapter 6, “Checking the Equipment,” to determine whether or not the monitor is the source of the problem.

To troubleshoot the video subsystem, run the video tests in the Dell Diagnostics.

   Did the tests run successfully?
   
   Yes. The problem is not related to video hardware. Go to Chapter 4, “Finding Software Solutions.”
   
   No. The integrated video controller is faulty. See Chapter 10, “Getting Help,” for instructions on obtaining technical assistance.
Troubleshooting the System Board

A system board problem can result from a defective system board component, a faulty power supply, or a defective component connected to the system board. If an error message indicates a system board problem, perform the following steps to troubleshoot the problem:

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

NOTICE: See “Protecting Against Electrostatic Discharge” in the safety instructions in your System Information document.

2. Open the system cover.


4. Close the system cover, reconnect the system to AC power, and power on the system.

5. Run the system board tests in the Dell Diagnostics.

Did the tests run successfully?

Yes. Go to step 6.


6. Power off the system and disconnect it from AC power.

7. Reinstall one of the expansion cards that you removed in step 3, repeat step 4, and continue with step 8.

8. Run the system board tests again.

Did the tests run successfully?

Yes. Go to step 9.


9. Repeat steps 6 through 8 for the remaining expansion card that you removed in step 3.

Have you reinstalled all of the expansion cards without a test failure?

Yes. You have fixed the problem.

No. One of the expansion cards is faulty. See Chapter 10, “Getting Help,” for instructions on obtaining technical assistance.
Troubleshooting the Diskette Drive Subsystem

If the monitor displays a system error message indicating a diskette drive problem during execution of either the boot routine or the Dell Diagnostics, the problem may be caused by any of the following conditions:

- An expansion card is interfering with proper drive operations.
- The diskette drive/CD-ROM drive cables are not firmly connected.
- The diskette drive is faulty.
- The system’s power supply is not providing sufficient power for the drives.
- The system’s diskette drive logic is faulty.

To troubleshoot the diskette drive subsystem, perform the following steps:

1. Enter the System Setup program, and verify that the diskette drive setting is configured correctly.
   

2. Run the diskette drive test in the Dell Diagnostics to determine whether the diskette drive subsystem now works correctly.

   Do the tests complete successfully?

   Yes. You have fixed the problem.

   No. Go to step 3.

3. Power off the system, including any attached peripherals, and disconnect the AC power cable from its power source.

4. Open the system cover.

   NOTICE: See “Protecting Against Electrostatic Discharge” in the safety instructions in your System Information document.

5. Remove all expansion cards from the system.

6. Close the system cover, reconnect the system to AC power, and power on the system.

7. Run the diskette drive test in the Dell Diagnostics to determine whether the diskette drive subsystem now works correctly.

   Do the tests complete successfully?

   Yes. An expansion card may be conflicting with the diskette drive logic, or you may have a faulty expansion card. Go to step 8.

   No. The diskette drive subsystem is faulty. See Chapter 10, “Getting Help,” for instructions on obtaining technical assistance.
8. Reinstall one of the expansion cards that you removed in step 5, and repeat steps 6 and 7.

9. Close the system cover, reconnect the system to AC power, and power on the system.

10. Run the diskette drive tests in the Dell Diagnostics to determine whether the diskette drive subsystem now works correctly.

11. Repeat steps 8 through 10 until all expansion cards have been reinstalled or until one of the expansion cards prevents the system from booting from the diagnostics diskette.

12. Has an expansion card prevented the system from booting from the diagnostics diskette?
   - **Yes.** An expansion card is faulty. See Chapter 10, “Getting Help,” for instructions on obtaining technical assistance.
   - **No.** The diskette drive subsystem is faulty. See Chapter 10, “Getting Help,” for instructions on obtaining technical assistance.

**Troubleshooting Hard-Disk Drives**

If you have hard-disk drive problems, perform the following checks:

1. Back up the files on your hard-disk drive.

2. Run the appropriate integrated drive electronics (IDE) hard-disk drive tests as described in Chapter 5, “Running the Dell Diagnostics.”

3. If necessary, see Chapter 10, “Getting Help,” for instructions on obtaining technical assistance.
CHAPTER 8
Installing System Board Options

This section describes how to install the following options:

- Expansion cards
- Memory modules
- Microprocessor

This section also includes instructions for replacing the system battery, if necessary.

Use Figure 8-1 to locate the system board features.

WARNING: Before you perform the procedures in this section, you must power off the system and disconnect it from its AC power source. For more information, see “Safety First—For You and Your System” in Chapter 7 and the safety instructions in the System Information document that came with your system.

Figure 8-1. System Board Features
**Expansion Cards**

Expansion cards are installed on the system’s riser board or the system board right angle connector. The riser board plugs into the PCI2 connector on the system board (see Figure 8-1) and is considered an extension of the system board.

The system board supports two 32-bit, 33-megahertz (MHz), peripheral component interconnect (PCI) expansion-card connectors. The low-profile PCI slot is occupied by the system’s video controller card and only the full-length PCI slot is available for an expansion NIC card.

**Removing an Expansion Card**

To remove an expansion card, perform the following steps.

**CAUTION:** Observe the precautions in “Safety First—For You and Your System” in Chapter 7 and the safety instructions in the System Information document that came with your system.

**NOTICE:** See “Protecting Against Electrostatic Discharge” in the safety instructions in your System Information document.

1. Remove the cover.
2. Remove the two screws securing the PCI retention panel to the chassis back panel (see Figure 8-2).

![Figure 8-2. PCI Retention Panel Removal](image)
3. Disconnect any cables connected to expansion cards through the back-panel openings.

4. Disconnect any internal cables connected to expansion cards.

5. Remove the riser board, together with installed expansion cards, from the system board.

6. Remove the expansion card from its slot on the riser board (see Figure 8-3).

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

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

8. Replace the cover, and then reconnect the system and peripherals to their AC power sources and power them on.

---

**Figure 8-3. Expansion Card Removal**
Installing an Expansion Card

To install an expansion card, perform the following steps.

**CAUTION:** Observe the precautions in “Safety First—For You and Your System” in Chapter 7 and the safety instructions in the System Information document that came with your system.

**NOTICE:** See “Protecting Against Electrostatic Discharge” in the safety instructions in your System Information document.

1. Remove the system cover, if it is not already removed.
2. Prepare the replacement expansion card for installation.
   
   See the documentation that came with the expansion card for information on configuring the card, making internal connections, or otherwise customizing the card for the system.
3. To remove a PCI retention panel (if it is not already removed), remove the two screws securing it to the chassis back panel (see Figure 8-2).
4. Remove the riser board, together with installed expansion cards, from the system board. See “Removing and Replacing the Riser Board” in this chapter.
5. To install the replacement expansion card, insert the card-edge connector firmly into the socket on the riser board.
6. Connect any cables that should be attached to the card.
   
   See the documentation that came with the card for information about cable connections.
7. Install the riser board into the chassis. See “Removing and Replacing the Riser Board” in this chapter.
8. To replace a PCI retention panel, position the tab on the end into its slot and install two screws to secure it to the chassis back panel (see Figure 8-2).
9. Replace the cover, and then reconnect the system and peripherals to their AC power sources and power them on.

Removing and Replacing the Riser Board

To remove the expansion card riser board, perform the following steps:

**CAUTION:** Observe the precautions in “Safety First—For You and Your System” in Chapter 7. Also observe the safety instructions in your System Information document.

1. Remove the system cover if it is not already removed.
2. Grasp the riser firmly and lift it up and out of the chassis (see Figure 8-4).
3. Disconnect any cables connected to the expansion cards.
4. Remove the expansion cards installed on the riser board.

**Memory Modules**

The system is upgradable to 1 GB by installing combinations of 128, 256, and 512 MB ECC unbuffered SDRAM memory modules. You can purchase memory upgrade kits from Dell as needed. See Figure 8-1 to locate the DIMM sockets.

**CAUTION:** Observe the precautions in “Safety First—For You and Your System” in Chapter 7 and the safety instructions in the *System Information* document that came with your system.

**NOTICE:** See “Protecting Against Electrostatic Discharge” in the safety instructions in your *System Information* document.

**Memory Module Installation Guidelines**

Starting with the socket nearest to the system board’s center, the DIMM sockets are labeled “DIMM3” through “DIMM0” (see Figure 8-5). When you install memory modules, follow these guidelines:

- Install a DIMM in socket DIMM3 (the socket toward the center of the board) before socket DIMM2, socket DIMM2 before socket DIMM1, and so on.
  
  The reason for installing memory in the back-most socket first is for ease of future installations.
If you install different sizes of memory modules, install them in order of descending capacity, beginning with the highest-capacity DIMM in socket DIMM3.

You do not need to install memory modules in pairs.

**Figure 8-5. DIMM Sockets**

Table 8-1 illustrates the valid memory configurations based on these guidelines.

**Table 8-1. Sample DIMM Configurations**

<table>
<thead>
<tr>
<th>Total Desired Memory</th>
<th>DIMM3</th>
<th>DIMM2</th>
<th>DIMM1</th>
<th>DIMM0</th>
</tr>
</thead>
<tbody>
<tr>
<td>128 MB</td>
<td>128 MB</td>
<td>none</td>
<td>none</td>
<td>none</td>
</tr>
<tr>
<td>256 MB</td>
<td>256 MB</td>
<td>none</td>
<td>none</td>
<td>none</td>
</tr>
<tr>
<td>512 MB</td>
<td>256 MB</td>
<td>256 MB</td>
<td>none</td>
<td>none</td>
</tr>
<tr>
<td>1 GB</td>
<td>256 MB</td>
<td>256 MB</td>
<td>256 MB</td>
<td>256 MB</td>
</tr>
</tbody>
</table>
Memory Installation and Replacement

To install or replace a memory module on the system board, perform the following steps.

CAUTION: Observe the precautions in “Safety First—For You and Your System” in Chapter 7 and the safety instructions in the System Information document that came with your system.

NOTICE: See “Protecting Against Electrostatic Discharge” in the safety instructions in your System Information document.

