Dell™ PowerEdge™ 1400 Systems

# USER'S GUIDE

# *Safety Instructions*

Use the following safety guidelines to ensure your own personal safety and to help protect your server, storage system, or appliance from potential damage.

## *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.**

## *Safety Caution and Warnings*

Observe the following caution and warnings while servicing this 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.**

# *Additional Safety Precautions*

To reduce the risk of bodily injury, electrical shock, fire, and damage to the equipment, observe the following precautions.

## *General Precautions*

Observe the following general precautions for using and working with your system:

- Observe and follow service markings. Do not service any Dell product except as explained in your Dell system documentation. Opening or removing covers that are marked with the triangular symbol with a lightning bolt may expose you to electrical shock. Components inside these compartments should be serviced only by a Dell authorized service technician.

- If any of the following conditions occur, unplug the product from the electrical outlet and replace the part or contact your Dell authorized service provider:

  — The power cable, extension cable, or plug is damaged.

  — An object has fallen into the product.

  — The product has been exposed to water.

  — The product has been dropped or damaged.

  — The product does not operate correctly when you follow the operating instructions.

- Keep your system components away from radiators and heat sources. Also, do not block cooling vents.

- Do not spill food or liquids on your system components, and never operate the product in a wet environment. If the computer gets wet, see the appropriate chapter in your troubleshooting guide or contact a Dell-authorized service provider.

- Do not push any objects into the openings of your system components. Doing so can cause fire or electric shock by shorting out interior components.

- Use the product only with Dell products or other Dell-approved equipment.

- Allow the product to cool before removing covers or touching internal components.

- Use the correct external power source. Operate the product only from the type of power source indicated on the electrical ratings label. If you are not sure of the type of power source required, consult your Dell service provider or local power company.

- To help avoid damaging your system components, be sure the voltage selection switch (if provided) on the power supply is set to match the power available at your location:

  — 115 volts (V)/60 hertz (Hz) in most of North and South America and some Far Eastern countries such as South Korea and Taiwan

— 100 V/50 Hz in eastern Japan and 100 V/60 Hz in western Japan

— 230 V/50 Hz in most of Europe, the Middle East, and the Far East

Also be sure that your monitor and attached devices are electrically rated to operate with the power available in your location.

- Use only approved power cable(s). If you have not been provided with a power cable for your server, storage system, or appliance, or for any AC-powered option intended for your system, purchase a power cable that is approved for use in your country. The power cable must be rated for the product and for the voltage and current marked on the product's electrical ratings label. The voltage and current rating of the cable should be greater than the ratings marked on the product.

- To help prevent electric shock, plug the system/components and peripheral power cables into properly grounded electrical outlets. These cables are equipped with three-prong plugs to help ensure proper grounding. Do not use adapter plugs or remove the grounding prong from a cable. If you must use an extension cable, use a three-wire cable with properly grounded plugs.

- Observe extension cable and power strip ratings. Make sure that the total ampere rating of all products plugged into the extension cable or power strip does not exceed 80 percent of the extension cable or power strip ampere ratings limit.

- To help protect your system/components from sudden, transient increases and decreases in electrical power, use a surge suppressor, line conditioner, or uninterruptible power supply (UPS).

- Position system cables and power cables carefully; route system cables and the power cable and plug so that they cannot be stepped on or tripped over. Be sure that nothing rests on your system components' cables or power cable.

- Do not modify power cables or plugs. Consult a licensed electrician or your power company for site modifications. Always follow your local/national wiring rules.

- To help avoid possible damage to the system board, wait 5 seconds after turning off the system before removing a component from the system board or disconnecting a peripheral device from the computer.

- Handle batteries carefully. Do not disassemble, crush, puncture, short external contacts, dispose of in fire or water, or expose batteries to temperatures higher than 60 degrees Celsius (140 degrees Fahrenheit). Do not attempt to open or service batteries; replace batteries only with batteries designated for the product.

- Turn down the volume before using headphones or other audio devices.

## *Precautions for Servers, Storage Systems, and Appliances*

Observe the following additional safety guidelines for your system:

- Unless your installation and/or troubleshooting documentation specifically allows it, do not remove enclosure covers, attempt to override the safety interlocks, or access any components inside the system. Depending on your system, installation and repairs may be done only by individuals who are qualified to service your

computer or storage system equipment and trained to deal with products capable of producing hazardous energy levels.

- When connecting or disconnecting power to hot-pluggable power supplies, if offered with your Dell product, observe the following guidelines:

  — Install the power supply before connecting the power cable to the power supply.

  — Unplug the power cable before removing the power supply.

  — If the system has multiple sources of power, disconnect power from the system by unplugging *all* power cables from the power supplies.

- Move products with care; ensure that all casters and/or stabilizers are firmly connected to the computer or storage system. Avoid sudden stops and uneven surfaces.

## *Precautions for Rack-Mountable Products*

Observe the following precautions for rack stability and safety. Also refer to the rack installation documentation accompanying the system and the rack for specific warning and/or caution statements and procedures.

Servers, storage systems, and appliances are considered to be components in a rack. Thus, "component" refers to any server, storage system, or appliance, as well as to various peripherals or supporting hardware.

**WARNING: Installing Dell system components in a Dell rack without the front and side stabilizers installed could cause the rack to tip over, potentially resulting in bodily injury under certain circumstances. Therefore, always install the stabilizers before installing components in the rack.**

**After installing system/components in a rack, never pull more than one component out of the rack on its slide assemblies at one time. The weight of more than one extended component could cause the rack to tip over and injure someone.**

*NOTE: Dell's servers, storage systems, and appliances are certified as components for use in Dell's rack cabinet using the Dell customer rack kit. The final installation of Dell systems and rack kits in any other brand of rack cabinet has not been approved by any safety agencies. It is the customer's responsibility to have the final combination of Dell systems and rack kits for use in other brands of rack cabinets evaluated for suitability by a certified safety agency.*

- System rack kits are intended to be installed in a Dell rack by trained service technicians. If you install the kit in any other rack, be sure that the rack meets the specifications of a Dell rack.

- Do not move large racks by yourself. Due to the height and weight of the rack, Dell recommends a minimum of two people to accomplish this task.

- Before working on the rack, make sure that the stabilizers are secure to the rack, extend to the floor, and that the full weight of the rack rests on the floor. Install front and side stabilizers on a single rack or front stabilizers for joined multiple racks before working on the rack.

- Always load the rack from the bottom up, and load the heaviest item in the rack first.

- Make sure that the rack is level and stable before extending a component from the rack.

- Use caution when pressing the component rail release latches and sliding a component into or out of a rack; the slide rails can pinch your fingers.

- After a component is inserted into the rack, carefully extend the rail into a locking position, and then slide the component into the rack.

- Do not overload the AC supply branch circuit that provides power to the rack. The total rack load should not exceed 80 percent of the branch circuit rating.

- Ensure that proper airflow is provided to components in the rack.

- Do not step on or stand on any system/component when servicing other systems/components in a rack.

## Precautions for Products With Modems, Telecommunications, or Local Area Network Options

Observe the following guidelines when working with options:

- Do not connect or use a modem or telephone during a lightning storm. There may be a risk of electrical shock from lightning.

- Never connect or use a modem or telephone in a wet environment.

- Do not plug a modem or telephone cable into the network interface controller (NIC) receptacle.

- Disconnect the modem cable before opening a product enclosure, touching or installing internal components, or touching an uninsulated modem cable or jack.

- Do not use a telephone line to report a gas leak while you are in the vicinity of the leak.

## Precautions for Products With Laser Devices

Observe the following precautions for laser devices:

- Do not open any panels, operate controls, make adjustments, or perform procedures on a laser device other than those specified in the product's documentation.

- Only authorized service technicians should repair laser devices.

# When Working Inside Your Computer

Before you remove the computer covers, perform the following steps in the sequence indicated.

**CAUTION: Some Dell systems can be serviced only by trained service technicians because of high voltages and energy hazards. Do not attempt to service the computer system yourself, except as explained in this guide and elsewhere in Dell documentation. Always follow installation and service instructions closely.**

**NOTICE: To help avoid possible damage to the system board, wait 5 seconds after turning off the system before removing a component from the system board or disconnecting a peripheral device from the computer.**

1. Turn off your computer and any devices.

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 computer, before touching anything inside your computer.

   While you work, periodically touch an unpainted metal surface on the computer chassis to dissipate any static electricity that might harm internal components.

3. Disconnect your computer and devices from their power sources. Also, disconnect any telephone or telecommunication lines from the computer.

   Doing so reduces the potential for personal injury or shock.

In addition, take note of these safety guidelines when appropriate:

- When you disconnect a cable, pull on its connector or on its strain-relief loop, not on the cable itself. Some cables have a connector with locking tabs; if you are disconnecting this type of cable, press in on the locking tabs before disconnecting the cable. As you pull connectors apart, keep them evenly aligned to avoid bending any connector pins. Also, before you connect a cable, make sure that both connectors are correctly oriented and aligned.

- Handle components and cards with care. Don't touch the components or contacts on a card. Hold a card by its edges or by its metal mounting bracket. Hold a component such as a microprocessor chip by its edges, not by its pins.

**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.**

# Protecting Against Electrostatic Discharge

Static electricity can harm delicate components inside your computer. To prevent static damage, discharge static electricity from your body before you touch any of your computer's electronic components, such as the microprocessor. You can do so by touching an unpainted metal surface on the computer chassis.

As you continue to work inside the computer, periodically touch an unpainted metal surface to remove any static charge your body may have accumulated.

You can also take the following steps to prevent damage from electrostatic discharge (ESD):

- When unpacking a static-sensitive component from its shipping carton, do not remove the component from the antistatic packing material until you are ready to install the component in your computer. Just before unwrapping the antistatic packaging, be sure to discharge static electricity from your body.

- When transporting a sensitive component, first place it in an antistatic container or packaging.

- Handle all sensitive components in a static-safe area. If possible, use antistatic floor pads and workbench pads.

The following notice may appear throughout this document to remind you of these precautions:

**NOTICE: See "Protecting Against Electrostatic Discharge" in the safety instructions at the front of this guide.**

# *Ergonomic Computing Habits*

**CAUTION: Improper or prolonged keyboard use may result in injury.**

**CAUTION: Viewing the monitor screen for extended periods of time may result in eye strain.**

For comfort and efficiency, observe the following ergonomic guidelines when you set up and use your computer system:

- Position your system so that the monitor and keyboard are directly in front of you as you work. Special shelves are available (from Dell and other sources) to help you correctly position your keyboard.

- Set the monitor at a comfortable viewing distance (usually 510 to 610 millimeters [20 to 24 inches] from your eyes).

- Make sure that the monitor screen is at eye level or slightly lower when you sit in front of the monitor.

- Adjust the tilt of the monitor, its contrast and brightness settings, and the lighting around you (such as overhead lights, desk lamps, and the curtains or blinds on nearby windows) to minimize reflections and glare on the monitor screen.

- Use a chair that provides good lower back support.

- Keep your forearms horizontal with your wrists in a neutral, comfortable position while you use the keyboard or mouse.

- Always leave space to rest your hands while you use the keyboard or mouse.

- Let your upper arms hang naturally at your sides.

- Sit erect, with your feet resting on the floor and your thighs level.

- When sitting, make sure the weight of your legs is on your feet and not on the front of your chair seat. Adjust your chair's height or use a footrest, if necessary, to maintain proper posture.

- Vary your work activities. Try to organize your work so that you do not have to type for extended periods of time. When you stop typing, try to do things that use both hands.
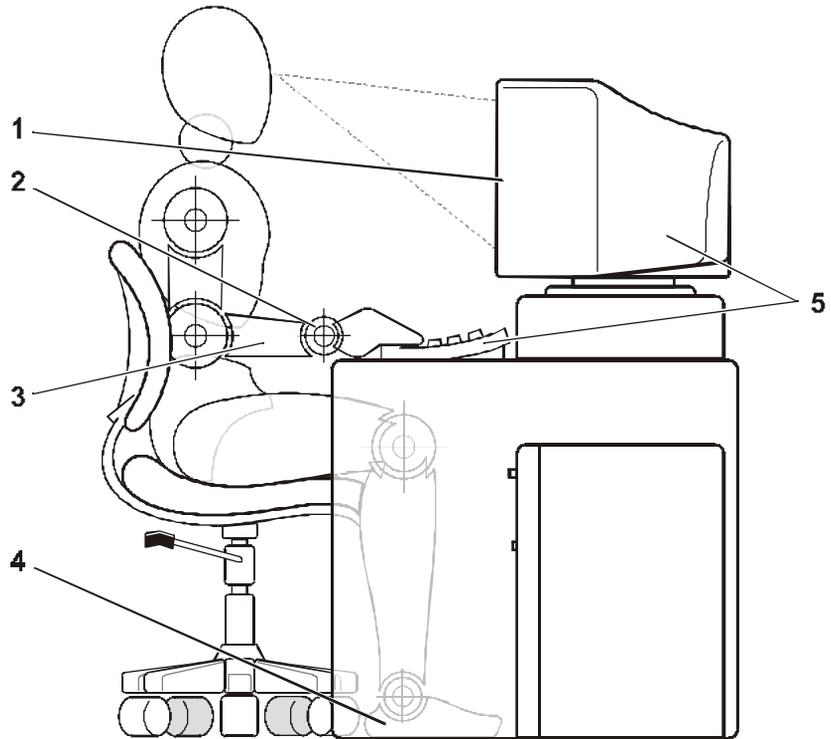


| **1** | Monitor screen at or below eye level |
|---|---|
| **2** | Wrists relaxed and flat |
| **3** | Arms at desk level |
| **4** | Feet flat on the floor |
| **5** | Monitor and keyboard positioned directly in front of user |

# *Preface*

## *About This Guide*

This guide is intended for anyone who uses the Dell PowerEdge 1400 computer system. The guide can be used by both first-time and experienced computer users who want to learn about the features and operation of the systems or who want to upgrade their systems. The files in this guide are summarized as follows:

- Everyone should read Chapter 1, "Introduction," for an overview of the system features, a description of the controls and indicators on the front panel, and a general discussion of connecting external devices to the back panel of the system.

- Users who want to use the utilities, the diagnostics, or the online documentation, or who want to install drivers for their operating system, should read Chapter 2, "Using the Dell OpenManage Server Assistant CD".

- Everyone should read the first few sections of Chapter 3, "Installing and Configuring SCSI Drivers," to find out which small computer system interface (SCSI) device drivers (if any) are required for a particular system configuration. Users who need to install and configure particular SCSI device drivers should then read the appropriate section for their operating system.

- Everyone should read the first several sections of Chapter 4, "Using the System Setup Program," to become familiar with this important program. Only users who want to make configuration changes to their system or who want to use the password features need to read the rest of "Using the System Setup Program."

- Appendix A, "Technical Specifications," summarizes this system's technical specifications.

- Appendix B, "I/O Ports and Connectors," provides specific information about the ports and connectors on the back panel.

- Appendix C, "Regulatory Notices," is for users who are interested in which regulatory agencies have tested and approved your system.

- Appendix D, "Limited Warranty and Return Policy," describes the warranty and return policy for Dell systems. It also provides information about year 2000 compliance of Dell-branded hardware products.

- The "Glossary," provides definitions of terms, acronyms, and abbreviations used in this guide.

# Limited Warranty and Return Policy Information

Dell Computer Corporation ("Dell") manufactures its hardware products from parts and components that are new or equivalent to new in accordance with industry-standard practices. For information about the Dell limited warranty for your system, see Appendix D, "Limited Warranty and Return Policy,"

# Other Documents You May Need

Besides this *User's Guide*, the following documentation is included with your system:

- The *Installation and Troubleshooting Guide* provides instructions for installing system hardware and includes troubleshooting and diagnostic procedures for testing your computer system.

- The *Dell OpenManage Agent* documentation describes the server management software, including alert messages issued by the software.

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

*NOTE: Information updates are sometimes included with your system to describe changes to your system or software. Always read these updates **before** consulting any other documentation because the updates often contain the latest information.*

- Operating system documentation is included if you ordered your operating system software from Dell. This documentation describes how to install (if necessary), configure, and use your operating system software.

- Documentation is included with any options you purchase separately from your system. This documentation includes information that you need to configure and install these options in your Dell computer. Installation instructions for the options are included in this *User's Guide*.

- Technical information files—sometimes called "readme" files—may be installed on your hard-disk drive to provide last-minute updates about technical changes to your system or advanced technical reference material intended for experienced users or technicians.

# 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.**

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

# *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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# C H A P T E R 1
# *Introduction*

Dell™ PowerEdge™ 1400 systems are high-speed, upgradable servers designed around Intel® Pentium® III microprocessors. This document describes the major hardware and software features of the system. It also provides information about the indicators and controls on the computer's front panel and discusses connecting external devices to the computer.

## *System Features*

The system offers the following features:

- One or two Intel Pentium III microprocessor(s).

- Front side bus (FSB) with an external bus speed of 133 MHz.

- A secondary cache of 256 kilobytes (KB) of static random-access memory (SRAM). The secondary cache also provides error checking and correction (ECC) capability.

- Support for symmetric multiprocessing (SMP) when a second Pentium III microprocessor is installed. SMP greatly improves overall system performance by dividing microprocessor operations among the independent microprocessors. To take advantage of this feature, you must use an operating system that supports multiprocessing, Microsoft® Windows NT® Server 4.0, Windows 2000 Server, Novell® NetWare® 5.1, Red Hat Linux 6.2 Release SBE2 (and later versions), or Microsoft BackOffice® Small Business Server (SBS) 4.5 (and later versions).

   *NOTES: If you decide to upgrade your system by installing a second microprocessor, you must order the microprocessor upgrade kit from Dell. Not all versions of the Pentium III microprocessor will work properly as additional microprocessors. The upgrade kit from Dell contains the correct version of the microprocessor for use as a second microprocessor.*

   *The second microprocessor must have the same internal operating frequency as the first.*

- System memory that can be increased incrementally up to 2 gigabytes (GB) using registered dynamic random-access memory (DRAM) dual in-line memory modules (DIMMs). The memory subsystem also provides ECC capability, which corrects all single-bit memory errors and detects all multibit errors.

- A modular computer chassis with a minimum number of screws for easy disas-
sembly and improved serviceability.

The system board includes the following integrated features:

- Four 64-bit and two 32-bit peripheral component interconnect (PCI) expansion
slots.

- A high-speed, high-resolution ATI RAGE XL PCI video controller with 4 MB of syn-
chronous dynamic random-access memory (SDRAM).

- Integrated server management circuitry that monitors operation of the system
fans as well as critical system voltages and temperatures. The integrated server
management circuitry works in conjunction with the Dell OpenManage™ Server
Agent.

- A diskette drive interface, which supports a 3.5-inch diskette drive.

- An enhanced integrated drive electronics (EIDE) controller that supports an EIDE
CD-ROM drive.

- Ultra3 small computer system interface (SCSI) support via an integrated dual
channel controller, which provides support for up to four high-performance SCSI
hard-disk drives.

- Two high-performance serial ports and one bidirectional parallel port for connect-
ing external devices.

- An integrated Intel PRO/100+ network interface controller (NIC), which provides
an Ethernet interface.

- A Personal System/2 (PS/2)-style keyboard port, dual Universal Serial Bus (USB)
ports, and a PS/2-compatible mouse port.

**CAUTION: Do not attach a USB device or a combination of USB devices that draw a maximum current over 500 milliamperes (mA) per channel or +5 volts (V). Attaching devices that exceed this threshold may cause the USB ports to shut down. See the documentation that accompanied the USB devices for their maximum current ratings.**

The following software is included with your system:

- SCSI device drivers that allow your operating system to communicate with
devices attached to the built-in SCSI subsystem. For more information on these
drivers, see Chapter 3, "Installing and Configuring SCSI Drivers," in this guide.

- The System Setup program for quickly viewing and changing the system configu-
ration information for your system. For more information on this program, see
Chapter 4, "Using the System Setup Program," in this guide.

- Enhanced security features, including a user password and a supervisor pass-
word, available through the System Setup program.

- Diagnostics for evaluating your system's components and devices. For information
on using the system diagnostics, see Chapter 2, "Using the Dell OpenManage
Server Assistant CD," in this guide or "Running the Dell Diagnostics," in your
*Installation and Troubleshooting Guide*.

## Supported Operating Systems

Dell supports the following network operating systems for use on PowerEdge 1400 systems:

- Windows NT Server 4.0 and Windows 2000 Server

- NetWare 5.1 (and later versions)

- Red Hat Linux 6.2 release SBE2 (and later versions)

- Microsoft BackOffice Small Business Server (SBS) 4.5 (and later versions)

# Front Panel

The computer's front panel contains the following indicators and controls
(see Figure 1-1):

- The *power button* provides control of the system's alternating current (AC) input power. The push-button switch operates as follows:

  — When the computer is turned off, pressing the button turns the computer on.

  — When the computer is turned on, pressing the button turns the computer off. However, a low-voltage (standby) current is maintained by the power supply. To completely remove all power from the system, unplug the AC power cable from its source.

*NOTE: A Display Power Management Signaling (DPMS) monitor does not begin warming up until the computer to which it is attached is turned on. Thus, some DPMS monitors may not display a video image until several seconds after you turn on the computer.*

- The *power indicator* light is green during normal system operation and amber when the computer is in sleep mode.

- The *hard-disk drive access indicator* lights up when a hard-disk drive is in use. (Drive access indicators for diskette drives and tape drives are located on the front of the drives.)

- The *reset button* reboots (restarts) the system without your having to turn the power off and then on again. Rebooting the system in this manner reduces stress on system components.

reset button

power button

power indicator

hard-disk drive
access indicator

chassis cover
release button
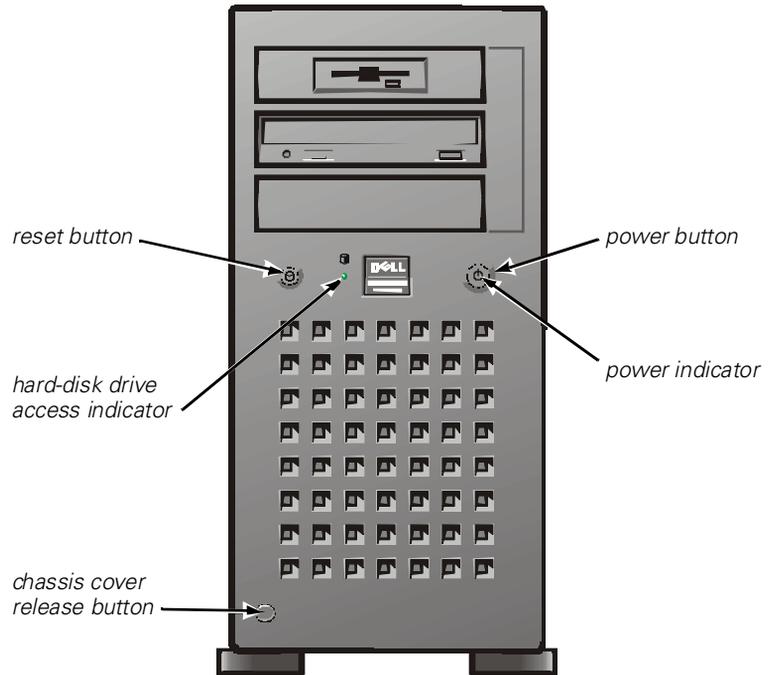
*Figure 1-1.  Front Panel*

# Back Panel

The computer's back panel contains various ports and connectors for attaching exter-
nal devices and includes a security cable slot. Figure 1-2 shows the back-panel
connections on the computer.

*power receptacle*
*serial port 2 connector*
*parallel port connector*
*serial port 1 connector*
*mouse connector*
*keyboard connector*
*USB connectors*
*video connector*
*NIC connector*
*expansion slots (6)*
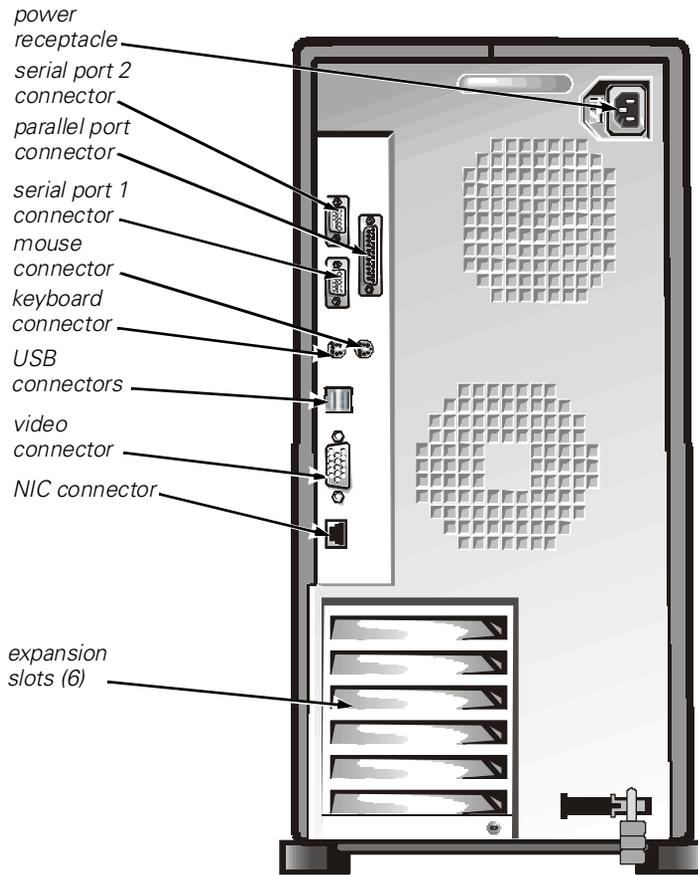
### Figure 1-2. Back-Panel Features

For information about enabling, disabling, or configuring input/output (I/O) ports and connectors, see Chapter 4, "Using the System Setup Program," in this guide. For detailed descriptions and illustrations of each port and connector on the back panel, see Appendix B, "I/O Ports and Connectors," in this guide.