1. Power off the system, including any attached peripherals, and disconnect the AC power cable from its power source.
2. Remove the front bezel, if one is present.
3. Remove the cover.
4. Locate the DIMM socket(s) in which you will replace memory modules.
   
   Figure 8-5 shows the location and labeling of the DIMM sockets on the system board.
5. Replace the memory modules as necessary to reach the desired memory total.

When installing a memory module in DIMM3, perform the following steps:

1. Press down and outward on the right-hand ejector (the one nearest the microprocessor/heat-sink assembly). The DIMM socket has two alignment keys that allow the DIMM to be installed in the socket only one way.
2. Press the right-hand corner of the module into the DIMM3 socket (see Figure 8-6).
3. Holding the right-hand corner of the module in place, press down and outward on the left-hand ejector and rotate the left-hand side of the module into position.
4. After you are sure that the module is centered in the socket, press down on the DIMM while pulling up on the ejectors to lock the DIMM into the socket (see Figure 8-7).
After DIMM3 has been installed, install the remaining memory modules using the following procedure:

1. Press down and outward on the ejectors on the DIMM socket to allow the DIMM to be inserted into the socket. (See Figure 8-7).

2. Align the DIMM’s edge connector with the slot in the center of the DIMM socket, and insert the DIMM in the socket (see Figure 8-7).

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

3. Press down on the DIMM with your thumbs while pulling up on the ejectors with your index fingers to lock the DIMM into the socket (see Figure 8-7).

4. When all of the DIMMs are properly seated in the sockets and the ejectors are in the locked position, verify that all of the DIMMs and all of the ejectors are in alignment with one another. Reseat any modules that appear to be out of alignment.

5. Replace the cover, replace the optional front bezel (if one is present), and reconnect the system to the electrical outlet, and power on the system.

   After the system completes the POST routine, it runs a memory test that displays the new memory total, which includes all newly installed memory.

   **NOTE:** If the memory total is incorrect, power off and disconnect the system and peripherals from their AC power sources, open the system cover, and check all the installed memory modules to make sure they are seated properly in their sockets. Ensure that the installed memory modules conform to one of the valid configurations listed in Table 8-1.

6. Press <F2> to enter the System Setup program and check the System Memory setting in the system data box on the System Setup screens. The system should have already changed the value in the System Memory setting to reflect the newly installed memory.
7. If the **System Memory** value is incorrect, one or more of the memory modules may not be installed properly. Repeat steps 1 through 6.

   Carefully examine each DIMM to ensure proper seating in its socket.

8. Run the system memory test in the Dell Diagnostics (see Chapter 5, “Running the Dell Diagnostics” for complete information).

**Figure 8-7. DIMM Installation**

**Memory Module Removal**

To remove a memory module, press down and outward on the ejectors on each end of the socket until the memory module pops out of the socket (see Figure 8-8).

**CAUTION:** Observe the precautions in “Safety First—For You and Your System” in Chapter 7 and the safety instructions in the *System Information* document that came with your system.

**NOTICE:** See “Protecting Against Electrostatic Discharge” in the safety instructions in your *System Information* document.

**NOTES:** This procedure assumes the power is off and you have access to the DIMM slots. See steps 1 through 6 in “Memory Installation and Replacement” for these preliminary steps.

If you encounter difficulty in moving the ejector nearest to the chassis wall, press down on the opposite ejector and lift that end of the DIMM slightly to free the DIMM from its socket.
Replacing the Microprocessor

The microprocessor and heat sink assembly is secured to the system board in a zero-insertion-force (ZIF) socket.

To remove the microprocessor and heat sink assembly, perform the following steps.

CAUTION: Observe the precautions in “Safety First—For You and Your System” in Chapter 7 and the safety instructions in the System Information document that came with your system.

NOTICE: See “Protecting Against Electrostatic Discharge” in the safety instructions in your System Information document.

Removing the Microprocessor and Heat Sink

To remove the microprocessor and heat sink, perform the following steps.

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

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

1. Power off the system, including any attached peripherals, and disconnect the AC power cable from its power source.

2. Remove the front bezel.

3. Remove the system cover.

4. Disconnect the AC power cable and all peripheral cables from the back panel of the system.
5. Release the clip securing the heat sink to the microprocessor socket by first inserting a small flat-tip screwdriver into the upper slot at the front of the socket to release the clamp, and then releasing the clip from the opposite side of the socket.

6. Grasp the end of the ZIF socket arm and bend it out slightly until it disengages from the socket tab.

7. Swing the ZIF arm up to the upright position.

   The microprocessor and heat sink assembly are now unlocked from the ZIF socket.

   **NOTICE:** The microprocessor may adhere to the heat sink assembly because of a layer of thermal grease applied to the top of the microprocessor. When lifting the heat sink away, use care to prevent the microprocessor from separating from the heat sink and falling on system board components.

8. Lift the microprocessor and heat sink assembly away from the ZIF socket (see Figure 8-9).

![Figure 8-9. Microprocessor and Heat Sink Removal](image-url)
Microprocessor and Heat Sink Assembly Replacement

To install the replacement microprocessor and heat sink assembly, see Figure 8-10 and perform the following steps:

1. Remove the microprocessor and heat sink assembly.
2. Gently place the replacement microprocessor into the ZIF socket so that the processor pins mate exactly with the ZIF socket.
   Make certain that pin 1 of the microprocessor is oriented correctly in the socket.

   **CAUTION:** Do not force the processor into the socket. Even slight pressure can bend the microprocessor pins.

3. With the microprocessor in place, swing the ZIF socket arm down until it snaps into the socket tab (see Figure 8-10).

4. At the base of the heat sink, remove and discard any protective cover that may be over the thermal grease by pulling on the cover’s tab.

---

*Figure 8-10. Microprocessor and Heat Sink Replacement*
5. Carefully place the heat sink on the microprocessor. Be careful not to touch the surfaces coated with thermal grease. The beveled surface on the heat sink covers the part of the ZIF socket that is not covered by the microprocessor.

6. Drop the heat sink clip into the heat sink’s center groove, with the end of the clip that has two slots facing the front of the ZIF socket.

7. Gently hold the heat sink in place as you press down on the end of the shorter end of the heat sink clip (the end that has a single slot) until that end snaps into its tab on the back of the ZIF socket.

8. Use your thumb to press down on the front end of the heat sink clip (the end that has two slots) until it snaps into the socket tab.

9. Replace the system cover, install the power cord, and power on the system.

**Replacing the Battery**

The system battery maintains system configuration, date, and time information in a special section of memory when you power off the system. The operating life of the battery ranges from 2 to 5 years, depending on how you use the system (for example, if you keep the system on most of the time, the battery gets little use and thus lasts longer). You may need to replace the battery if an incorrect time or date is displayed during the boot routine along with the following or similar message:

Time-of-day not set -- please run SETUP program
Strike the F1 key to continue, F2 to run the setup utility

or

System CMOS checksum bad -- Run SETUP
Strike the F1 key to continue, F2 to run the setup utility

or

Invalid configuration information -- please run SETUP program
Strike the F1 key to continue, F2 to run the setup utility

To determine if the battery needs replacing, reenter the time and date through the System Setup program. Power off and disconnect the system from the electrical outlet for a few hours, and then reconnect and power the system on again. Enter the System Setup program. If the date and time are not correct in the System Setup program, replace the battery.

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

If the system is turned off for long periods of time (for weeks or months), the NVRAM may lose its system configuration information. This situation is not caused by a defective battery.
You can operate the system without a battery; however, the system configuration information maintained by the battery in NVRAM is erased each time you shut down the system. Therefore, you must reenter the system configuration information and reset the options each time the system boots until you replace the battery.

The battery is a 3.0-volt (V), coin-cell CR2032-type battery. To remove the battery, perform the following steps.

**CAUTION:** Observe the precautions in “Safety First—For You and Your System” in Chapter 7 and the safety instructions in the System Information document that came with your system.

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

1. Enter the System Setup program and, if possible, make a printed copy of the System Setup screens.
   

2. Shut down the system, including any attached peripherals, and disconnect the system from the electrical outlet.

3. Open the system cover.

4. Remove the battery.
   
   Pry the battery out of its socket with your fingers or with a blunt, nonconductive object such as a plastic screwdriver.

5. Install the new battery with the side labeled “+” facing up (see Figure 8-11).

**Figure 8-11. Installing the Battery**
6. Close the system cover, and then reconnect the system and peripherals to their AC power sources and power them on.

7. Enter the System Setup program to confirm that the battery is operating properly.

8. Enter the correct time and date through the System Setup program's time and date settings. Also reenter any system configuration information that is no longer displayed on the System Setup screens, and then exit the System Setup program.

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

10. After an hour, plug in and power on the system and enter the System Setup program. If the time and date are still incorrect, see Chapter 10, “Getting Help,” for instructions on obtaining technical assistance.
CHAPTER 9
Installing Drives

This chapter explains how to remove and install hard-disk drives, diskette drives, and CD-ROM drives.

Hard-Disk Drives

CAUTION: Observe the precautions in “Safety First—For You and Your System” in Chapter 7 and the safety instructions in the System Information document that came with your system.

Figure 9-1 shows the locations of drives that can be installed in the system. Refer to this figure when you perform any of the procedures in the following subsections.

Figure 9-1. Drive Locations

NOTE: When you reinstall a replacement integrated drive electronics (IDE) hard-disk drive, ensure the drive has the identical part number and ensure any jumpers are at the settings you recorded.
Hard-Disk Drive Removal

Each hard-disk drive is mounted in a mounting bracket. The mounting bracket is secured to slots in the chassis front panel and to two snap-in posts at the back of the mounting bracket. To remove a faulty hard-disk drive and its mounting bracket, perform the following steps.

CAUTION: Observe the precautions in “Safety First—For You and Your System” in Chapter 7 and the safety instructions in the System Information document that came with your system.

NOTICE: See “Protecting Against Electrostatic Discharge” in the safety instructions in your System Information document.