## Connecting External Devices

You can connect various external devices, such as a mouse and printer, to the I/O ports and connectors on the computer's back panel. The server's basic input/output system (BIOS) detects the presence of most external devices when you boot or reboot the system. When connecting external devices to the computer, follow these guidelines:

• Check the documentation that accompanied the device for specific installation and configuration instructions.

For example, most devices must be connected to a particular I/O port or connector to operate properly. Also, external devices like a mouse or printer usually

require you to load software files called *device drivers* into system memory before they will work.

These software drivers help the computer recognize the external device and direct its operation.

- Dell recommends that you attach external devices *only while the computer is turned off* unless you are instructed otherwise in the documentation for the particular device. Then turn the computer on before turning on any external devices unless the documentation for the device specifies otherwise. (If the computer does not seem to recognize the device, try turning on the device before turning on the computer.)

⚠️ **CAUTION: When disconnecting external devices from the back of the computer, wait 5 seconds after disconnecting the computer from AC power before you disconnect the device to avoid possible damage to the system board.**

# *Power Protection Devices*

A number of devices are available that protect your system against power problems such as power surges, transients, and power failures. The following subsections describe some of these devices.

## *Surge Protectors*

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

## *Line Conditioners*

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

## *Uninterruptible Power Supplies*

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

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

## *Getting Help*

If at any time you don't understand a procedure described in this guide or if the system does not perform as expected, Dell provides a number of tools to help you. For more information on these help tools, see "Getting Help" in your *Installation and Troubleshooting Guide*.

# C H A P T E R 2
# *Using the Dell OpenManage Server Assistant CD*

The *Dell OpenManage Server Assistant* CD contains utilities, diagnostics, drivers, and other items that can help you configure your system to best meet your needs. Some of the functions available on the *Dell OpenManage Server Assistant* CD are also available on a bootable utility partition that is installed on your hard-disk drive. This chapter describes how to use the *Dell OpenManage Server Assistant* CD. It also describes the utility partition and its options and provides instructions for reinstalling the partition (if necessary).

## Starting the Dell OpenManage Server Assistant CD

The Dell OpenManage Server Assistant application program has two modes of operation: a *setup mode* for setting up and configuring your system, creating diskettes, and viewing information, and a *service mode* for creating diskettes and viewing information. Documentation is available on the *Dell Online Documentation* CD.

In both setup mode and service mode, the **Dell OpenManage Server Assistant** main screen gives you the option to choose one of the supported languages as the language for the screen text. You can choose a language at any time from the main screen.

### Setup Mode

To set up your system, as well as access the utilities, drivers, and other items available on the *Dell OpenManage Server Assistant* CD, insert the *Dell OpenManage Server Assistant* CD into your CD-ROM drive, and turn on or reboot the system. The **Dell OpenManage Server Assistant** main page appears.

If the CD does not boot, verify that the **Boot Sequence** is set to **IDE CD-ROM** in the System Setup program.

### Service Mode

You can create system diskettes and view information on any system that has Microsoft Internet Explorer 4.0 (or later). When you insert the CD in a system that

uses the Microsoft Windows NT or Windows 2000 Server operating system, the system automatically starts the browser software and displays the **Dell OpenManage Server Assistant** main page.

## Navigating the CD

The *Dell OpenManage Server Assistant* CD utilizes a standard Web browser interface. Navigating the CD is accomplished by clicking the mouse on the various icons and text hyperlinks.

Click the **Back** icon to return to the previous screen. Click the **Exit** icon to exit the program. Exiting the program causes the system to reboot to the standard operating-system boot partition.

## Setting Up Your Server

If you purchase a system that does not have an operating system preinstalled by Dell, or if you reinstall an operating system at a later date, you should use the **Server Setup** option to configure your system or install your operating system.

### Server Setup Mode

Dell recommends using the Server Setup program for most situations including installing and reinstalling an operating system. The *Dell OpenManage Server Assistant* CD guides you through the operating system setup and configuration process. If a Dell redundant array of independent disks (RAID) controller is installed, the Dell RAID utility configures the drives. If the drive does not have a utility partition, one is created. The program prompts you to select the operating system used on the drive and leads you through a step-by-step process to install the operating system.

To start the Server Setup program, perform the following steps:

1. Click the **SETUP** icon at the top of the screen.

2. Click **Server Setup**.

After you start the Server Setup program, follow the directions on the screen to complete the installation and configuration process. The Server Setup program takes you through the following tasks:

- Configuring your RAID controller (if applicable)

- Entering operating system and hard-disk drive information

- Entering operating system configuration

- Installing an operating system

# Utility Partition

The utility partition is a bootable partition on the hard-disk drive that provides some of the functions available on the *Dell OpenManage Server Assistant* CD. Most of the application programs found on the CD are contained in the utility partition. When implemented, the partition boots and provides an executable environment for the partition's utilities. When the utility partition is not booted, it is designated as a non–MS-DOS® partition.

*NOTE: The utility partition provides only limited MS-DOS functionality and cannot be used as a general-purpose MS-DOS partition.*

To start the utility partition, turn on or reboot the system. During the power-on self-test (POST), the following message appears:

```
<F10> = Utility Mode
```

The utility partition provides a text-based interface from which you can run the partition's utilities. To select a menu option, you can either use the arrow keys to highlight the option and press <Enter>, or type the number of the menu option. To exit the utility partition, press <Esc> from the **Main Menu**. Exiting the utility from setup mode causes the system to reboot to the standard operating-system boot partition.

Table 2-1 provides a sample list and explanation of the options that appear on the utility partition menu even when the *Dell OpenManage Server Assistant* CD is not in the CD-ROM drive. The options displayed on your system may vary depending on the configuration.

*NOTE: Although most options are available from both the Dell OpenManage Server Assistant CD and the utility partition, some options or features are available only from the CD.*

**Table 2-1.  Utility Partition Main Menu Options**

| Option | Description |
| --- | --- |
| Run Dell System Diagnostics | Runs the system hardware diagnostics. |
| Run RAID Configuration Utility | Runs the RAID controller configuration utility if a RAID controller card is installed. |

*NOTE: The options displayed on your system are dependent on your system configuration and may not include all of those listed here. For the full name of an abbreviation or acronym used in this table, see the Glossary.*

## Running the System Diagnostics

You can run the system diagnostics from the utility partition, but not from the *Dell OpenManage Server Assistant* CD. From the **Utility Partition** menu, select **Run Dell System Diagnostics**. To run the diagnostics from a set of diskettes, create diagnostics diskettes from the *Dell OpenManage Server Assistant* CD.

The system hardware diagnostics are described in "Running the Dell Diagnostics" in your *Installation and Troubleshooting Guide*.

# Asset Tag Utility

The Asset Tag utility allows you to enter an asset tag number for your system.

*NOTE: The Asset Tag utility works only on systems running MS-DOS.*

## Using the Asset Tag Utility

To create the Asset Tag utility diskette and boot the system, perform the following steps:

1.  If you have not already done so, create a bootable *Asset Tag Utilities with CD-ROM* diskette from the *Dell OpenManage Server Assistant* CD using the **Create Diskettes** option.

2.  Insert the diskette into the diskette drive and reboot the system.

*NOTE: The Asset Tag utility diskette contains CD-ROM drivers that provide access to the CD-ROM drive when you boot from the diskette.*

After you boot the system with the Asset Tag utility diskette, you can use the Asset Tag utility to enter an asset tag number that you or your organization assigns to the system. You can also use the Asset Tag utility to reenter the system's service tag number if that becomes necessary.

## Assigning and Deleting an Asset Tag Number

An asset tag number can have up to ten characters; any combination of characters, excluding spaces, is valid.

To assign or change an asset tag number, perform the following steps:

1.  Perform the steps in "Using the Asset Tag Utility."

2.  Type asset and a space followed by the new number.

    For example, type the following command:

    asset 1234567890

3.  Press <Enter>.

4.  When you are prompted to verify the asset tag number, type y and press <Enter>.

    The system then displays the new or modified asset tag number and the service tag number.

To delete the asset tag number without assigning a new one, type asset /d and press <Enter>.

Table 2-2 lists the command-line options you can use with the Asset Tag utility. To use one of these options, type `asset` and a space followed by the option.

*Table 2-2. Asset Tag Command-Line Options*

| Asset Tag Option | Description |
| --- | --- |
| /d | Deletes the asset tag number |
| /? | Displays the Asset Tag utility help screen |

# C H A P T E R  3
# *Installing and Configuring SCSI Drivers*

This section describes how to install and configure the Dell small computer system interface (SCSI) device drivers included with your Dell PowerEdge 1400 computer system. These device drivers are designed to work with the Adaptec AIC-7899 Ultra3 SCSI controller on the system board.

*NOTE: Use these procedures only if you did not use Server Setup from the Dell OpenManage Server Assistant CD to install your operating system.*

If you are using an optional Dell RAID controller, see your controller documentation for information on installing your SCSI device drivers.

For instructions on installing SCSI hardware devices such as hard-disk drives, tape drives, or CD-ROM drives, see, "Installing Drives" in your *Installation and Trouble-shooting Guide*. After the SCSI devices are installed, install and configure any SCSI device drivers to enable them to communicate with your operating system.

SCSI device drivers are provided for the following operating systems:

- Microsoft Windows NT Server 4.0

- Novell NetWare 5.1

- Red Hat Linux version 6.2 release SBE2 (and later versions)

- Microsoft Windows 2000 Server

See Chapter 2, "Using the Dell OpenManage Server Assistant CD," for instructions on installing your operating system. For instructions on configuring the SCSI device drivers, see the following sections.

## *Dell-Installed Operating Systems*

If the Windows NT Server 4.0, BackOffice Small Business Server (SBS), NetWare 5.1, Windows 2000 Server, or Red Hat Linux 6.2 release SBE2 (or later versions) operating system was installed by Dell, all of the SCSI drivers required by your system are preinstalled. You do not need to use the procedures in this chapter unless you need to reinstall the drivers at a later date.

# Driver Installation for Windows NT 4.0

This section provides information about installing the Dell drivers for the Microsoft Windows NT 4.0 operating system.

*NOTE: Use these procedures only if you did not use Server Setup from the Dell Open-Manage Server Assistant CD to install your operating system.*

## Installing the CD-ROM Driver

To install the IDE CD-ROM driver, perform the following steps:

1.  Boot from the *Microsoft Windows NT Server* CD, and press <F6> when the first **Windows NT Setup** screen appears.

    This action disables automatic detection of devices.

2.  Load the IDE CD-ROM driver.

    Type s to select the **Other** option. Insert the driver diskette into drive A, and select **IDE-CD-ROM ATAPI 1.2 PCI IDE Controller** from the list of drivers.

3.  Press <Enter> and continue with the setup.

## Installing SCSI Drivers

This section provides the information that you need to install and use the Dell SCSI drivers for the 78*xx* series of SCSI controllers with Windows NT.

The Windows NT 4.0 driver diskette that you create for the Microsoft Windows NT Server operating system contains the files that you need for driver installation. The **scsi** subdirectory on the diskette contains the following files to be used with Windows NT:

*   **adpu160m.sys** — Adaptec's 7899 Ultra3 driver for Windows NT
*   **oemsetup.inf** — A file used by Windows NT Setup for driver installation
*   **readme.txt** — A text file describing the Adaptec 78*xx* driver for Windows NT

If you are installing Windows NT for the first time, see the next section "Installing Windows NT and the Driver for the First Time" to begin driver installation. If Windows NT is already installed in your system, see the section "Using Windows NT to Install or Update the Driver" found later in this chapter.

## Installing Windows NT and the Driver for the First Time

Windows NT 4.0 has SCSI drivers for the Adaptec 78*xx* series of SCSI controllers integrated into the operating system. When you load the operating system software, the drivers are automatically loaded. However, Dell recommends that you update the **adpu160m.sys** driver by using the diskette of drivers that you created from the *Dell OpenManage Server Assistant* CD. To install or update the **adpu160m.sys** driver for Windows NT 4.0, see the next subsection.

## Using Windows NT to Install or Update the Driver

This section describes how to install or update the **adpu160m.sys** driver if Windows NT is already installed. If you are installing Windows NT for the first time, see the section "Installing Windows NT and the Driver for the First Time" found earlier in this chapter.

Perform the following steps only if Windows NT 4.0 is already installed:

1. Click the **Start** button, point to **Settings**, and click **Control Panel**.

2. Double-click the **SCSI Adapters** icon.

3. Click the **Driver** tab and then click **Add**.

4. Click **Have Disk**.

5. Insert the Windows NT 4.0 driver diskette that you created into drive A.

6. In the **Copy Manufacturer's Files From:** field, type a:\scsi\ and click **OK**.

7. Select **Adaptec AHA-294x/AHA-394x/AHA4944** or **78xx PCI SCSI Controller (NT 4.0)**. Then click **OK**.

8. If the following message appears, click **New** to replace the existing driver:

   ```
   The driver(s) for this SCSI Adapter are already on the sys-
   tem. Do you want to use the currently installed driver(s) or
   install new one(s).
   ```

9. If the following message appears, type a:\scsi in the dialog box and click **Continue**:

   ```
   Please enter the full path to Adaptec's installation files.
   ```

   These files are located in the **\scsi** directory on the Windows NT 4.0 Driver diskette.

   The driver is copied from the diskette to your system.

10. Click **Yes** when prompted to restart the system and remove the diskette from drive A.

After the system reboots, the new driver is active. Some drive letter assignments may have changed from the previous configuration.

If you need additional assistance, see the section "Troubleshooting for Windows NT" found later in this chapter.

# Driver Installation for NetWare 5.1

This section provides information on installing the SCSI drivers for the Novell NetWare 5.1 operating system. Instructions assume that NetWare 5.1 is installed and operational.

*NOTE: Use these procedures only if you did not use Server Setup from the Dell Open-Manage Server Assistant CD to install your operating system.*

## Creating the NetWare 5.1 SCSI Driver Diskette

If you have not already done so, use the *Dell OpenManage Server Assistant* CD to create a NetWare 5.1 SCSI driver diskette.

## Uninstalling a SCSI Driver

If you are replacing an existing driver (for example, because it has become corrupted or an upgrade has become available), you must first remove the installed driver. To remove a driver, perform the following steps:

1.  At the initial NetWare screen, press <Alt><Esc> to display the NetWare console screen.

2.  At the server prompt, type nwconfig and press <Enter>.

    The **NetWare Configuration** screen appears, displaying the **Configuration Options** menu.

3.  At the **Configuration Options** menu, highlight **Driver Options** and press <Enter>.

4.  At the **Driver Options** menu, highlight **Configure disk and storage device drivers** and press <Enter>.

5.  At the **Additional Driver Actions** menu, highlight **Unload an additional driver** and press <Enter>.

6.  At the **Selected Disk Drivers** menu, highlight the driver that you want to uninstall and press <Enter>.

7.  At the message Driver *xxx* successfully unloaded, press <Enter>.

    The **Additional Driver Actions** menu appears.

From the **Additional Driver Actions** menu, you can repeat steps 5 through 7 to uninstall an additional driver, start with step 5 of the next procedure to install a driver, or press <Esc> to exit.

## *Installing the SCSI Drivers for NetWare 5.1*

To install NetWare 5.1 SCSI drivers from the NetWare 5.1 SCSI driver diskette that you created, perform the following steps:

1. At the initial NetWare screen, press <Alt><Esc> to display the NetWare console screen.

2. At the server prompt, type nwconfig and press <Enter>.

   The **NetWare Configuration** screen appears, displaying the **Configuration Options** menu.

3. At the **Configuration Options** menu, highlight **Driver Options** and press <Enter>.

4. At the **Driver Options** menu, highlight **Configure disk and storage device drivers** and press <Enter>.

5. At the **Additional Driver Actions** menu, highlight **Load an additional driver** and press <Enter>.

   The software scans the system to determine what drivers are already installed.

6. When the **Select a driver** menu appears, insert the NetWare 5.1 SCSI driver diskette into the diskette drive and press <Insert> to install an unlisted driver.

7. Read the instructions on the screen and press <Enter> to continue.

8. At the **Select a driver to install** menu, highlight a desired driver and press <Enter>.

9. When you are prompted to confirm, highlight **Yes** and press <Enter>.

10. To accept the default server boot path that is displayed, press <Enter>.
    The software copies the driver to the selected location.

11. At the **Driver *xxx* Parameter Actions** screen, highlight **Select/Modify driver parameters** and press <Enter>.

12. At the **driver parameters** screen, type 1 for the integrated SCSI adapter or enter the slot number of the SCSI adapter card.

    *NOTE: The integrated SCSI adapter is always assigned to slot 1. If an adapter card is installed in slot 1, you must specify it as being in slot 2. An adapter card installed in slot 2 or a higher numbered slot is assigned its true physical slot number.*

13. Press <F10> to save the parameters and exit.

14. At the **Driver xxx Parameter Actions** screen, highlight **Save parameter and load driver** and press <Enter>.

15. At the **NetWare Configuration** screen, confirm that the new driver has been added to the list that is displayed.

16. Repeat steps 3 through 15 for any additional drivers you want to install.

17. Press <Esc> three times. At the **Exit nwconfig?** dialog box, highlight **Yes** and press <Enter>.

If you need additional assistance, see the section "Troubleshooting for NetWare" found later in this chapter.

# *The SCSISelect Utility*

The BIOS for the integrated Adaptec AIC-7899 SCSI controller includes the menu-driven SCSI*Select* configuration utility, which allows you to change SCSI controller settings without opening the computer. SCSI*Select* also contains SCSI disk utilities that let you low-level format or verify the disk media of your SCSI hard-disk drives.

## *Starting the SCSISelect Utility*

You can start the SCSI*Select* utility by pressing <Ctrl><a> when the following prompt appears briefly during start-up:

```
Press <CTRL><A> for SCSISelect™ Utility!
```

The first menu displays the **Configure/View Host Adapter Settings** and **SCSI Disk Utilities** options.

## *Using SCSISelect Menus*

SCSI*Select* uses menus to list options that you can select. To select an option, press the up- and down-arrow keys to move the cursor to the option; then press <Enter>.

In some cases, selecting an option displays another menu. You can return to the previous menu at any time by pressing <Esc>. To restore the original SCSI*Select* default values, press <F6>.

## *SCSISelect Default Settings*

Default settings for the integrated AIC-7899 SCSI controller are shown in Table 3-1. These default settings are appropriate for most Peripheral Component Interconnect (PCI) systems. Run SCSI*Select* only if you need to change any of the default settings.

*NOTES: To change the configuration settings, you must run the SCSISelect Utility.*

*The term **host adapter** is used throughout this file to refer to the integrated AIC-7899 SCSI controller.*

*If the host adapter does not control the bootable hard-disk drive, you may want to disable its BIOS.*

For situations in which you might want or need to change the settings, see the descriptions of each setting in the following subsections.

**Table 3-1.  AIC-7899 SCSI Controller Settings**

| Setting | Default |
| --- | --- |
| **SCSI Bus Interface Definitions:** | |
| Host Adapter SCSI ID | 7 |
| SCSI Parity Checking | Enabled |
| Host Adapter SCSI Termination | Enabled |
| **Boot Device Options:** | |
| Boot Channel | A First |
| Boot SCSI ID | 0 |
| Boot LUN Number | 0 |
| **SCSI Device/Configuration:** | |
| Sync Transfer Rate MB/Sec | 160 |
| Initiate Wide Negotiation | Yes (Enabled) |
| Enable Disconnection | Yes (Enabled) |
| Send Start Unit Command | Yes (Enabled) |
| Enable Write Back Cache | Yes |
| BIOS Multiple LUN Support | No (Enabled) |
| Include in BIOS Scan | Yes (Enabled) |
| **Advanced Configuration:** | |
| Reset SCSI Bus at IC Initialization | Enabled |
| Display <Ctrl><a> Message During BIOS Initialization | Enabled |
| Extended BIOS Translation For DOS Drivers > 1 GB | Enabled |
| Silent/Verbose Mode | Verbose |
| Host Adapter BIOS | Enabled |
| Domain Validation | Enabled |
| Support Removable Disks Under BIOS As Fixed Disks | Boot Only |
| BIOS Support For Bootable CD-ROM | Enabled |
| BIOS Support For Int 13 Extensions | Enabled |
| Support For Ultra SCSI Speed | Enabled |

*NOTE: For the full name of an abbreviation or acronym used in this table, see the "Glossary."*

## SCSI Bus Interface Definitions

The basic host adapter settings are the SCSI*Select* settings most likely to require modification:

- **Host Adapter SCSI ID** — Sets the host adapter's SCSI ID. The default setting is **SCSI ID 7**, which allows the host adapter to support narrow SCSI devices in addition to wide SCSI devices. Dell recommends that you leave the host adapter set to **SCSI ID 7**.

- **SCSI Parity Checking** — Determines whether the host adapter verifies the accuracy of data transfer on the SCSI bus. The default setting is **Enabled**. You should disable **SCSI Parity Checking** if any SCSI device connected to the host adapter does not support SCSI parity; otherwise, leave it enabled. Most SCSI devices support SCSI parity. If you are unsure if a device supports SCSI parity, consult the documentation for the device.

- **Host Adapter SCSI Termination** — Sets termination on the host adapter. The default setting for the AIC-7899 host adapter is **Automatic**. Dell recommends that you leave this option set to the default.

## Boot Device Options

The boot device options allow you to specify the device from which to boot your computer:

- **Boot SCSI ID** — Specifies the boot channel (A or B) for the dual channel Adaptec 7899 host adapter. The default is **A First**.

- **Boot SCSI ID** — Specifies the SCSI ID of the device from which you want to boot your system.

- **Boot LUN Number** — Allows you to specify a particular logical unit number (LUN) from which to boot your boot device if your boot device has multiple LUNs and **Multiple LUN Support** is enabled (see the section "Advanced Configuration Settings" found later in this chapter). The default setting is **LUN 0**.

## SCSI Device/Configuration Settings

The SCSI device/configuration settings allow you to configure certain parameters for each device on the SCSI bus. To configure a specific device, you must know the SCSI ID assigned to that device. If you are not sure of the SCSI ID, see the section "Using the SCSI Disk Utilities" found later in this chapter.

- **Sync Transfer Rate** — Sets the maximum synchronous data transfer rate that the host adapter supports.

  The AIC-7899 host adapter supports rates up to 160 megabytes per second (MB/sec). The default for the AIC-7899 host adapter is **160 MB/sec**.

  If the host adapter is set to not negotiate for synchronous data transfer, the maximum synchronous transfer rate is the maximum rate that the host adapter accepts from the device during negotiation. (This is standard SCSI protocol.)

- **Initiate Wide Negotiation** — Determines whether the host adapter attempts 16-bit data transfer instead of 8-bit data transfer. The default is **Yes**.

*NOTE: Some 8-bit SCSI devices may have trouble handling wide negotiation, which may result in erratic behavior or a hang condition. For these devices, set **Initiate Wide Negotiation** to **No**.*

When this option is set to **Yes**, the host adapter attempts 16-bit data transfer. When this option is set to **No**, 8-bit data transfer is used unless the SCSI device itself requests wide negotiation. The effective transfer rate is doubled when 16-bit data transfer is used because the data path for wide SCSI is twice the size of normal 8-bit SCSI.

- **Enable Disconnection** (sometimes called disconnect/reconnect) — Determines whether the host adapter allows the SCSI device to disconnect from the SCSI bus. Enabling disconnection allows the host adapter to perform other operations on the SCSI bus while the SCSI device is temporarily disconnected. The default setting is **Yes**.

Leave **Enable Disconnection** set to **Yes** if two or more SCSI devices are connected to the host adapter. This optimizes SCSI bus performance. If only one SCSI device is connected to the host adapter, set **Enable Disconnection** to **No** to achieve slightly better performance.

- **Send Start Unit Command** — Determines whether the start unit command is sent to the SCSI device during the boot routine. The default is **Yes**.

Setting this option to **Yes** reduces the load on your computer's power supply by allowing the host adapter to start SCSI devices one at a time when you boot your computer. When this option is set to **No**, the devices are allowed to start at the same time. Most devices require you to set a jumper before they can respond to this command.

*NOTE: For many devices, if **Send Start Unit Command** is set to **Yes**, the boot routine time will vary depending on how long it takes each drive to start.*

- **Enable Write Back Cache** — Signals the completion of a write request as soon as the data is in cache. Actual writing to the disk occurs at a later time. The default setting is **N/C**.
- **BIOS Multiple LUN Support** — Provides support for peripherals that contain multiple SCSI devices, such as autoloading tape drives and CD-ROM changers.

*NOTE: The setting for **BIOS Multiple LUN Support** must be **Enabled** if a tape autoloader is connected.*

- **Include in BIOS Scan** — Enables you to set whether the system BIOS scans this device during system start-up. The default is **Yes**.

## Advanced Configuration Settings

The advanced host adapter settings should not be changed unless absolutely necessary. These values are set by Dell, and changing them may cause conflicts with the SCSI devices.

- **Reset SCSI Bus at IC Initialization** — Enables the SCSI bus to be reset when the controller is initialized. The default is **Enabled**.

- **Display <Ctrl><a> Message During BIOS Initialization** — Determines whether the `Press <CTRL><A> for SCSISelect (TM) Utility!` message appears on your screen during system start-up. The default setting is **Enabled**. If this setting is disabled, you can still run the SCSI*Select* utility by pressing <Ctrl><a> after the host adapter BIOS banner appears.