1. Shut down the system and disconnect the cables.
2. Remove the bezel.
3. If you have not already done so, remove the system cover.
4. Remove the faulty hard-disk drive by lifting up at the rear of the mounting bracket, and then moving the hard-disk drive and bracket toward the back, still connected to its power and IDE interface cables (see Figure 9-2).
5. Disconnect the power and IDE interface connectors, and set the hard-disk drive and bracket on a nonconductive work surface.

6. Remove the four screws that secure the hard-disk drive to its bracket (see Figure 9-3).
Hard-Disk Drive Installation
To install the replacement hard-disk drive, perform the following steps:

1. Secure the replacement drive to the bracket using the four screws removed earlier (see Figure 9-3).
2. Install the power and IDE interface cable connectors to the back of the drive.
3. Insert the two vertical tabs on the front of the bracket into mating slots in the front panel of the chassis.
4. Press down at the rear of the drive until the bracket snaps into place on its snap-in posts.
5. Replace the system cover.
6. If you removed the front bezel in step 2 of “Hard-Disk Drive Removal,” reinstall it now.
7. Run the Dell Diagnostics (see Chapter 5, “Running the Dell Diagnostics”) to test and prepare the new drive.

Diskette Drive and CD-ROM Drive

CAUTION: Observe the precautions in “Safety First—For You and Your System” in Chapter 7 and the safety instructions in the System Information document that came with your system.
To remove the 3.5-inch diskette drive or the CD-ROM drive, perform the following steps:

1. Remove the cover.
2. Remove the power cables from both the 3.5-inch diskette drive and the CD-ROM drive.
3. Remove the interface cable from the back of the 3.5-inch diskette drive.
4. Remove the three screws securing the 3.5-inch diskette drive bracket and the CD-ROM drive bracket to the floor of the chassis.
5. Lift the 3.5-inch diskette drive and bracket out of the chassis and set it on a smooth, nonconducting work surface (see Figure 9-4).

6. If you are also removing the CD-ROM drive, remove the IDE cable from the back of the CD-ROM drive.
7. If you are also removing the CD-ROM drive, lift the CD-ROM drive and its bracket out of the chassis.
8. Remove the faulty drive (either the 3.5-inch diskette drive or the CD-ROM drive) from its mounting bracket by removing four screws (see Figure 9-4).

To install these drives, reverse the order of the steps.

**Figure 9-4. Diskette Drive and CD-ROM Drive Removal**
This chapter describes the tools Dell provides to help you when you have a problem with your system. It also tells you when and how to call Dell for technical or customer assistance.

**Technical Assistance**

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

1. Complete the troubleshooting checks in Chapter 2, “Checking the Basics.”
2. Run the Dell Diagnostics as described in Chapter 5, “Running the Dell Diagnostics.”
3. Make a copy of the Diagnostics Checklist (found later in this chapter), and fill it out.
4. Use Dell's extensive suite of online services available at Dell’s World Wide Web site (http://support.dell.com) for help with installation and troubleshooting procedures.
   
   For more information, see “World Wide Web” found later in this chapter.
5. If the preceding steps have not resolved the problem, call Dell for technical assistance.

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

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

For instructions on using the technical support service, see “Technical Support Service” and “Before You Call” found later in this chapter.
Help Tools

Dell provides a number of tools to assist you. These tools are described in the following sections.

NOTE: Some of these tools are not always available in all locations outside the continental U.S. Please call your local Dell representative for information on availability.

World Wide Web

The Internet is your most powerful tool for obtaining information about your system and other Dell products. Through the Internet, you can access most of the services described in this section, including AutoTech, TechFax, order status, technical support, and product information.

You can access Dell's support Web site at http://support.dell.com. To select your country, click the map that appears. The Welcome to support.dell.com page opens. Enter your system information to access help tools and information.

Dell can be accessed electronically using the following addresses:

- World Wide Web
  http://www.dell.com/
  http://www.dell.com/ap/ (for Asian/Pacific countries only)
  http://www.euro.dell.com (for Europe only)
  http://www.dell.com/la (for Latin American countries)
- Anonymous file transfer protocol (FTP)
  ftp.dell.com/
  Log in as user: anonymous, and use your e-mail address as your password.
- Electronic Support Service
  support@us.dell.com
  apsupport@dell.com (for Asian/Pacific countries only)
  support.euro.dell.com (for Europe only)
- Electronic Quote Service
  sales@dell.com
  apmarketing@dell.com (for Asian/Pacific countries only)
- Electronic Information Service
  info@dell.com
**AutoTech Service**

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

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

The AutoTech service is available 24 hours a day, seven days a week. You can also access this service through the technical support service. For the telephone number to call, see “Dell Contact Numbers” found later in this chapter.

**TechFax Service**

Dell takes full advantage of fax technology to serve you better. Twenty-four hours a day, seven days a week, you can call the Dell TechFax line toll-free for all kinds of technical information.

Using a touch-tone phone, you can select from a full directory of topics. The technical information you request is sent within minutes to the fax number you designate. For the TechFax telephone number to call, see “Dell Contact Numbers” found later in this chapter.

**Automated Order-Status System**

You can call this automated service to check on the status of any Dell products that you have ordered. A recording prompts you for the information needed to locate and report on your order. For the telephone number to call, see “Dell Contact Numbers” found later in this chapter.

**Technical Support Service**

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

To contact Dell’s technical support service, first see the section titled “Before You Call” and then call the number for your country as listed in “Dell Contact Numbers” found later in this chapter.

**Problems With Your Order**

If you have a problem with your order, such as missing parts, wrong parts, or incorrect billing, contact Dell for customer assistance. Have your invoice or packing slip handy when you call. For the telephone number to call, see “Dell Contact Numbers” found later in this chapter.
Product Information

If you need information about additional products available from Dell, or if you would like to place an order, visit Dell’s World Wide Web site at [http://www.dell.com/](http://www.dell.com/). For the telephone number to call to speak to a sales specialist, see “Dell Contact Numbers” found later in this chapter.

 Returning Items for Warranty Repair or Credit

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

1. Call Dell to obtain an authorization number, and write it clearly and prominently on the outside of the box.
   
   For the telephone number to call, see “Dell Contact Numbers” found later in this chapter.

2. Include a copy of the invoice and a letter describing the reason for the return.

3. Include a copy of the Diagnostics Checklist indicating the tests you have run and any error messages reported by the Dell Diagnostics.

4. Include any accessories that belong with the item(s) being returned (power cables, software diskettes, guides, and so on) if the return is for credit.

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

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

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

Before You Call

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

Remember to fill out the Diagnostics Checklist (Figure 10-1). If possible, turn on your system before you call Dell for technical assistance and call from a telephone at or near the system. 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 system itself. Make sure that the system documentation is available.

WARNING: If you need to remove the system covers, be sure to first disconnect the system’s power and modem cables from all electrical outlets.
## Diagnostics Checklist

<table>
<thead>
<tr>
<th>Name: ____________________________</th>
<th>Date: ____________________________</th>
</tr>
</thead>
<tbody>
<tr>
<td>Address: __________________________</td>
<td>Phone number: _____________________</td>
</tr>
<tr>
<td>Service tag (bar code on the back of the system): ____________________________</td>
<td></td>
</tr>
<tr>
<td>Express Service Code: _____________</td>
<td></td>
</tr>
<tr>
<td>Return Material Authorization Number (if provided by Dell support technician):</td>
<td></td>
</tr>
<tr>
<td>Operating system and version: ________</td>
<td></td>
</tr>
<tr>
<td>Peripherals: ____________________________________________________________________</td>
<td></td>
</tr>
<tr>
<td>Expansion cards: ____________________________________________________________________</td>
<td></td>
</tr>
<tr>
<td>Are you connected to a network?</td>
<td>☐ yes ☐ no</td>
</tr>
<tr>
<td>Network, version, and network card: ____________________________________________________________________</td>
<td></td>
</tr>
<tr>
<td>Programs and versions: ____________________________________________________________________</td>
<td></td>
</tr>
</tbody>
</table>

See your operating system documentation to determine the contents of the system’s start-up files. If the system 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: ____________________________________________________________________
Dell Contact Numbers

When you need to contact Dell, use the telephone numbers, codes, and electronic addresses provided in Table 10-1 and Table 10-2. Table 10-1 provides the various codes required to make long-distance and international calls. Table 10-2 provides local telephone numbers, area codes, toll-free numbers, Web site and e-mail addresses, if applicable, for each department or service available in various countries around the world. If you are making a direct-dialed call to a location outside of your local telephone service area, determine which codes to use (if any) in Table 10-1 in addition to the local numbers provided in Table 10-2. For example, to place an international call from Paris, France to Bracknell, England, dial the international access code for France followed by the country code for the U.K., the city code for Bracknell, and then the local number as shown in the following illustration.

```
00  International Access Code (in France)
```

```
44  Country Code (for U.K.)
```

```
1344  City Code (Bracknell)
```

```
________ Local Number
```

To place a long-distance call within your own country, use area codes instead of international access codes, country codes, and city codes. For example, to call Paris, France from Montpellier, France, dial the area code plus the local number as shown in the following illustration.

```
01  Area Code (for Paris from outside Paris)
```

```
________ Local Number
```

The codes required depend on where you are calling from as well as the destination of your call; in addition, each country has a different dialing protocol. If you need assistance in determining which codes to use, contact a local or an international operator.

**NOTE:** Toll-free numbers are for use only within the country for which they are listed. Area codes are most often used to call long distance within your own country (not internationally)—in other words, when your call originates in the same country you are calling.
<table>
<thead>
<tr>
<th>Country (City)</th>
<th>International Access Code</th>
<th>Country Code</th>
<th>City Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Australia (Sydney)</td>
<td>001</td>
<td>61</td>
<td>2</td>
</tr>
<tr>
<td>Austria (Vienna)</td>
<td>900</td>
<td>43</td>
<td>1</td>
</tr>
<tr>
<td>Belgium (Brussels)</td>
<td>00</td>
<td>32</td>
<td>2</td>
</tr>
<tr>
<td>Brazil</td>
<td>0021</td>
<td>55</td>
<td>51</td>
</tr>
<tr>
<td>Brunei</td>
<td>—</td>
<td>673</td>
<td>—</td>
</tr>
<tr>
<td>Canada (North York, Ontario)</td>
<td>011</td>
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<td>Not required</td>
</tr>
<tr>
<td>Chile (Santiago)</td>
<td>—</td>
<td>56</td>
<td>2</td>
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<td>China (Xiamen)</td>
<td>—</td>
<td>86</td>
<td>592</td>
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<td>Czech Republic (Prague)</td>
<td>00</td>
<td>420</td>
<td>2</td>
</tr>
<tr>
<td>Denmark (Horsholm)</td>
<td>009</td>
<td>45</td>
<td>Not required</td>
</tr>
<tr>
<td>Finland (Helsinki)</td>
<td>990</td>
<td>358</td>
<td>9</td>
</tr>
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<td>France (Paris) (Montpellier)</td>
<td>00</td>
<td>33</td>
<td>(1) (4)</td>
</tr>
<tr>
<td>Germany (Langen)</td>
<td>00</td>
<td>49</td>
<td>6103</td>
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<tr>
<td>Hong Kong</td>
<td>001</td>
<td>852</td>
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<td>1</td>
</tr>
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<td>Italy (Milan)</td>
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<td>39</td>
<td>02</td>
</tr>
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<td>Japan (Kawasaki)</td>
<td>001</td>
<td>81</td>
<td>44</td>
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<td>Macau</td>
<td>—</td>
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<td>Poland (Warsaw)</td>
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<td>Portugal</td>
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<td>Singapore (Singapore)</td>
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### Table 10-1. International Dialing Codes (continued)

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<th>Country Code</th>
<th>City Code</th>
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<tbody>
<tr>
<td>South Africa (Johannesburg)</td>
<td>09/091</td>
<td>27</td>
<td>11</td>
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<tr>
<td>Spain (Madrid)</td>
<td>00</td>
<td>34</td>
<td>91</td>
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<td>Sweden (Upplands Vasby)</td>
<td>009</td>
<td>46</td>
<td>8</td>
</tr>
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<td>Switzerland (Geneva)</td>
<td>00</td>
<td>41</td>
<td>22</td>
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<tr>
<td>Taiwan</td>
<td>002</td>
<td>886</td>
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<td>Thailand</td>
<td>001</td>
<td>66</td>
<td>—</td>
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<td>U.K. (Bracknell)</td>
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<td>011</td>
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### Table 10-2. Dell Contact Numbers

<table>
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<tr>
<th>Country (City)</th>
<th>Department Name or Service</th>
<th>Area Code</th>
<th>Local Number or Toll-Free Number</th>
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</thead>
<tbody>
<tr>
<td><strong>Australia (Sydney)</strong></td>
<td>Home and Small Business</td>
<td></td>
<td>1-300-65-55-33</td>
</tr>
<tr>
<td></td>
<td>Government and Business</td>
<td></td>
<td>toll free: 1-800-633-559</td>
</tr>
<tr>
<td></td>
<td>Preferred Accounts Division (PAD)</td>
<td></td>
<td>toll free: 1-800-060-889</td>
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<tr>
<td></td>
<td>Customer Care</td>
<td></td>
<td>toll free: 1-800-819-339</td>
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<td>Corporate Sales</td>
<td></td>
<td>toll free: 1-800-808-385</td>
</tr>
<tr>
<td></td>
<td>Transaction Sales</td>
<td></td>
<td>toll free: 1-800-808-312</td>
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<tr>
<td></td>
<td>Fax</td>
<td></td>
<td>toll free: 1-800-818-341</td>
</tr>
<tr>
<td><strong>Austria (Vienna)</strong></td>
<td>Home/Small Business Sales</td>
<td>01</td>
<td>795 567602</td>
</tr>
<tr>
<td><strong>NOTE:</strong> Customers in Austria call Germany for technical and customer assistance.</td>
<td>Home/Small Business Fax</td>
<td>01</td>
<td>795 67605</td>
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<td>Home/Small Business Customer Care</td>
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<td>795 67603</td>
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<td>Preferred Accounts/Corporate Customer Care</td>
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<td>8056</td>
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<td>Home/Small Business Technical Support</td>
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</tr>
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<td></td>
<td>E-mail: <a href="mailto:tech_support_central_europe@dell.com">tech_support_central_europe@dell.com</a></td>
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### Table 10-2. Dell Contact Numbers (continued)

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<th>Country (City)</th>
<th>Department Name or Service</th>
<th>Area Code</th>
<th>Local Number or Toll-Free Number</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Belgium</strong> (Brussels)</td>
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<td>02</td>
<td>481 92 88</td>
</tr>
<tr>
<td></td>
<td>Customer Care</td>
<td>02</td>
<td>481 91 19</td>
</tr>
<tr>
<td></td>
<td>Home/Small Business Sales</td>
<td></td>
<td>toll free: 0800 16884</td>
</tr>
<tr>
<td></td>
<td>Corporate Sales</td>
<td>02</td>
<td>481 91 00</td>
</tr>
<tr>
<td></td>
<td>Fax</td>
<td>02</td>
<td>481 91 99</td>
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<tr>
<td></td>
<td>Switchboard</td>
<td>02</td>
<td>481 91 00</td>
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<tr>
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<td></td>
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</tr>
<tr>
<td></td>
<td>E-mail: <a href="mailto:tech_be@dell.com">tech_be@dell.com</a></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Brazil</strong></td>
<td>Customer Support, Technical Support</td>
<td>0800</td>
<td>90 3355</td>
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<tr>
<td></td>
<td>Sales</td>
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<tr>
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<td>633</td>
<td>4966</td>
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<tr>
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<td>633</td>
<td>4949</td>
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<tr>
<td></td>
<td>Transaction Sales (Penang, Malaysia)</td>
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<tr>
<td><strong>Note:</strong> Customers in Brunei call Malaysia for sales, customer, and technical assistance.</td>
<td></td>
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<tr>
<td><strong>Canada</strong> (North York, Ontario)</td>
<td>Automated Order-Status System</td>
<td></td>
<td>toll free: 1-800-433-9014</td>
</tr>
<tr>
<td></td>
<td>AutoTech (Automated technical support)</td>
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<td>toll free: 1-800-247-9362</td>
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<tr>
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<td>Customer Care (From outside Toronto)</td>
<td></td>
<td>toll free: 1-800-387-5759</td>
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<td>416</td>
<td>758-2400</td>
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<td>Customer Technical Support</td>
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<td>toll free: 1-800-847-4096</td>
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<tr>
<td></td>
<td>Sales (Direct Sales—from outside Toronto)</td>
<td></td>
<td>toll free: 1-800-387-5752</td>
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<td></td>
<td>Sales (Direct Sales—from within Toronto)</td>
<td>416</td>
<td>758-2200</td>
</tr>
<tr>
<td></td>
<td>Sales (Federal government, education, and medical)</td>
<td></td>
<td>toll free: 1-800-567-7542</td>
</tr>
<tr>
<td></td>
<td>Sales (Major Accounts)</td>
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<td>toll free: 1-800-950-1329</td>
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### Table 10-2. Dell Contact Numbers (continued)

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<th>Country (City)</th>
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<tr>
<td>Chile (Santiago)</td>
<td>Sales, Customer Support, and Technical Support . . . . . . . .</td>
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<td>toll free: 1230-020-4823</td>
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<td><strong>NOTE:</strong> Customers in Chile call the U.S.A for sales, customer, and technical assistance.</td>
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<td>China (Xiamen)</td>
<td>Technical Support . . . . . . . . . . . . . . . . . . . . . . . . .</td>
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<td>toll free: 800 858 2437</td>
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<tr>
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<tr>
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<tr>
<td></td>
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<td></td>
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<tr>
<td>Denmark (Horsholm)</td>
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<tr>
<td></td>
<td>E-mail: <a href="mailto:den_support@dell.com">den_support@dell.com</a></td>
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## Table 10-2. Dell Contact Numbers (continued)

<table>
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<th>Country (City)</th>
<th>Department Name or Service</th>
<th>Area Code</th>
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<tbody>
<tr>
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<td>.09</td>
<td>253 313 60</td>
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<tr>
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<td>Technical Support Fax</td>
<td>.09</td>
<td>253 313 81</td>
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<td>Relational Customer Care</td>
<td>.09</td>
<td>253 313 38</td>
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<tr>
<td></td>
<td>Home/Small Business Customer Care</td>
<td>.09</td>
<td>693 791 94</td>
</tr>
<tr>
<td></td>
<td>Fax</td>
<td>.09</td>
<td>253 313 99</td>
</tr>
<tr>
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<td>Switchboard</td>
<td>.09</td>
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</tr>
<tr>
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<td>E-mail: <a href="mailto:fin_support@dell.com">fin_support@dell.com</a></td>
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<td></td>
</tr>
<tr>
<td>France (Paris/Montpellier)</td>
<td><strong>Home and Small Business</strong></td>
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</tr>
<tr>
<td></td>
<td>Technical Support</td>
<td>.0825</td>
<td>387 270</td>
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<tr>
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<td>Customer Care</td>
<td>.0825</td>
<td>823 833</td>
</tr>
<tr>
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<td>Switchboard</td>
<td>.0825</td>
<td>004 700</td>
</tr>
<tr>
<td></td>
<td>Switchboard (Alternative)</td>
<td>.04</td>
<td>99 75 40 00</td>
</tr>
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<td>Sales</td>
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<td><strong>Corporate</strong></td>
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<td>Technical Support</td>
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<td>004 719</td>
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<td>.01</td>
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Table 10-2. Dell Contact Numbers (continued)