- **Extended BIOS Translation For DOS Drives > 1 GB** — Determines whether extended translation is available for SCSI hard-disk drives with capacities greater than 1 gigabyte (GB). The default setting is **Enabled**.

**NOTICE: Back up your hard-disk drive before you change the translation scheme. All data is erased when you change from one translation scheme to another.**

The standard translation scheme for SCSI host adapters provides a maximum accessible capacity of 1 GB. To support hard-disk drives larger than 1 GB, the 78*xx* series host adapters include an extended translation scheme that supports hard-disk drives as large as 8 GB, with a maximum partition size of 2 GB under the DOS operating system.

It is not necessary to enable the **Extended BIOS Translation** setting if you are using another operating system, such as Novell NetWare.

When you partition a hard-disk drive larger than 1 GB, use the DOS **fdisk** utility as you normally would. Because the cylinder size increases to 8 MB under extended translation, the partition size you choose must be a multiple of 8 MB. If you request a size that is not a multiple of 8 MB, **fdisk** rounds up to the nearest whole multiple of 8 MB.

- **Silent/Verbose Mode** — Displays the host adapter information during system start-up. The default is **Verbose**.

- **Host Adapter BIOS** — Enables or disables the host adapter BIOS. The default setting is **Enabled**.

*NOTE: Several SCSISelect options are not valid unless the host adapter BIOS is enabled.*

If you are booting from a SCSI hard-disk drive connected to the host adapter, the BIOS must be enabled. You should disable the host adapter BIOS if the peripherals on the SCSI bus (for example, CD-ROM drives) are all controlled by device drivers and do not need the BIOS.

- **Domain Validation** — Instructs the host adapter not to accept a negotiated speed until a validation test is successfully performed. After determining the speed that a target device is capable of, the host adapter sends a **Write Buffer** command to the target device. The data transfer occurs at the full speed initially. The initiator reads and tests the data, and identifies any parity or cyclic redundancy check (CRC) errors. If the test fails, the initiator lowers its speed and repeats the test. In this manner, a compatible speed will be found and locked in before user data transfers begin. The default is **Enabled**.

- **Support Removable Disks Under BIOS As Fixed Disks** — Controls which removable-media drives are supported by the host adapter BIOS. The default setting is **Boot Only**. The following choices are available.

**NOTICE: If a removable-media SCSI device is controlled by the host adapter BIOS, do not remove the media while the drive is on or you may lose data. If you want to be able to remove media while the drive is on, install your removable-media device driver and set this option to Disabled.**

- **Boot Only** — Only the removable-media drive designated as the boot device is treated as a hard-disk drive.

- **All Disks** — All removable-media drives supported by the BIOS are treated as hard-disk drives.

- **Disabled** — No removable-media drives are treated as hard-disk drives. In this situation, software drivers are needed because the drives are not controlled by the BIOS.

- **BIOS Support For Bootable CD-ROM** — Determines whether the host adapter BIOS provides support for booting from a CD-ROM drive. The default setting is **Enabled**.

- **BIOS Support For Int 13 Extensions** — Determines whether the host adapter BIOS supports disks with more than 1024 cylinders. The default setting is **Enabled**.

- **Support For Ultra SCSI Speed** — Determines whether the host adapter supports the fast transfer rates (20–40 MB/sec). The default setting is **Enabled**.

## *Using the SCSI Disk Utilities*

To access the SCSI disk utilities, select **SCSI Disk Utilities** from the menu that appears when you start SCSI*Select*. When the option is selected, SCSI*Select* immediately scans the SCSI bus (to determine the devices installed) and displays a list of all SCSI IDs and the device assigned to each ID.

When you select a specific ID and device, a menu appears, displaying the **Format Disk** and **Verify Disk Media** options.

**NOTICE: The Format Disk option destroys all data on the hard-disk drive.**

- **Format Disk** — Runs a utility that allows you to perform a low-level format on a hard-disk drive. Most SCSI disk drives are formatted at the factory and do not need to be formatted again. The Adaptec Format Disk utility is compatible with the majority of SCSI disk drives.

- **Verify Disk Media** — Runs a utility that allows you to scan the media of a hard-disk drive for defects. If the utility finds bad blocks on the media, it prompts you to reassign them; if you select **Yes**, those blocks are no longer used. You can press <Esc> at any time to exit the utility.

### *Exiting SCSISelect*

To exit SCSI*Select*, press <Esc> until a message prompts you to exit. (If you changed any 78*xx* series host adapter settings, you are prompted to save the changes before you exit.) At the prompt, select **Yes** to exit, and then press any key to reboot the computer. Any changes that you made in SCSI*Select* take effect after the computer boots. (You can select **No** at the prompt if you are not ready to exit SCSI*Select*.)

# *Using SCSI Devices*

The subsections that follow provide procedures and tips on the following topics:

- Formatting media
- Using removable media
- Verifying status
- Using drives that are tested and approved for NetWare
- Using the NetWare tape backup utility

### *Formatting Media*

NetWare's **nwconfig.nlm** program lets you optionally format a hard-disk drive for use with NetWare. If you are using SCSI drives, the program allows you to low-level format several SCSI drives simultaneously. The NetWare format procedure is not the same as using **fdisk** or **format** under DOS.

**NOTICE: You should not use NetWare to format a hard-disk drive that contains partitions for other operating systems because that information may be destroyed.**

### *Using Removable Media*

The **adpu160.ham** driver module fully supports removable-media disk drives, including magneto-optical drives. Removable media is treated as a standard SCSI hard-disk drive, with some exceptions:

- The driver only recognizes and registers media with 512 bytes per sector.
- NetWare allows you to mount or dismount the media and lock or unlock the media.

These removable media options are supported by NetWare's **monitor.nlm** program.

To set up the removable media, perform the following steps:

1. Load **monitor.nlm** to display the various options.

2. Select **Disk Information**.

    All system hard-disk drives appear.

3. Select the removable-media device.

   Drive status options appear as shown in Table 3-2.

*Table 3-2.  Drive Status Options*

| Menu Option | Default Value |
|---|---|
| Volume Segments on Drive[1] | Select for a list |
| Read After Write Verify[1] | Hardware Level |
| Drive Light Status[1] | Not supported |
| Driver Operating Status[1] | Active |
| Removable Drive Mount Status[2] | Mounted |
| Removable Drive Lock Status[2] | Not Locked |

[1]   Valid for both removable and nonremovable SCSI drives.

[2]   Valid for removable media only.

## Verify Status

The **Read After Write Verify** option is set to **Hardware Level** by default. This option cannot be specified in the **startup.ncf** or **autoexec.ncf** file. However, the default can be set on the command line. Refer to the NetWare *User's Guide* for information about using the **load** command-line options.

The available options are defined in Table 3-3.

*Table 3-3.  Read After Write Verify Options*

| Option Setting | Function |
|---|---|
| Disabled | All writes to SCSI disk drives are executed with the **SCSI Write** command (**0Ah** or **2Ah**). |
| Hardware Level | All writes to SCSI disk drives are executed with the **SCSI Write and Verify** command (**2Eh**) or (if this command is not supported by the drive) with the **SCSI Write** command (**0Ah** or **2Ah**), followed by the **SCSI Verify** command (**2Fh**). |
| Software Level | Not supported. |

## Mount Status

Mounting causes a drive to come online as a NetWare storage device. Dismounted drives are inactive and cannot be accessed.

Before you eject the current media, dismount it. When the mount status is **Dismounted**, eject the media. However, NetWare does not allow you to dismount media that are locked.

To insert your new media, wait for the drive to spin up, and then select the **Removable Drive Mount Status** option.

## Lock Status

If your removable-media device supports the lock/unlock feature, you can lock the media. The media must be in the **Not Locked** state before you can eject it.

## Using Drives Tested and Approved for NetWare

To be fully certified as NetWare "Yes, Tested and Approved," a drive and host adapter must both pass a qualification process that takes place before you see the product. The goals of NetWare testing are to simplify installation and provide the highest quality disk subsystem.

Adaptec 78*xx* series host adapters and their drivers are fully tested and approved for NetWare. This means that you can purchase a NetWare drive (certified as "Yes, Tested and Approved") from a vendor, connect it to your computer system or host adapter, partition it, and create a volume without any compatibility concerns.

*NOTE: Dell recommends using only Dell-tested drives.*

Adaptec's **adpu160.ham** driver module is flexible enough to allow you to connect SCSI drives that are tested and approved for NetWare as well as standard SCSI drives to a single host adapter. The driver registers each hard-disk drive accordingly.

Drive registration is a user-transparent process; no user interaction is required. You can tell that the drive has been detected as NetWare-tested and NetWare-approved if the message NetWare Yes Tested and Approved is included in the drive description string that appears when you run **monitor.nlm** (disk options).

## Using the NetWare Tape Backup Utility

Included with NetWare is a server-based tape backup utility called **sbcon.nlm**. This allows backup of server hard-disk drives to a server tape drive. The **sbcon.nlm** utility supports Adaptec host adapters. To load the backup utility, perform the following steps:

1. Load the SCSI adapter driver by entering:

   load [*pathname*]\aha160.ham [*options*] slot=x

   The ASPI layer (**nwaspi.cdm**) is automatically loaded.

2. Refer to the Novell NetWare documentation for additional instructions on loading the server backup software. Refer to the *NetWare Server Backup User's Guide* to load the **tsa** and **sbcon** modules.

# Troubleshooting for Windows NT

The boot manager for Windows NT contains recovery logic to allow you to return to the last known good configuration. If you have changed your host adapter configuration and Windows NT no longer boots, perform the following steps to recover it:

1. Undo any hardware changes that you have made to the computer since it was last operational.

2. Reboot the computer. Watch the display carefully during start-up. If the following message appears, press the spacebar, type 1 at the next screen, and then follow the instructions on the screen to continue booting with the last known good configuration:

   ```
   Press spacebar NOW to invoke the Last Known Good menu
   ```

3. When your computer is operational again, check all of the hardware and software configuration changes that you want to make. Look specifically for conflicts with parts of the existing system configuration that are not being changed.

   If you cannot determine the source of the error, see, "Getting Help" in the *Installation and Troubleshooting Guide* for instructions on contacting Dell for technical assistance.

# Troubleshooting for NetWare

Any error that occurs while the driver is initializing prevents it from loading. If an error does occur, the driver causes the computer to beep and then display the following numbered error message:

*xxx message*

The *xxx* indicates the error code and *message* is a line of text describing the error. The error codes are divided into three categories:

- 000-099 — Non-host-adapter specific
- 100-299 — Host-adapter specific
- 300-999 — Reserved

Specific error codes, such as those in the following subsections, appear only if you have installed the host adapters and drivers that generate them.

## Nonhost-Adapter Specific Error Codes

The following error codes alert you to error conditions caused by factors not related to the host adapter:

000 Failed ParseDriverParameters call

A call to NetWare's ParseDriverParameters routine has failed for some unknown reason. The command line contains errors, or you pressed <Esc> at the port or slot prompt.

```
001 Unable to reserve hardware, possible conflict
```

The driver failed in its attempt to reserve the host adapter's hardware settings (that is, direct memory access [DMA] and interrupt request [IRQ] settings). Another card in your system may be causing a conflict with the host adapter.

```
002 NetWare rejected card Failed AddDiskSystem call
```

The driver failed in its attempt to register the host adapter with NetWare. The file server may not have enough memory.

```
003 Invalid command line option entered > option
```

An invalid option was entered on the command line. The invalid option that was entered is also displayed.

```
004 Invalid command line, please enter correctly
```

The driver was unable to understand the command line options that you entered. Be sure that you have entered these options correctly.

## *Host-Adapter Specific Error Codes*

The following error codes alert you to error conditions caused by factors related to the host adapter:

```
200 No host adapter found for this driver to register
```

No Adaptec 78*xx* host adapter was found in your computer for the driver to register. Be sure that the host adapter is properly configured and properly seated in the slot.

```
203 Invalid 'device' setting
```

You have entered an invalid slot setting on the command line. You can only enter slot numbers for valid host adapters. If you load without the slot option, you will be prompted to enter a valid value.

```
204 Invalid 'verbose' setting, use 'y'
```

You can only enter y for this option (verbose=y).

```
205 Invalid 'removable' setting, use 'off'
```

You can only enter off for this option (removable=off).

```
206 Invalid 'fixed_disk' setting, use 'off'
```

You can only enter off for this option (fixed_disk=off).

```
208 SCSI present but not enabled/configured for PCI
```

A host adapter is present, but its bus or device entry has not been enabled.

# CHAPTER 4
# *Using the System Setup Program*

Each time you turn on your computer system, the system compares the configuration of the hardware installed in the system to the hardware listed in the system configuration information stored in nonvolatile random-access memory (NVRAM) on the system board. If the system detects a discrepancy, it generates error messages that identify the incorrect configuration settings. The system then prompts you to enter the System Setup program to correct the setting.