<table>
<thead>
<tr>
<th>Country (City)</th>
<th>Department Name or Service</th>
<th>Area Code</th>
<th>Local Number or Toll-Free Number</th>
</tr>
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<tbody>
<tr>
<td>Germany (Langen)</td>
<td>Technical Support</td>
<td>06103</td>
<td>766-7200</td>
</tr>
<tr>
<td></td>
<td>Home/Small Business Customer Care</td>
<td>0180-5-224400</td>
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<tr>
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<td>Global Segment Customer Care</td>
<td>06103</td>
<td>766-9570</td>
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<td></td>
<td>Preferred Accounts Customer Care</td>
<td>06103</td>
<td>766-9420</td>
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<td>Large Accounts Customer Care</td>
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<td>766-9560</td>
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<tr>
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<td>Public Accounts Customer Care</td>
<td>06103</td>
<td>766-9555</td>
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<td>766-7000</td>
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<td><a href="mailto:tech_support_central_europe@dell.com">tech_support_central_europe@dell.com</a></td>
</tr>
</tbody>
</table>

**Hong Kong**

*NOTE: Customers in Hong Kong call Malaysia for customer assistance.*

|                | Technical Support          | toll free: | 800 96 4107                     |
|                | Customer Service (Penang, Malaysia) | 633 4949 |
|                | Transaction Sales          | toll free: | 800 96 4109                     |
|                | Corporate Sales            | toll free: | 800 96 4108                     |

**Ireland (Bray)**

|                | Technical Support          | 0870 908 0800 |
|                | Customer Care              | 01 204 4026  |
|                | Sales                      | 01 286 0500  |
|                | SalesFax                   | 01 286 0144  |
|                | Fax                        | 0870 907 5590|
|                | Switchboard                | 01 286 0500  |
|                | Web site:                  |             | [http://support.euro.dell.com](http://support.euro.dell.com) |
|                | E-mail:                    |             | dell_direct_support@dell.com    |
## Table 10-2. Dell Contact Numbers (continued)

<table>
<thead>
<tr>
<th>Country (City)</th>
<th>Department Name or Service</th>
<th>Area Code</th>
<th>Local Number or Toll-Free Number</th>
</tr>
</thead>
</table>
| **Italy**  
(Milan) | Home and Small Business |           |                                  |
|               | Technical Support         | 02        | 577 826 90                       |
|               | Customer Care             | 02        | 696 821 14                       |
|               | Fax                       | 02        | 696 824 13                       |
|               | Switchboard               | 02        | 696 821 12                       |
|               | Web site: [http://support.euro.dell.com](http://support.euro.dell.com) | |                                  |
|               | E-mail: web_it_tech@dell.com |         |                                  |
| **Corporate** | Technical Support         | 02        | 577 826 90                       |
|               | Customer Care             | 02        | 577 825 55                       |
|               | Fax                       | 02        | 575 035 30                       |
|               | Switchboard               | 02        | 577 821                          |
|               | Web site: [http://support.euro.dell.com](http://support.euro.dell.com) | |                                  |
|               | E-mail: web_it_tech@dell.com |         |                                  |
| **Japan**   
(Kawasaki) | Technical Support (Server) |           |                                  |
|               | toll free: 0120-1984-35    |           |                                  |
|               | Technical Support (Dimension™ and Inspiron™) | |                                  |
|               | toll free: 0120-1982-26    |           |                                  |
|               | Technical Support Outside of Japan (Dimension and Inspiron) | |                                  |
|               | 81-44                      | 520-1435  |                                  |
|               | Technical Support (Dell Precision™, OptiPlex™, and Latitude™) | |                                  |
|               | toll free: 0120-1984-33    |           |                                  |
|               | Technical Support Outside of Japan (Dell Precision, OptiPlex, and Latitude) | |                                  |
|               | 81-44                      | 556-3894  |                                  |
|               | Customer Care             | 044       | 556-4240                         |
|               | 24-Hour Automated Order Status Service | |                                  |
|               | Home and Small Business Group Sales | |                                  |
|               | Preferred Accounts Division Sales | |                                  |
|               | Large Corporate Accounts  | 044       | 556-3433                         |
|               | Faxbox Service            | 044       | 556-3490                         |
|               | Switchboard               | 044       | 556-3400                         |
|               | Web site: [http://support.jp.dell.com](http://support.jp.dell.com) | |                                  |
### Table 10-2. Dell Contact Numbers (continued)

<table>
<thead>
<tr>
<th>Country (City)</th>
<th>Department Name or Service</th>
<th>Area Code</th>
<th>Local Number or Toll-Free Number</th>
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<tbody>
<tr>
<td><strong>Korea</strong></td>
<td>Technical Support</td>
<td></td>
<td>toll free: 080-200-3800</td>
</tr>
<tr>
<td>(Seoul)</td>
<td>Sales</td>
<td></td>
<td>toll free: 080-200-3777</td>
</tr>
<tr>
<td></td>
<td>Customer Service (Seoul, Korea)</td>
<td>2194-6220</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Customer Service (Penang, Malaysia)</td>
<td>604-633-4949</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Fax</td>
<td></td>
<td>2194-6202</td>
</tr>
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<td>Switchboard</td>
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<td>2194-6000</td>
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<tr>
<td><strong>Latin America</strong></td>
<td>Customer Technical Support (Austin, Texas, U.S.A.)</td>
<td>512</td>
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<td>Fax (Technical Support and Customer Service) (Austin, Texas, U.S.A.)</td>
<td>512</td>
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<td>Sales (Austin, Texas, U.S.A.)</td>
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<td>SalesFax (Austin, Texas, U.S.A.)</td>
<td>512</td>
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<td>728-3772</td>
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<tr>
<td><strong>Luxembourg</strong></td>
<td>Technical Support (Brussels, Belgium)</td>
<td>02</td>
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<td>Home/Small Business Sales (Brussels, Belgium)</td>
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<td>Customer Care (Brussels, Belgium)</td>
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<tr>
<td><strong>Macau</strong></td>
<td>Technical Support</td>
<td></td>
<td>toll free: 0800 582</td>
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<td>Customer Service (Penang, Malaysia)</td>
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<td>Transaction Sales</td>
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<td><strong>Malaysia</strong></td>
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<td>toll free: 1 800 888 298</td>
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<td>(Penang)</td>
<td>Customer Service</td>
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<td>633 4949</td>
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<td>Transaction Sales</td>
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<td>toll free: 1 800 888 202</td>
</tr>
<tr>
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<td>Corporate Sales</td>
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<td>toll free: 1 800 888 213</td>
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Table 10-2. Dell Contact Numbers (continued)

<table>
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<th>Department Name or Service</th>
<th>Area Code</th>
<th>Local Number or Toll-Free Number</th>
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<td><strong>Mexico</strong></td>
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<td>512</td>
<td>728-0685</td>
</tr>
<tr>
<td></td>
<td>AutoTech (Automated technical support) (Austin, Texas, U.S.A.)</td>
<td>512</td>
<td>728-0686</td>
</tr>
<tr>
<td></td>
<td>Customer Technical Support</td>
<td>525</td>
<td>228-7870</td>
</tr>
<tr>
<td></td>
<td>Sales</td>
<td>525</td>
<td>228-7811</td>
</tr>
<tr>
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<td>Customer Technical Support</td>
<td>525</td>
<td>228-7870</td>
</tr>
<tr>
<td></td>
<td>Main</td>
<td>525</td>
<td>228-7800</td>
</tr>
<tr>
<td><strong>Netherlands</strong> (Amsterdam)</td>
<td>Technical Support</td>
<td>020</td>
<td>581 8838</td>
</tr>
<tr>
<td></td>
<td>Customer Care</td>
<td>020</td>
<td>581 8740</td>
</tr>
<tr>
<td></td>
<td>Home/Small Business Sales</td>
<td></td>
<td>0800-0663</td>
</tr>
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<td></td>
<td>Home/Small Business Sales Fax</td>
<td></td>
<td>682 7171</td>
</tr>
<tr>
<td></td>
<td>Corporate Sales</td>
<td>020</td>
<td>581 8818</td>
</tr>
<tr>
<td></td>
<td>Corporate Sales Fax</td>
<td>020</td>
<td>686 8003</td>
</tr>
<tr>
<td></td>
<td>Fax</td>
<td>020</td>
<td>686 8003</td>
</tr>
<tr>
<td></td>
<td>Switchboard</td>
<td>020</td>
<td>581 8818</td>
</tr>
<tr>
<td></td>
<td>Web site: <a href="http://support.euro.dell.com">http://support.euro.dell.com</a></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>E-mail: <a href="mailto:tech_ni@dell.com">tech_ni@dell.com</a></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>New Zealand</strong></td>
<td>Home and Small Business</td>
<td></td>
<td>0800 446 255</td>
</tr>
<tr>
<td></td>
<td>Government and Business</td>
<td></td>
<td>0800 444 617</td>
</tr>
<tr>
<td></td>
<td>Sales</td>
<td></td>
<td>0800 441 567</td>
</tr>
<tr>
<td></td>
<td>Fax</td>
<td></td>
<td>0800 441 566</td>
</tr>
<tr>
<td><strong>Norway</strong></td>
<td>Technical Support</td>
<td></td>
<td>.671 16882</td>
</tr>
<tr>
<td>(Lysaker)</td>
<td>Relational Customer Care</td>
<td></td>
<td>.671 17514</td>
</tr>
<tr>
<td></td>
<td>Home/Small Business Customer Care</td>
<td></td>
<td>23162298</td>
</tr>
<tr>
<td></td>
<td>Switchboard</td>
<td></td>
<td>671 16800</td>
</tr>
<tr>
<td></td>
<td>Fax Technical Support (Upplands Vasby, Sweden)</td>
<td></td>
<td>590 05 594</td>
</tr>
<tr>
<td></td>
<td>Fax Switchboard</td>
<td></td>
<td>671 16865</td>
</tr>
<tr>
<td></td>
<td>Web site: <a href="http://support.euro.dell.com">http://support.euro.dell.com</a></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>E-mail: <a href="mailto:nor_support@dell.com">nor_support@dell.com</a></td>
<td></td>
<td></td>
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</table>
### Table 10-2. Dell Contact Numbers (continued)

<table>
<thead>
<tr>
<th>Country (City)</th>
<th>Department Name or Service</th>
<th>Area Code</th>
<th>Local Number or Toll-Free Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Poland (Warsaw)</td>
<td>Technical Support</td>
<td>22</td>
<td>57 95 700</td>
</tr>
<tr>
<td></td>
<td>Customer Care</td>
<td>22</td>
<td>57 95 999</td>
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<tr>
<td></td>
<td>Sales</td>
<td>22</td>
<td>57 95 999</td>
</tr>
<tr>
<td></td>
<td>Fax</td>
<td>22</td>
<td>57 95 998</td>
</tr>
<tr>
<td></td>
<td>Switchboard</td>
<td>22</td>
<td>57 95 999</td>
</tr>
<tr>
<td></td>
<td>Web site: <a href="http://support.euro.dell.com">http://support.euro.dell.com</a></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>E-mail: <a href="mailto:pl_support@dell.com">pl_support@dell.com</a></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Portugal</td>
<td>Technical Support</td>
<td>35</td>
<td>800 834 077</td>
</tr>
<tr>
<td></td>
<td>Customer Care</td>
<td>34 or 35</td>
<td>902 118 540 or 800 834 075</td>
</tr>
<tr>
<td></td>
<td>Sales</td>
<td>35</td>
<td>800 834 075</td>
</tr>
<tr>
<td></td>
<td>Fax</td>
<td>35</td>
<td>121 424 01 12</td>
</tr>
<tr>
<td></td>
<td>Switchboard</td>
<td>34</td>
<td>917 229 200</td>
</tr>
<tr>
<td></td>
<td>E-mail: <a href="mailto:es_support@dell.com">es_support@dell.com</a></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Singapore (Singapore)</td>
<td>Technical Support</td>
<td>toll free</td>
<td>800 6011 051</td>
</tr>
<tr>
<td></td>
<td>Customer Service (Penang, Malaysia)</td>
<td>04</td>
<td>633 4949</td>
</tr>
<tr>
<td></td>
<td>Transaction Sales</td>
<td>toll free</td>
<td>800 6011 054</td>
</tr>
<tr>
<td></td>
<td>Corporate Sales</td>
<td>toll free</td>
<td>800 6011 053</td>
</tr>
<tr>
<td>South Africa (Johannesburg)</td>
<td>Technical Support</td>
<td>011</td>
<td>709 7710</td>
</tr>
<tr>
<td></td>
<td>Customer Care</td>
<td>011</td>
<td>709 7707</td>
</tr>
<tr>
<td></td>
<td>Sales</td>
<td>011</td>
<td>709 7700</td>
</tr>
<tr>
<td></td>
<td>Fax</td>
<td>011</td>
<td>706 0495</td>
</tr>
<tr>
<td></td>
<td>Switchboard</td>
<td>011</td>
<td>709 7700</td>
</tr>
<tr>
<td></td>
<td>Web site: <a href="http://support.euro.dell.com">http://support.euro.dell.com</a></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>E-mail: <a href="mailto:dell_za_support@dell.com">dell_za_support@dell.com</a></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
**Table 10-2. Dell Contact Numbers (continued)**

<table>
<thead>
<tr>
<th>Country (City)</th>
<th>Department Name or Service</th>
<th>Area Code</th>
<th>Local Number or Toll-Free Number</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Southeast Asian/Pacific Countries</strong> (excluding Australia, Brunei, China, Hong Kong, Japan, Korea, Macau, Malaysia, New Zealand, Singapore, Taiwan, and Thailand—see individual listings for these countries)</td>
<td>Customer Technical Support, Customer Service, and Sales (Penang, Malaysia)</td>
<td>60 4 633 4810</td>
<td></td>
</tr>
<tr>
<td><strong>Spain</strong> (Madrid)</td>
<td><strong>Home and Small Business</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Technical Support</td>
<td>902 100 130</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Customer Care</td>
<td>902 118 540</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Sales</td>
<td>902 118 541</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Switchboard</td>
<td>902 118 541</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Fax</td>
<td>902 118 539</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Web site: <a href="http://support.euro.dell.com">http://support.euro.dell.com</a></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>E-mail: <a href="mailto:web_esp_tech@dell.com">web_esp_tech@dell.com</a></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Corporate</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Technical Support</td>
<td>902 100 130</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Customer Care</td>
<td>902 118 546</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Switchboard</td>
<td>91 722 92 00</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Fax</td>
<td>91 722 95 83</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Web site: <a href="http://support.euro.dell.com">http://support.euro.dell.com</a></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>E-mail: <a href="mailto:web_esp_tech@dell.com">web_esp_tech@dell.com</a></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Sweden</strong> (Upplands Vasby)</td>
<td>Technical Support</td>
<td>08 590 05 199</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Relational Customer Care</td>
<td>08 590 05 642</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Home/Small Business Customer Care</td>
<td>08 587 70 527</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Fax Technical Support</td>
<td>08 590 05 594</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Sales</td>
<td>08 590 05 185</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Web site: <a href="http://support.euro.dell.com">http://support.euro.dell.com</a></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>E-mail: <a href="mailto:swe_support@dell.com">swe_support@dell.com</a></td>
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### Table 10-2. Dell Contact Numbers (continued)

<table>
<thead>
<tr>
<th>Country (City)</th>
<th>Department Name or Service</th>
<th>Area Code</th>
<th>Local Number or Toll-Free Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Switzerland (Geneva)</td>
<td>Technical Support (Home and Small Business)</td>
<td>.</td>
<td>0844 811 411</td>
</tr>
<tr>
<td></td>
<td>Technical Support (Corporate)</td>
<td>.</td>
<td>0844 822 844</td>
</tr>
<tr>
<td></td>
<td>Customer Care (Home and Small Business)</td>
<td>.</td>
<td>0848 802 202</td>
</tr>
<tr>
<td></td>
<td>Customer Care (Corporate)</td>
<td>.</td>
<td>0848 821 721</td>
</tr>
<tr>
<td></td>
<td>Fax</td>
<td>022</td>
<td>799 01 90</td>
</tr>
<tr>
<td></td>
<td>Switchboard</td>
<td>022</td>
<td>799 01 01</td>
</tr>
<tr>
<td></td>
<td>Web site: <a href="http://support.euro.dell.com">http://support.euro.dell.com</a></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>E-mail: <a href="mailto:swisstech@dell.com">swisstech@dell.com</a></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Taiwan</td>
<td>Technical Support</td>
<td>toll free</td>
<td>0080 60 1255</td>
</tr>
<tr>
<td></td>
<td>Technical Support (servers)</td>
<td>toll free</td>
<td>0080 60 1256</td>
</tr>
<tr>
<td></td>
<td>Transaction Sales</td>
<td>toll free</td>
<td>0080 651 228/0800 33 556</td>
</tr>
<tr>
<td></td>
<td>Corporate Sales</td>
<td>toll free</td>
<td>0080 651 227/0800 33 555</td>
</tr>
<tr>
<td>Thailand</td>
<td>Technical Support</td>
<td>toll free</td>
<td>0880 060 07</td>
</tr>
<tr>
<td></td>
<td>Customer Service (Penang, Malaysia)</td>
<td></td>
<td>633 4949</td>
</tr>
<tr>
<td></td>
<td>Sales</td>
<td>toll free</td>
<td>0880 060 09</td>
</tr>
<tr>
<td></td>
<td>NOTE: Customers in Thailand call Malaysia for customer assistance.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Web site: <a href="http://support.euro.dell.com">http://support.euro.dell.com</a></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>E-mail: <a href="mailto:dell_direct_support@dell.com">dell_direct_support@dell.com</a></td>
<td></td>
<td></td>
</tr>
<tr>
<td>U.K. (Bracknell)</td>
<td>Technical Support</td>
<td>.</td>
<td>0870 908 0500</td>
</tr>
<tr>
<td></td>
<td>(Corporate/Preferred Accounts/PAD [1000+ employees])</td>
<td>.</td>
<td>0870 908 0800</td>
</tr>
<tr>
<td></td>
<td>Technical Support</td>
<td>.</td>
<td>0870 908 0800</td>
</tr>
<tr>
<td></td>
<td>(Direct/PAD and General)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Global Accounts Customer Care</td>
<td>01344</td>
<td>723186</td>
</tr>
<tr>
<td></td>
<td>Corporate Customer Care</td>
<td>01344</td>
<td>723185</td>
</tr>
<tr>
<td></td>
<td>Preferred Accounts (500-5000 employees) Customer Care01344</td>
<td></td>
<td>723196</td>
</tr>
<tr>
<td></td>
<td>Central Government Customer Care</td>
<td>01344</td>
<td>723193</td>
</tr>
<tr>
<td></td>
<td>Local Government Customer Care</td>
<td>01344</td>
<td>723194</td>
</tr>
<tr>
<td></td>
<td>Home/Small Business Sales</td>
<td></td>
<td>0870-907-4000</td>
</tr>
<tr>
<td></td>
<td>Corporate/Public Sector Sales</td>
<td>01344</td>
<td>860456</td>
</tr>
<tr>
<td></td>
<td>Web site: <a href="http://support.euro.dell.com">http://support.euro.dell.com</a></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>E-mail: <a href="mailto:dell_direct_support@dell.com">dell_direct_support@dell.com</a></td>
<td></td>
<td></td>
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</tbody>
</table>
Table 10-2. Dell Contact Numbers (continued)