You can use the System Setup program as follows:

- To change the system configuration information after you add, change, or remove any hardware in your system

- To set or change user-selectable options—for example, the time or date on your system

- To enable or disable all integrated devices in your system

After you set up your system, run the System Setup program to familiarize yourself with your system configuration information and optional settings. Dell recommends that you print the System Setup screens (by pressing the <Print Screen> key) or record the information for future reference.

Before you use the System Setup program, you need to know the kind of diskette drive(s) and hard-disk drive(s) installed in your computer. If you are unsure of any of this information, see the Manufacturing Test Report that was shipped with your system. You can access the **Manufacturing Test Report** in the **Dell Accessories** folder.

## *Entering the System Setup Program*

Enter the System Setup program as follows:

1. Turn on your system.

   If your system is already on, shut it down and then turn it on again.

2. Press <F2> immediately after you see the following message:

   ```
   Press <F2> for System Setup
   ```

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

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

You can also enter the System Setup program by responding to certain error messages. See the section "Responding to Error Messages" found later in this chapter.

*NOTE: For Help using the System Setup program, press <F1>.*

## Responding to Error Messages

If an error message appears on your monitor screen while the system is booting, make a note of the message. Then, before entering the System Setup program, refer to "System Beep Codes" and "System Messages" in your *Installation and Trouble-shooting Guide* for an explanation of the message and suggestions for correcting any errors. (An exception to this routine: It is normal to receive an error message the first time you boot your system after installing a memory upgrade. In that situation, do not refer to "System Beep Codes" and "System Messages." Instead, follow the instructions for performing a memory upgrade in "Adding Memory" in your *Installation and Troubleshooting Guide*.)

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

## Using the System Setup Program

Table 4-1 lists the keys that you use to view or change information on the System Setup screens and to exit the program.

### Table 4-1.  System Setup Navigation Keys

| Keys | Action |
|------|--------|
| Tab  or  ↓ | Moves to the next field. |
| Shift  Tab  or  ↑ | Moves to the previous field. |

**Table 4-1.  System Setup Navigation Keys** *(continued)*

| Keys | Action |
|---|---|
| ← or → | Cycles through the settings in a field. In many fields, you can also type the appropriate value. |
| Esc | Exits the System Setup program and reboots the system if any changes were made.

For most of the options, any changes you make are recorded but do not take effect until the next time you boot the system. For a few options (as noted in the help area), the changes take effect immediately. |

# System Setup Options

The following subsections outline the options on the System Setup screens.

## Main Screen

When the System Setup program runs, the main program screen appears (see Figure 4-1).

```
        Dell Computer Corporation (www.dell.com) - PowerEdge 1400

  Intel Pentium III Processor: 800 MHz    BIOS Version: XXX
  Level 2 Cache: 256 KB Integrated        Service Tag : XXXXX


  System Time ....................................... 11:30:04
  System Date ....................................... Wed May 24, 2000

  Diskette Drive A: ................................. 3.5 inch, 1.44 MB

  System Memory ..................................... 2048 MB ECC SDRAM
  Video Memory ...................................... 4 MB SDRAM
  CPU Information ................................... <ENTER>

  Boot Sequence ..................................... <ENTER>
  Hard-Disk Drive Sequence .......................... <ENTER>

  Integrated Devices ................................ <ENTER>
  PCI IRQ Assignment ................................ <ENTER>

  System Security ................................... <ENTER>

  Keyboard NumLock .................................. On
  Report Keyboard Errors ............................ Report

  Asset Tag ......................................... XXXXX

  ↑↓ to select  |  SPACE,+,- to change  |  ESC to exit  |  F1=HELP
```

**Figure 4-1.  Main System Setup Screen**

The following options or information fields appear on the main System Setup screen:

- **System Time** — resets the time on the computer's internal clock.
- **System Date** — resets the date on the computer's internal calendar.
- **Diskette Drive A:** — identifies the type of diskette drive installed in your computer.
- **System Memory** — displays the amount of system memory. This option has no user-selectable settings.
- **Video Memory** — displays the amount of video memory. This option has no user-selectable settings.
- **CPU Information** — displays information related to the system bus and micro-processors. This screen has no user-selectable settings.
- **Boot Sequence** — displays the **Boot Sequence** screen, discussed later in this chapter.
- **Hard-Disk Drive Sequence** — displays the **Hard Disk Drive Sequence** screen, discussed later in this chapter.
- **Integrated Devices** — displays the **Integrated Devices** screen, discussed later in this chapter.
- **PCI IRQ Assignment** — displays a screen that allows you to change the interrupt request (IRQ) allocated to each of the three integrated devices on the peripheral component interconnect (PCI) bus, as well as any installed expansion cards that require an IRQ.
- **System Security** — displays a screen which allows you to configure the system password and setup password features. See "Using the System Password Feature" and "Using the Setup Password Feature" later in this chapter.
- **Keyboard Numlock** — determines whether your system boots with the Num Lock mode activated on 101- or 102-key keyboards (it does not apply to 84-key keyboards).
- **Report Keyboard Error** — enables or disables reporting of keyboard errors during the power-on self-test (POST).

    This option is useful when applied to self-starting servers or host systems that have no permanently attached keyboard. In these situations, selecting **Do Not Report** suppresses all error messages relating to the keyboard or to the keyboard controller during POST. This setting does not affect the operation of the keyboard itself if a keyboard is attached to the computer.

- **Asset Tag** — displays the customer-programmable asset tag number for the system if an asset tag number has been assigned. To enter an asset tag number of up to ten characters into NVRAM, follow the procedure in "Asset Tag Utility" in Chapter 2.

## *Boot Sequence Screen*

The **Boot Sequence** screen options determine the order in which the system looks for the files that it needs to load during system startup. Available options include the

diskette drive, CD-ROM drive, and hard-disk drive. You can enable or disable a device by selecting it and pressing the spacebar. To change the order in which devices are searched, use the <+> and <-> keys.

## *Hard-Disk Drive Sequence Screen*

The **Boot Sequence** screen options determine the order in which the system searches hard-disk drives for the files that it needs to load during system startup. The choices depend on the particular hard-disk drives installed in your system. You can enable or disable a device by selecting it and pressing the spacebar. To change the order in which devices are searched, use the <+> and <-> keys.

## *Integrated Devices Screen*

The following devices on the system board are configured through this screen:

- **SCSI Controller** — determines whether the system's integrated small computer system interface (SCSI) controller is enabled. Changes take effect after reboot.

- **Network Interface Controller** — determines whether the system's integrated network interface controller (NIC) is enabled. Changes take effect after reboot.

- **NIC MAC Address** — displays the address of the media access control (MAC) address used by the integrated NIC. This field has no user-selectable settings.

- **Mouse Controller** — enables or disables the system's mouse controller. Disabling the mouse controller allows an expansion card to use IRQ12.

- **Serial Port 1, Serial Port 2** — configure the system's integrated serial ports. These options can be set to **Auto** (the default) to automatically configure a port, to a particular designation, or to **Off** to disable the port.

  If you set a serial port to **Auto** and add an expansion card containing a port configured to the same designation, the system automatically remaps the integrated port to the next available port designation that shares the same interrupt request (IRQ) setting

- **Parallel Port**— configures the system's integrated parallel port.

- **Parallel Port Mode** — controls whether the system's integrated parallel port acts as an AT-compatible (unidirectional) or PS/2-compatible (bidirectional) port. To determine the correct mode to use, see the documentation that came with the peripheral device connected to the serial port.

- **USB Controller** — enables or disables the system's Universal Serial Bus (USB) ports. Disabling the USB ports makes system resources available for other devices.

- **IDE CD-ROM Interface** — enables or disables the system's IDE CD-ROM interface.

- **Diskette Controller** — enables or disables the system's diskette drive controller. With **Auto** (default) selected, the system turns off the controller when necessary to accommodate a controller card installed in an expansion slot.

- **Speaker** — determines whether the integrated speaker is **On** (the default) or **Off**. A change to this option takes effect immediately (rebooting the system is not required).

## System Security Screen

You can set the following security features through the System Security screen:

- **Password Status** — when **Setup Password** is set to **Enabled**, allows you to prevent the system password from being changed or disabled at system start-up.

  To lock the system password, you must first assign a setup password in the **Setup Password** option and then change the **Password Status** option to **Locked**. In this state, the system password cannot be changed through the **System Password** option and cannot be disabled at system start-up by pressing <Ctrl><Enter>.

  To unlock the system password, you must enter the setup password in the **Setup Password** option and then change the **Password Status** option to **Unlocked**. In this state, the system password can be disabled at system start-up by pressing <Ctrl><Enter> and then changed through the **System Password** option.

- **System Password** — displays the current status of your system's password security feature and allows you to assign and verify a new password.

  *NOTE: See the section "Using the System Password Feature" found later in this chapter for instructions on assigning a system password and using or changing an existing system password. See the section, "Disabling a Forgotten Password" found later in this chapter for instructions on disabling a forgotten system password.*

- **Setup Password** — lets you restrict access to your computer's System Setup program in the same way that you restrict access to your system with the system password feature.

  *NOTE: See the section "Using the Setup Password Feature" found later in this chapter for instructions on assigning a setup password and using or changing an existing setup password. See the section "Disabling a Forgotten Password" found later in this chapter for instructions on disabling a forgotten setup password.*

- **Chassis Intrusion** — lets you enable the system chassis intrusion switch to detect if the system cover is removed. If this option is set to **Enabled**, a warning message is displayed during system startup. If the option is set to **Enabled – Silent**, no Startup message is displayed, but the **Chassis Intrusion** option in the System Setup program will change to **Detected**.

## Exit Screen

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

- **Save Changes and Exit**
- **Discard Changes ad Exit**
- **Return to Setup**

# Using the System Password Feature

**NOTICE: The password features provide a basic level of security for the data on your system. However, they are not foolproof. If your data requires more security, it is your responsibility to obtain and use additional forms of protection, such as data encryption programs.**

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

You can assign a system password whenever you use the System Setup program. After a system password is assigned, only those who know the password have full use of the system.

When the **System Password** option is set to **Enabled**, the computer system prompts you for the system password just after the system boots.

To change an existing system password, you must know the password (see the section "Deleting or Changing an Existing System Password" found later in this chapter). If you assign and later forget a system password, you need to be able to remove the computer cover to change a jumper setting that disables the system password feature (see the section "Disabling a Forgotten Password" found later in this chapter). Note that you erase the setup password at the same time.

**NOTICE: If you leave your system running and unattended without having a system password assigned, or if you leave your computer unlocked so that someone can disable the password by changing a jumper setting, anyone can access the data stored on your hard-disk drive.**

## Assigning a System Password

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

When a system password is assigned, the setting shown for the **System Password** option is **Enabled**. When the system password feature is disabled by a jumper setting on the system board, the setting shown is **Disabled by Jumper**. You cannot change or enter a new system password if either of these settings is displayed.

When no system password is assigned and the password jumper on the system board is in the enabled position (its default), the setting shown for the **System Password** option is **Not Enabled**. Only when this option is set to **Not Enabled** can you assign a system password, using the following procedure:

1. Verify that the **Password Status** option is set to **Unlocked**.

2. Highlight the **System Password** option and then press the left- or right-arrow key.

3. Type your new system password.

   You can use up to seven characters in your password.

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

The password assignment operation recognizes keys by their location on the keyboard without distinguishing between lowercase and uppercase characters. For example, if you have an *M* in your password, the system recognizes either *M* or *m* as correct. Certain key combinations are not valid. If you enter one of these combinations, the speaker emits a beep. To erase a character when entering your password, press the <Backspace> key or the left-arrow key.

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

4.  Press <Enter>.

    If the new system password is less than seven characters, the whole field fills with placeholders. Then the option heading changes to **Verify Password**, followed by another empty seven-character field in square brackets.

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

    The password setting changes to **Enabled**. Your system password is now set; you can exit the System Setup program and begin using your system. Note, however, that password protection does not take effect until you reboot the system by turning the system off and then on again.

### *Using Your System Password to Secure Your System*

Whenever you turn on or reboot your system by pressing the <Ctrl><Alt><Del> key combination, the following prompt appears on the screen when the **Password Status** option is set to **Unlocked**:

```
Type in the password and... -- press <ENTER> to leave password
security enabled. -- press <CTRL><ENTER> to disable password
security. Enter password:
```

If the **Password Status** option is set to **Locked**, the following prompt appears:

```
Type the password and press <Enter>.
```

After you type the correct system password and press <Enter>, your system boots and you can use the keyboard or mouse to operate your system as usual.

*NOTE: If you have assigned a setup password (see the section "Using the Setup Password Feature" found later in this chapter), the system accepts your setup password as an alternate system password.*

If a wrong or incomplete system password is entered, the following message appears:

```
** Incorrect password. **

Enter password:
```

If an incorrect or incomplete system password is entered again, the same message appears.

The third and subsequent times an incorrect or incomplete system password is entered, the system displays the following message:

```
** Incorrect password. **
Number of unsuccessful password attempts: 3
System halted! Must power down.
```

The number of unsuccessful attempts made to enter the correct system password can alert you to an unauthorized person attempting to use your system.