<table>
<thead>
<tr>
<th>Country (City)</th>
<th>Department Name or Service</th>
<th>Area Code</th>
<th>Local Number or Toll-Free Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>U.S.A. (Austin, Texas)</td>
<td>Automated Order-Status System</td>
<td></td>
<td>toll free: 1-800-433-9014</td>
</tr>
<tr>
<td></td>
<td>AutoTech (for portable and desktop systems)</td>
<td></td>
<td>toll free: 1-800-247-9362</td>
</tr>
<tr>
<td></td>
<td>Customer Service (Credit Return Authorization Numbers)</td>
<td></td>
<td>toll free: 1-800-624-9897</td>
</tr>
<tr>
<td><strong>National Accounts</strong> (systems purchased by established Dell national accounts [have your account number handy], medical institutions, or value-added resellers [VARs]):</td>
<td>Customer Service and Technical Support (Return Material Authorization Numbers)</td>
<td></td>
<td>toll free: 1-800-822-8965</td>
</tr>
<tr>
<td><strong>Public Americas International</strong> (systems purchased by governmental agencies [local, state, or federal] or educational institutions):</td>
<td>Customer Service and Technical Support (Return Material Authorization Numbers)</td>
<td></td>
<td>toll free: 1-800-234-1490</td>
</tr>
<tr>
<td></td>
<td>Dell Sales</td>
<td></td>
<td>toll free: 1-800-289-3355</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>toll free: 1-800-879-3355</td>
</tr>
<tr>
<td></td>
<td>Spare Parts Sales</td>
<td></td>
<td>toll free: 1-800-357-3355</td>
</tr>
<tr>
<td></td>
<td>DellWare™</td>
<td></td>
<td>toll free: 1-800-753-7201</td>
</tr>
<tr>
<td></td>
<td>Desktop and Portable Fee-Based Technical Support</td>
<td></td>
<td>toll free: 1-800-433-9005</td>
</tr>
<tr>
<td></td>
<td>Server Fee-Based Technical Support</td>
<td></td>
<td>toll free: 1-800-967-0765</td>
</tr>
<tr>
<td></td>
<td>Sales (Catalogs)</td>
<td></td>
<td>toll free: 1-800-426-5150</td>
</tr>
<tr>
<td></td>
<td>Fax</td>
<td></td>
<td>toll free: 1-800-727-8320</td>
</tr>
<tr>
<td></td>
<td>TechFax</td>
<td></td>
<td>toll free: 1-800-950-1329</td>
</tr>
<tr>
<td></td>
<td>Dell Services for the Deaf, Hard-of-Hearing, or Speech-Impaired</td>
<td></td>
<td>toll free: 1-877-DELLTTY (1-877-335-5889)</td>
</tr>
<tr>
<td></td>
<td>Switchboard</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
This section provides specific information about the jumpers on the system board. It also provides some basic information on jumpers and switches and describes the connectors and sockets on the various boards in the system.

**Jumpers—A General Explanation**

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

**Jumpers**

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

**Figure A-1. Jumper**

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

A jumper is referred to as open or unjumpered when the plug is pushed down over only one pin or if there is no plug at all. When the plug is pushed down over two pins, the jumper is referred to as jumpered. The jumper setting is often shown in text as two numbers, such as 1-2. The number 1 is printed on the circuit board so that you can identify each pin number based on the location of pin 1.
Figure A-2 shows the location and default settings of the jumper blocks on the system board. See Table A-1 for the designations, default settings, and functions of the system’s jumpers.

**System Board Jumpers**

Figure A-2 shows the location of the configuration jumpers on the system board. Table A-1 lists the function of these jumpers.

![System Board Jumpers Diagram](image)

**Table A-1. System-Board Jumper Settings**

<table>
<thead>
<tr>
<th>Jumper</th>
<th>Setting</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOS CONFIG</td>
<td>(default)</td>
<td>Normal setting (on pins 1 and 2)</td>
</tr>
<tr>
<td></td>
<td>1 3</td>
<td>Recovery position (CMOS clear) (on pins 2 and 3)</td>
</tr>
<tr>
<td>PASSWORD CLEAR</td>
<td>(default)</td>
<td>The password feature is enabled.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>The password clear feature has cleared the password.</td>
</tr>
</tbody>
</table>

jumpered [ ] unjumpered [ ]

*NOTE: For the full name of an abbreviation or acronym used in this table, see “Abbreviations and Acronyms.”*
System Board Connectors

Table A-2 lists the connectors and sockets located on the system board.

Table A-2. System Board Connectors and Sockets

<table>
<thead>
<tr>
<th>Connector or Socket</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>BATTERY</td>
<td>Battery socket</td>
</tr>
<tr>
<td>DIMM n</td>
<td>DIMM sockets</td>
</tr>
<tr>
<td>FAN n</td>
<td>Power connectors for the fans</td>
</tr>
<tr>
<td>FLOPPY</td>
<td>Diskette drive interface connector</td>
</tr>
<tr>
<td>FRONT PANEL</td>
<td>Front panel connector</td>
</tr>
<tr>
<td>HD FLOPPY</td>
<td>High-density diskette drive connector</td>
</tr>
<tr>
<td>IDE SEC</td>
<td>Secondary IDE connector</td>
</tr>
<tr>
<td>IDE PRI</td>
<td>Primary IDE connector</td>
</tr>
<tr>
<td>J6</td>
<td>Ethernet connector</td>
</tr>
<tr>
<td>J7</td>
<td>USB connectors</td>
</tr>
<tr>
<td>J20, J13</td>
<td>Riser board sockets</td>
</tr>
<tr>
<td>KYB/MSE</td>
<td>Keyboard and Mouse connectors (stacked connector)</td>
</tr>
<tr>
<td>POWER CONN</td>
<td>Power connector</td>
</tr>
<tr>
<td>SER A</td>
<td>Serial port connector; sometimes referred to as COM1</td>
</tr>
<tr>
<td>U15</td>
<td>Microprocessor zero-insertion-force socket</td>
</tr>
</tbody>
</table>

Disabling a Forgotten Password

The system’s software security features include a system password and a setup password, which are discussed in detail in “Using the System Setup Program” in the User’s Guide. A password jumper on the system board enables these password features or disables them and clears any password(s) currently in use.

To disable a forgotten system password or setup password, perform the following steps.

NOTICE: See “Protecting Against Electrostatic Discharge” in the safety instructions in your System Information document.

1. Shut down and power off your system. Then disconnect the system and peripherals from their electrical outlets.

2. Remove the system cover.
3. Locate the password jumper (labeled PASSWORD CLEAR) on the system board (see Figure A-2).

4. Place a jumper plug on the PASSWORD CLEAR jumper.

5. Replace the system cover, and then reconnect the system to an electrical outlet and power on.

   The system password is cleared. Do not set a new system password at this time.

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

6. Repeat steps 1, 2, and 3.

7. Remove the jumper plug from the PASSWORD CLEAR jumper.

8. Replace the system cover, and then reconnect the system and peripherals to their electrical outlets and power them on.

9. Assign a new supervisor and/or user password.

   To assign a new supervisor password using the System Setup program, see “Assigning a Supervisor Password” in the *User’s Guide*. To assign a new user password using the System Setup program, see “Assigning a User Password” in the *User’s Guide*. 
Abbreviations and Acronyms

The following list defines or identifies technical terms, abbreviations, and acronyms used in Dell user documents.

A
ampere(s)

AC
alternating current

ACPI
Advanced Configuration and Power Interface

ADC
analog-to-digital converter

ADI
Autodesk Device Interface

AI
artificial intelligence

ANSI
American National Standards Institute

APIC
Advanced Peripheral Interrupt Controller

ASCII
American Standard Code for Information Interchange

ASIC
application-specific integrated circuit

BASIC
Beginner’s All-Purpose Symbolic Instruction Code

BBS
bulletin board service

BIOS
basic input/output system

bpi
bits per inch

bps
bits per second

BTU
British thermal unit

C
Celsius

CCFT
cold cathode fluorescent tube

CD
compact disc

CD-ROM
compact disc read-only memory

CGA
color graphics adapter

cm
centimeter(s)