Even after your system is turned off and on, the previous message is displayed each time an incorrect or incomplete system password is entered.

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

### Deleting or Changing an Existing System Password

To delete or change an existing system password, perform the following steps:

1.  Enter the System Setup program by pressing <F2>. Select the **System Security** screen field to verify that the **Password Status** option is set to **Unlocked**.

2.  Reboot your system to force it to prompt you for a system password.

3.  When prompted, type the system password.

4.  Press the <Ctrl><Enter> key combination to disable the existing system password, instead of pressing <Enter> to continue with the normal operation of your system.

5.  Confirm that **Not Enabled** is displayed for the **System Password** option of the System Setup program.

    If **Not Enabled** appears for the **System Password** option, the system password has been deleted. If you want to assign a new password, continue to step 6. If **Not Enabled** is not displayed for the **System Password** option, press the <Alt><b> key combination to reboot the system, and then repeat steps 3 through 5.

6.  To assign a new password, follow the procedure in the section "Assigning a System Password" found earlier in this chapter.

## Using the Setup Password Feature

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

You can assign a setup password whenever you use the System Setup program. After a setup password is assigned, only those who know the password have full use of the System Setup program.

To change an existing setup password, you must know the setup password (see the section "Deleting or Changing an Existing Setup Password" found later in this chapter). If you assign and later forget a setup password, you cannot operate your system or change settings in the System Setup program until a trained service technician opens the computer chassis, changes the password jumper setting to disable the passwords, and erases the existing passwords. This procedure is described in Appendix B of the *Installation and Troubleshooting Guide*.

## Assigning a Setup Password

A setup password can be assigned (or changed) only when the **Setup Password** option is set to **Not Enabled**. To assign a setup password, highlight the **Setup Password** option and press the left- or right-arrow key. The system prompts you to enter and verify the password. If a character is illegal for password use, the system emits a beep.

*NOTES: The setup password can be the same as the system password.*

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

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

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

## Operating With a Setup Password Enabled

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

If you do not enter the correct password in three tries, the system lets you view, but not modify, the System Setup screens—with the following exceptions:

- You can still modify the **Date**, **Time**, **Keyboard Num Lock**, and **Speaker** options.
- If **System Password** is not enabled and is not locked via the **Password Status** option, you can assign a system password (however, you cannot disable or change an existing system password).

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

### *Deleting or Changing an Existing Setup Password*

To delete or change an existing setup password, perform the following steps:

1.  Enter the System Setup program and select the **System Security** screen option.

2.  Highlight the **Setup Password** option and press the left- or right-arrow key to delete the existing setup password.

    The setting changes to **Not Enabled**.

3.  If you want to assign a new setup password, perform the steps in the section "Assigning a Setup Password" found earlier in this chapter.

# *Disabling a Forgotten Password*

If you forget your system or setup password, you cannot operate your system or change settings in the System Setup program until a trained service technician opens the computer chassis, changes the password jumper setting to disable the passwords, and erases the existing passwords. This procedure is described in Appendix B of the *Installation and Troubleshooting Guide*.

# APPENDIX A
## *Technical Specifications*

Table A-1 provides the technical specifications for the Dell PowerEdge 1400 systems.

**Table A-1.  Technical Specifications**

| Microprocessor | |
| --- | --- |
| Microprocessor type. . . . . . . . . . . . . . . | one or two Intel Pentium III microprocessors with a minimum internal operating frequency of 733 MHz |
| Front side bus speed. . . . . . . . . . . . . . | 133 MHz |
| Math coprocessor . . . . . . . . . . . . . . . . | internal to the microprocessor |
| Level 2 cache. . . . . . . . . . . . . . . . . . . | 256 KB |
| **Expansion Bus** | |
| Bus type . . . . . . . . . . . . . . . . . . . . . . | PCI |
| Expansion slots . . . . . . . . . . . . . . . . . | four 64-bit, 33-MHz slots two 32-bit, 33-MHz slots |
| **Memory** | |
| Architecture. . . . . . . . . . . . . . . . . . . . | 72-bit ECC SDRAM |
| DIMM sockets. . . . . . . . . . . . . . . . . . | four |
| DIMM capacities. . . . . . . . . . . . . . . . | 128-MB, 256-, or 512-MB |
| Minimum RAM . . . . . . . . . . . . . . . . . | 128 MB |
| Maximum RAM. . . . . . . . . . . . . . . . . | 2 GB |

*NOTE: Under typical line conditions and over the entire system ambient operating range, the inrush may reach 140A.*

**Table A-1. Technical Specifications** (continued)

| Drives | |
|---|---|
| Externally accessible bays . . . . . . . . . . | three 5.25-inch bays accommodate one 3.5-inch, 1.44-MB diskette drive (standard), one IDE CD-ROM drive (optional) and one other optional 5.25-inch peripheral |
| Internally accessible bays . . . . . . . . . . . | removable drive cage accommodates up to four 1-inch SCSI hard-disk drives |

| Ports and Connectors | |
|---|---|
| **Externally accessible:** | |
| Serial (DTE) . . . . . . . . . . . . . . . . . . | two 9-pin connectors; 16550-compatible |
| Parallel . . . . . . . . . . . . . . . . . . . . . | one 25-pin connector (bidirectional) |
| Video . . . . . . . . . . . . . . . . . . . . . . | one 15-pin connector |
| PS/2-style keyboard . . . . . . . . . . . | 6-pin mini-DIN connector |
| PS/2-compatible mouse . . . . . . . . | 6-pin mini-DIN connector |
| USB . . . . . . . . . . . . . . . . . . . . . . . | two USB-compliant 4-pin connectors |
| NIC . . . . . . . . . . . . . . . . . . . . . . . | RJ45 connector for integrated NIC |
| **Internally accessible:** | |
| EIDE channel . . . . . . . . . . . . . . . . | one 40-pin connector on PCI local bus |
| SCSI channels . . . . . . . . . . . . . . . | two 68-pin Ultra3 SCSI connectors |
| Diskette drive . . . . . . . . . . . . . . . . | one 34-pin connector |
| Fans . . . . . . . . . . . . . . . . . . . . . . . | two three-pin connectors |

| Video | |
|---|---|
| Video type . . . . . . . . . . . . . . . . . . . . | ATI RAGE XL integrated video controller |
| Video memory . . . . . . . . . . . . . . . . . | 4MB SDRAM |

| Power | |
|---|---|
| **DC power supply:** | |
| Wattage . . . . . . . . . . . . . . . . . . . . . | 330 W |
| Heat dissipation . . . . . . . . . . . . . . | 600 BTU/hr (nominal) |
| Voltage . . . . . . . . . . . . . . . . . . . . . | autoranging 90 to 265 V at 47 to 63 Hz |
| Backup battery . . . . . . . . . . . . . . . . . | 3-V CR2032 coin cell |

*NOTE: Under typical line conditions and over the entire system ambient operating range, the inrush may reach 140A.*

**Table A-1. Technical Specifications** *(continued)*

| Physical | |
|---|---|
| Height . . . . . . . . . . . . . . . . . . . . . . . . | 45.9 cm (18.1 inches) |
| Width . . . . . . . . . . . . . . . . . . . . . . . . | 21.6 cm (8.5 inches) |
| Depth . . . . . . . . . . . . . . . . . . . . . . . . | 43.6 cm (17.6 inches) |
| Weight. . . . . . . . . . . . . . . . . . . . . . . . | 16.0 kg (37.0 lb) or more, depending on options installed |

| Environmental | |
|---|---|
| **Temperature:** | |
|     Operating . . . . . . . . . . . . . . . . . . | 10° to 35°C* (50× to 95°F) |
|     Storage. . . . . . . . . . . . . . . . . . . . | –40° to 65°C (–40° to 149°F) |
|     Relative humidity . . . . . . . . . . . . . | 8% to 80% (noncondensing) |
| **Maximum vibration:** | |
|     Operating . . . . . . . . . . . . . . . . . . | 0.25 G at 3 to 200 Hz for 30 min |
|     Storage. . . . . . . . . . . . . . . . . . . . | 0.5 G at 3 to 200 Hz for 30 min |
| **Maximum shock:** | |
|     Operating . . . . . . . . . . . . . . . . . . | half-sine wave form: 50 G for 2 ms |
|     Storage. . . . . . . . . . . . . . . . . . . . | half-sine wave form: 110 G for 2 ms square wave form: 27 G for 15 ms |
| **Altitude:** | |
|     Operating . . . . . . . . . . . . . . . . . . | –16 to 3048 m* (–50 to 10,000 ft) |
|     Storage. . . . . . . . . . . . . . . . . . . . | –16 to 10,600 m (–50 to 35,000 ft) |

\*   At 35°C (95°F), the maximum operating altitude is 914 m (3000 ft).

*NOTE: For the full name of an abbreviation or acronym used in this table, see the "Glossary" in this guide.*

# A P P E N D I X   B
# *I/O Ports and Connectors*

This file provides specific information about the input/output (I/O) ports and connectors on the back panel of the computer system.

The I/O ports and connectors on the back panel of the system are the gateways through which the computer system communicates with external devices such as a keyboard, mouse, printer, and monitor. Figure B-1 identifies the I/O ports and connectors for your system.

## Serial and Parallel Ports

The two built-in serial ports use 9-pin D-subminiature connectors on the back panel. These ports support devices such as external modems, printers, plotters, and mice that require serial data transmission (the transmission of data one bit at a time over one line).

Most software uses the term COM (for communications) plus a number to designate a serial port (for example, COM1 or COM2). The defaults for your system's built-in serial ports are COM1 and COM2.

The built-in parallel port uses a 25-pin D-subminiature connector on the system's back panel. This I/O port sends data in parallel format (where eight data bits, or one byte, are sent simultaneously over eight separate lines in a single cable). The parallel port is used primarily for printers.

Most software uses the term LPT (for line printer) plus a number to designate a parallel port (for example, LPT1). The default for the system's built-in parallel port is LPT1.

serial port 2
connector

parallel port
connector

serial port 1
connector

keyboard
connector

mouse
connector

USB connectors

video
connector
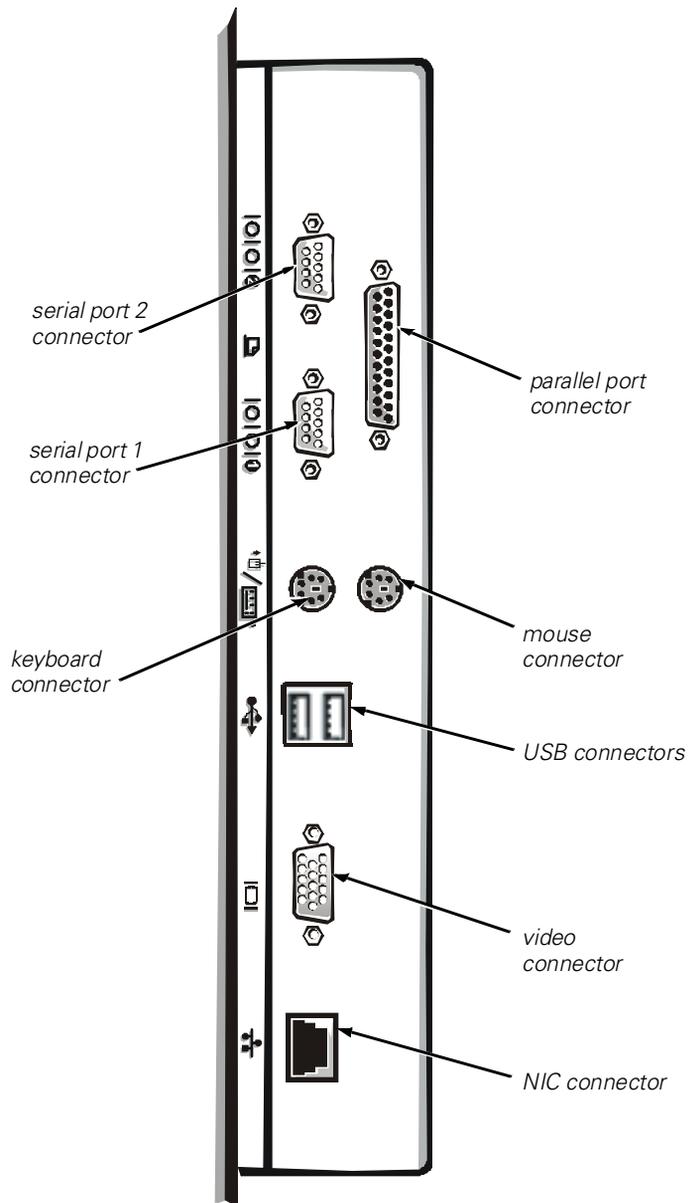
NIC connector

**_Figure B-1.  I/O Ports and Connectors_**

Port designations are used, for example, in software installation procedures that
include a step in which you identify the port to which a printer is attached, thus telling
the software where to send its output. An incorrect designation prevents the printer
from printing or causes scrambled print.