CMOS
complementary metal-oxide semiconductor

C.O.D.
collect on delivery
**cpi**
characters per inch

**cpl**
characters per line

**CPU**
central processing unit

**DAC**
digital-to-analog converter

**DASH**
Dell Advanced SCSI Host

**DAT**
digital audio tape

**dB**
decibel(s)

**dBA**
adjusted decibel(s)

**DC**
direct current

**DIMM**
dual in-line memory module

**DIN**
Deutsche Industrie Norm

**DIP**
dual in-line package

**DMA**
direct memory access

**DOC**
Department of Communications (in Canada)

**dpi**
dots per inch

**DRAC**
Dell OpenManage Remote Assistant Card

**DRAM**
dynamic random-access memory

**DS/DD**
double-sided double-density

**DS/HD**
double-sided high-density

**DSA**
Dell SCSI Array

**ECC**
error checking and correction

**EDO**
extended-data out

**EGA**
enhanced graphics adapter

**EIDE**
enhanced integrated drive electronics

**EMI**
electromagnetic interference

**EMM**
expanded memory manager

**EMS**
Expanded Memory Specification

**EPP**
Enhanced Parallel Port

**EPROM**
erasable programmable read-only memory

**ESD**
electrostatic discharge

**ESDI**
enhanced small-device interface

**ESM**
embedded server management

**F**
Fahrenheit

**FAT**
file allocation table

**FCC**
Federal Communications Commission
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<tr>
<td><strong>FIFO</strong></td>
<td>first-in first-out</td>
</tr>
<tr>
<td><strong>ft</strong></td>
<td>feet</td>
</tr>
<tr>
<td><strong>g</strong></td>
<td>gram(s)</td>
</tr>
<tr>
<td><strong>G</strong></td>
<td>gravities</td>
</tr>
<tr>
<td><strong>GB</strong></td>
<td>gigabyte(s)</td>
</tr>
<tr>
<td><strong>GUI</strong></td>
<td>graphical user interface</td>
</tr>
<tr>
<td><strong>h</strong></td>
<td>hexadecimal</td>
</tr>
<tr>
<td><strong>HIP</strong></td>
<td>Hardware Instrumentation Package</td>
</tr>
<tr>
<td><strong>HMA</strong></td>
<td>high memory area</td>
</tr>
<tr>
<td><strong>HPFS</strong></td>
<td>High Performance File System</td>
</tr>
<tr>
<td><strong>Hz</strong></td>
<td>hertz</td>
</tr>
<tr>
<td><strong>I/O</strong></td>
<td>input/output</td>
</tr>
<tr>
<td><strong>ICBM</strong></td>
<td>inter-chassis management bus</td>
</tr>
<tr>
<td><strong>ID</strong></td>
<td>identification</td>
</tr>
<tr>
<td><strong>IDE</strong></td>
<td>integrated drive electronics</td>
</tr>
<tr>
<td><strong>IRQ</strong></td>
<td>interrupt request</td>
</tr>
<tr>
<td><strong>ISA</strong></td>
<td>Industry-Standard Architecture</td>
</tr>
<tr>
<td><strong>JEIDA</strong></td>
<td>Japanese Electronic Industry Development Association</td>
</tr>
<tr>
<td><strong>K</strong></td>
<td>kilo- (1024)</td>
</tr>
<tr>
<td><strong>KB</strong></td>
<td>kilobyte(s)</td>
</tr>
<tr>
<td><strong>KB/sec</strong></td>
<td>kilobyte(s) per second</td>
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<tr>
<td><strong>Kb</strong></td>
<td>kilobit(s)</td>
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<tr>
<td><strong>Kbps</strong></td>
<td>kilobit(s) per second</td>
</tr>
<tr>
<td><strong>kg</strong></td>
<td>kilogram(s)</td>
</tr>
<tr>
<td><strong>kHz</strong></td>
<td>kilohertz</td>
</tr>
<tr>
<td><strong>LAN</strong></td>
<td>local area network</td>
</tr>
<tr>
<td><strong>lb</strong></td>
<td>pound(s)</td>
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<tr>
<td><strong>LCD</strong></td>
<td>liquid crystal display</td>
</tr>
<tr>
<td><strong>LED</strong></td>
<td>light-emitting diode</td>
</tr>
<tr>
<td><strong>LIF</strong></td>
<td>low insertion force</td>
</tr>
<tr>
<td><strong>LN</strong></td>
<td>load number</td>
</tr>
<tr>
<td><strong>lpi</strong></td>
<td>lines per inch</td>
</tr>
<tr>
<td><strong>LVD</strong></td>
<td>low voltage differential</td>
</tr>
<tr>
<td><strong>m</strong></td>
<td>meter(s)</td>
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<tr>
<td><strong>mA</strong></td>
<td>milliampere(s)</td>
</tr>
<tr>
<td><strong>mAh</strong></td>
<td>milliampere-hour(s)</td>
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<td>Abbreviation</td>
<td>Description</td>
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<td>--------------</td>
<td>-------------</td>
</tr>
<tr>
<td>MB</td>
<td>megabyte(s)</td>
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<tr>
<td>Mb</td>
<td>megabit(s)</td>
</tr>
<tr>
<td>Mbps</td>
<td>megabit(s) per second</td>
</tr>
<tr>
<td>MBR</td>
<td>master boot record</td>
</tr>
<tr>
<td>MDA</td>
<td>monochrome display adapter</td>
</tr>
<tr>
<td>MGA</td>
<td>monochrome graphics adapter</td>
</tr>
<tr>
<td>MHz</td>
<td>megahertz</td>
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<td>mm</td>
<td>millimeter(s)</td>
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<tr>
<td>ms</td>
<td>millisecond(s)</td>
</tr>
<tr>
<td>MTBF</td>
<td>mean time between failures</td>
</tr>
<tr>
<td>mV</td>
<td>millivolt(s)</td>
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<tr>
<td>NIC</td>
<td>network interface controller</td>
</tr>
<tr>
<td>NiCad</td>
<td>nickel cadmium</td>
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<tr>
<td>NiMH</td>
<td>nickel-metal hydride</td>
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<tr>
<td>NMI</td>
<td>nonmaskable interrupt</td>
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<tr>
<td>NNM</td>
<td>Network Node Manager</td>
</tr>
<tr>
<td>ns</td>
<td>nanosecond(s)</td>
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<tr>
<td>NTFS</td>
<td>NT File System</td>
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<tr>
<td>NVRAM</td>
<td>nonvolatile random-access memory</td>
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<tr>
<td>OTP</td>
<td>one-time programmable</td>
</tr>
<tr>
<td>PAL</td>
<td>programmable array logic</td>
</tr>
<tr>
<td>PCI</td>
<td>Peripheral Component Interconnect</td>
</tr>
<tr>
<td>PCMCIA</td>
<td>Personal Computer Memory Card International Association</td>
</tr>
<tr>
<td>PGA</td>
<td>pin grid array</td>
</tr>
<tr>
<td>POST</td>
<td>power-on self-test</td>
</tr>
<tr>
<td>ppm</td>
<td>pages per minute</td>
</tr>
<tr>
<td>PQFP</td>
<td>plastic quad flat pack</td>
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<tr>
<td>PSDB</td>
<td>power-supply distribution board</td>
</tr>
<tr>
<td>PS/2</td>
<td>Personal System/2</td>
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<tr>
<td>PVC</td>
<td>polyvinyl chloride</td>
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<tr>
<td>QIC</td>
<td>quarter-inch cartridge</td>
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<tr>
<td>RAID</td>
<td>redundant arrays of independent disks</td>
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<tr>
<td>RAM</td>
<td>random-access memory</td>
</tr>
<tr>
<td>RAMDAC</td>
<td>random-access memory digital-to-analog converter</td>
</tr>
<tr>
<td>RCU</td>
<td>Resource Configuration Utility</td>
</tr>
<tr>
<td>Abbreviation</td>
<td>Description</td>
</tr>
<tr>
<td>--------------</td>
<td>-------------</td>
</tr>
<tr>
<td>REN</td>
<td>ringer equivalence number</td>
</tr>
<tr>
<td>RFI</td>
<td>radio frequency interference</td>
</tr>
<tr>
<td>RGB</td>
<td>red/green/blue</td>
</tr>
<tr>
<td>ROM</td>
<td>read-only memory</td>
</tr>
<tr>
<td>rpm</td>
<td>revolutions per minute</td>
</tr>
<tr>
<td>RTC</td>
<td>real-time clock</td>
</tr>
<tr>
<td>SCA</td>
<td>Single Controller Architecture</td>
</tr>
<tr>
<td>SCSI</td>
<td>small computer systems interface</td>
</tr>
<tr>
<td>SDS</td>
<td>Scalable Disk System</td>
</tr>
<tr>
<td>sec</td>
<td>second(s)</td>
</tr>
<tr>
<td>SEC</td>
<td>single-edge contact</td>
</tr>
<tr>
<td>SDRAM</td>
<td>synchronous dynamic random-access memory</td>
</tr>
<tr>
<td>SIMM</td>
<td>single in-line memory module</td>
</tr>
<tr>
<td>SMB</td>
<td>server management bus</td>
</tr>
<tr>
<td>SNMP</td>
<td>Simple Network Management Protocol</td>
</tr>
<tr>
<td>SRAM</td>
<td>static random-access memory</td>
</tr>
<tr>
<td>SSU</td>
<td>system setup utility</td>
</tr>
<tr>
<td>SVGA</td>
<td>super video graphics array</td>
</tr>
<tr>
<td>TFT</td>
<td>thin film transistor</td>
</tr>
<tr>
<td>tpi</td>
<td>tracks per inch</td>
</tr>
<tr>
<td>TSR</td>
<td>terminate-and-stay-resident</td>
</tr>
<tr>
<td>UMB</td>
<td>upper memory block</td>
</tr>
<tr>
<td>UPS</td>
<td>uninterruptible power supply</td>
</tr>
<tr>
<td>USOC</td>
<td>Universal Service Ordering Code</td>
</tr>
<tr>
<td>V</td>
<td>volt(s)</td>
</tr>
<tr>
<td>VAC</td>
<td>volt(s) alternating current</td>
</tr>
<tr>
<td>VDC</td>
<td>volt(s) direct current</td>
</tr>
<tr>
<td>VESA®</td>
<td>Video Electronics Standards Association</td>
</tr>
<tr>
<td>VGA</td>
<td>video graphics array</td>
</tr>
<tr>
<td>VLSI</td>
<td>very-large-scale integration</td>
</tr>
<tr>
<td>VRAM</td>
<td>video random-access memory</td>
</tr>
<tr>
<td>W</td>
<td>watt(s)</td>
</tr>
<tr>
<td>WH</td>
<td>watt-hour(s)</td>
</tr>
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</table>
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**XMM**
extended memory manager

**XMS**
eXtended Memory Specification

Z

**ZIF**
zero insertion force
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**Postscript Imaging and Printing Specs**

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<tr>
<td>PREPARED BY:</td>
<td>Gloria Salinas</td>
</tr>
<tr>
<td>CONTACT:</td>
<td>Cathy Brown 512-723-9330</td>
</tr>
<tr>
<td>EMAIL ADDRESS:</td>
<td><a href="mailto:cathy_brown@dell.com">cathy_brown@dell.com</a></td>
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<tr>
<td>VENDOR:</td>
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| COMPUTER SOURCE:         | Dell PC                                                                                |
| APPLICATION SOFTWARE:    | FrameMaker Version 5.5.2                                                               |
| POSTSCRIPT FILES:        | Yes                                                                                    |
| POSTSCRIPT DRIVER USED:  | Scitex Dolev400 PSM L2                                                                  |
| COLOR SEPARATED FILES:   | English: No Languages: No                                                               |
| COMPRESSED & TESTED:     | Yes                                                                                    |
| PAGE SIZE:               | 7.5 x 9 inches                                                                         |
| PAGE ORIENTATION:        | Portrait                                                                               |
| LINE SCREEN:             | 133 lpi                                                                                |
| TRANSPORT MEDIA:         | FTP                                                                                   |
| HALFTONES/SCREENS/       | No                                                                                    |
| DUOTONES:                | No                                                                                    |
| COLOR(S):                | Cover - Black, PMS 130CV, PMS 286CV                                                    |
|                         | Text - Black                                                                          |
| COLOR MARKUP PROVIDED:   | No                                                                                    |

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**TOTAL PAGE COUNT:** 120

**SPECIAL INSTRUCTIONS:** Add blank pages needed to complete signatures.