# Adding an Expansion Card Containing Serial or Parallel Ports

The system has an autoconfiguration capability for the serial ports. This feature lets you add an expansion card containing a serial port that has the same designation as one of the built-in ports, without having to reconfigure the card. When the system detects the duplicate serial port on the expansion card, it remaps (reassigns) the built-in port to the next available port designation.

Both the new and the remapped COM ports share the same interrupt request (IRQ) setting, as follows:

COM1, COM3: IRQ4 (shared setting)
COM2, COM4: IRQ3 (shared setting)

These COM ports have the following I/O address settings:

COM1: 3F8h
COM2: 2F8h
COM3: 3E8h
COM4: 2E8h

For example, if you add an internal modem card with a port configured as COM1, the system then sees logical COM1 as the address on the modem card. It automatically remaps the built-in serial port that was designated as COM1 to COM3, which shares the COM1 IRQ setting. (Note that when you have two COM ports sharing an IRQ setting, you can use either port as necessary but you may not be able to use them both at the same time.) If you install one or more expansion cards with serial ports designated as COM1 and COM3, the corresponding built-in serial port is disabled.

Before adding a card that remaps the COM ports, check the documentation that accompanied your software to make sure that the software can be mapped to the new COM port designation.

To avoid autoconfiguration, you may be able to reset jumpers on the expansion card so that the card's port designation changes to the next available COM number, leaving the designation for the built-in port as is. Alternatively, you can disable the built-in ports through the System Setup program. The documentation for your expansion card should provide the card's default I/O address and allowable IRQ settings. It should also provide instructions for readdressing the port and changing the IRQ setting, if necessary.

The built-in parallel port has autoconfiguration capability through the System Setup program; that is, if you set the parallel port to its automatic configuration and add an expansion card containing a port configured as LPT1 (IRQ7, I/O address 378h), the system automatically remaps the built-in parallel port to its secondary address (IRQ5, I/O address 278h). If the secondary port address is already being used, the built-in parallel port is turned off.

For general information on how your operating system handles serial and parallel ports, and for more detailed command procedures, see your operating system documentation.

# Serial Port Connectors

If you reconfigure your hardware, you may need pin number and signal information for the serial port connectors. Figure B-2 illustrates the pin numbers for the serial port connectors, and Table B-1 lists and defines the pin assignments and interface signals for the serial port connectors.
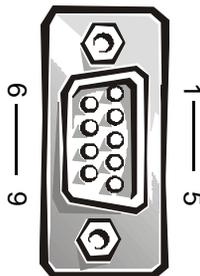


**Figure B-2.  Pin Numbers for the Serial Port Connectors**

**Table B-1.  Pin Assignments for the Serial Port Connectors**

| Pin | Signal | I/O | Definition |
| --- | --- | --- | --- |
| 1 | DCD | I | Data carrier detect |
| 2 | SIN | I | Serial input |
| 3 | SOUT | O | Serial output |
| 4 | DTR | O | Data terminal ready |
| 5 | GND | — | Signal ground |
| 6 | DSR | I | Data set ready |
| 7 | RTS | O | Request to send |
| 8 | CTS | I | Clear to send |
| 9 | RI | I | Ring indicator |
| Shell | — | — | Chassis ground |

# Parallel Port Connector

If you reconfigure your hardware, you may need pin number and signal information for the parallel port connector. Figure B-3 illustrates the pin numbers for the parallel port connector, and Table B-2 lists and defines the pin assignments and interface signals for the parallel port connector.
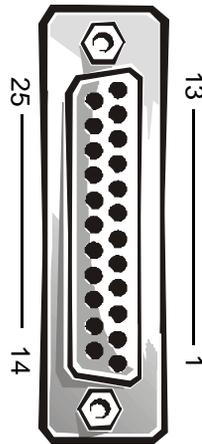
**Figure B-3.  Pin Numbers for the Parallel Port Connector**

**Table B-2.  Pin Assignments for the Parallel Port Connector**

| Pin | Signal | I/O | Definition |
| --- | --- | --- | --- |
| 1 | STB# | I/O | Strobe |
| 2 | PD0 | I/O | Printer data bit 0 |
| 3 | PD1 | I/O | Printer data bit 1 |
| 4 | PD2 | I/O | Printer data bit 2 |
| 5 | PD3 | I/O | Printer data bit 3 |
| 6 | PD4 | I/O | Printer data bit 4 |
| 7 | PD5 | I/O | Printer data bit 5 |
| 8 | PD6 | I/O | Printer data bit 6 |
| 9 | PD7 | I/O | Printer data bit 7 |
| 10 | ACK# | I | Acknowledge |
| 11 | BUSY | I | Busy |
| 12 | PE | I | Paper end |
| 13 | SLCT | I | Select |
| 14 | AFD# | O | Automatic feed |
| 15 | ERR# | I | Error |

**Table B-2. Pin Assignments for the Parallel Port Connector** (continued)

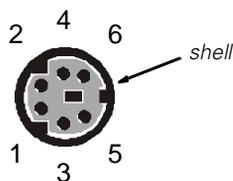| Pin | Signal | I/O | Definition |
|-----|--------|-----|------------|
| 16 | INIT# | O | Initialize printer |
| 17 | SLIN# | O | Select in |
| 18-25 | GND | — | Signal ground |

# Keyboard and Mouse Connectors

The system uses a Personal System/2 (PS/2)-style keyboard and supports a PS/2-compatible mouse. Cables from both devices attach to 6-pin, miniature Deutsche Industrie Norm (DIN) connectors on the back panel of your system.

A PS/2-compatible mouse works identically to an industry-standard serial mouse or bus mouse except that it has its own dedicated connector, which frees up both serial ports and does not require an expansion card. Circuitry inside the mouse detects the movement of a small ball and relays the direction to the system.

Mouse driver software can give the mouse priority with the microprocessor by issuing IRQ12 whenever new mouse movement is detected. The driver software also passes along the mouse data to the application program that is in control.

# Keyboard Connector

If you reconfigure your hardware, you may need pin number and signal information for the keyboard connector. Figure B-4 illustrates the pin numbers for the keyboard connector, and Table B-3, lists and defines the pin assignments and interface signals for the keyboard connector.
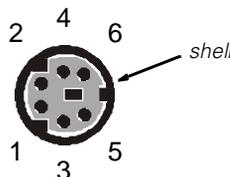


**Figure B-4. Pin Numbers for the Keyboard Connector**

**Table B-3.  Pin Assignments for the Keyboard Connector**

| Pin | Signal | I/O | Definition |
|-----|--------|-----|------------|
| 1 | KBDATA | I/O | Keyboard data |
| 2 | NC | — | No connection |
| 3 | GND | — | Signal ground |
| 4 | FVcc | — | Fused supply voltage |
| 5 | KBCLK | I/O | Keyboard clock |
| 6 | NC | — | No connection |
| Shell | — | — | Chassis ground |

# Mouse Connector

If you reconfigure your hardware, you may need pin number and signal information for the mouse connector. Figure B-5 illustrates the pin numbers for the mouse connector, and Table B-4, lists and defines the pin assignments and interface signals for the mouse connector.



**Figure B-5.   Pin Numbers for the Mouse Connector**

**Table B-4.  Pin Assignments for the Mouse Connector**

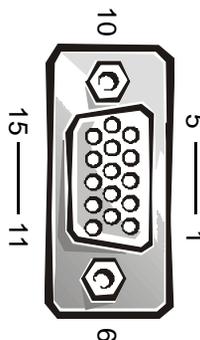| Pin | Signal | I/O | Definition |
|-----|--------|-----|------------|
| 1 | MFDATA | I/O | Mouse data |
| 2 | NC | — | No connection |
| 3 | GND | — | Signal ground |
| 4 | FVcc | — | Fused supply voltage |
| 5 | MFCLK | I/O | Mouse clock |
| 6 | NC | — | No connection |
| Shell | — | — | Chassis ground |

# *Video Connector*

The system uses a 15-pin high-density D-subminiature connector on the back panel for attaching a video graphics array (VGA)-compatible monitor to your system. The video circuitry on the system board synchronizes the signals that drive the red, green, and blue electron guns in the monitor.

*NOTE: Installing a video card automatically disables the system's built-in video subsystem.*

If you reconfigure your hardware, you may need pin number and signal information for the video connector. Figure B-6 illustrates the pin numbers for the video connector, and Table B-5 lists and defines the pin assignments and interface signals for the video connector.



*Figure B-6.  Pin Numbers for the Video Connector*

*Table B-5.  Pin Assignments for the Video Connector*

| Pin | Signal | I/O | Definition |
|-----|--------|-----|------------|
| 1 | RED | O | Red video |
| 2 | GREEN | O | Green video |
| 3 | BLUE | O | Blue video |
| 4 | NC | — | No connection |
| 5-8, 10 | GND | — | Signal ground |
| 9 | VCC | — | Vcc |
| 11 | NC | — | No connection |
| 12 | DDC data out | O | Monitor detect data |
| 13 | HSYNC | O | Horizontal synchronization |
| 14 | VSYNC | O | Vertical synchronization |
| 15 | DDC clock out | O | Monitor detect clock |
| Shell | — | — | Chassis ground |

# Integrated Network Interface Controller Connector

Your system has an integrated 10/100–megabit-per-second (Mbps) network interface controller (NIC). The NIC provides all the functions of a separate network expansion card and supports both the 10BASE-T and 100BASE-TX Ethernet standards.

The NIC includes a Wakeup On LAN feature that enables the computer to be started by a special local area network (LAN) signal from a server management console. Wakeup On LAN provides remote computer setup, software downloading and installation, file updates, and asset tracking after hours and on weekends when LAN traffic is typically at a minimum.

## Network Cable Requirements

Your computer's RJ45 NIC connector is designed for attaching an unshielded twisted pair (UTP) Ethernet cable equipped with standard RJ45-compatible plugs. Press one end of the UTP cable into the NIC connector until the plug 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. Observe the following cabling restrictions for 10BASE-T and 100BASE-TX networks.

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

- For 10BASE-T networks, use Category 3 or greater wiring and connectors.
- For 100BASE-TX networks, use Category 5 or greater wiring and connectors.
- The maximum cable run length (from a workstation to a concentrator) is 328 feet (ft) (100 meters [m]).
- For 10BASE-T networks, the maximum number of daisy-chained concentrators on one network segment is four.

# USB Connectors

Your system contains two Universal Serial Bus (USB) connectors for attaching USB-compliant devices. USB devices are typically peripherals such as keyboards, mice, printers, and computer speakers.

**NOTICE: Do not attach a USB device or a combination of USB devices that draw a maximum current over 500 milliamperes (mA) per channel or +5 volts (V). Attaching devices that exceed this threshold may cause the USB ports to shut down. See the documentation that accompanied the USB devices for their maximum current ratings.**

If you reconfigure your hardware, you may need pin number and signal information for the USB connectors. Figure B-7 illustrates the pin numbers for the USB connectors, and Table B-6 lists and defines the pin assignments and interface signals for the USB connectors.
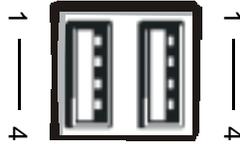
**Figure B-7. Pin Numbers for the USB Connectors**

**Table B-6. Pin Assignments for the USB Connectors**

| Pin | Signal | I/O | Definition |
|-----|--------|-----|------------|
| 1 | Vcc | N/A | Supply voltage |
| 2 | DATA | I | Data in |
| 3 | +DATA | O | Data out |
| 4 | GND | N/A | Signal ground |

# A P P E N D I X   C
# *Regulatory Notices*

Electromagnetic Interference (EMI) is any signal or emission, radiated in free space or conducted along power or signal leads, that endangers the functioning of a radio navigation or other safety service or seriously degrades, obstructs, or repeatedly interrupts a licensed radio communications service. Radio communications services include but are not limited to AM/FM commercial broadcast, television, cellular services, radar, air-traffic control, pager, and Personal Communication Services (PCS). These licensed services, along with unintentional radiators such as digital devices, including computer systems, contribute to the electromagnetic environment.

Electromagnetic Compatibility (EMC) is the ability of items of electronic equipment to function properly together in the electronic environment. While this computer system has been designed and determined to be compliant with regulatory agency limits for EMI, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause interference with radio communications services, which can be determined by turning the equipment off and on, you are encouraged to try to correct the interference by one or more of the following measures:

- Reorient the receiving antenna.
- Relocate the computer with respect to the receiver.
- Move the computer away from the receiver.
- Plug the computer into a different outlet so that the computer and the receiver are on different branch circuits.

If necessary, consult a Technical Support representative of Dell or an experienced radio/television technician for additional suggestions. You may find the *FCC Interference Handbook, 1986*, to be helpful. It is available from the U.S. Government Printing Office, Washington, DC 20402, Stock No. 004-000-00450-7 or on the World Wide Web at **http://www.fcc.gov/cib/Publications/tvibook.html**.

Dell computer systems are designed, tested, and classified for their intended electromagnetic environment. These electromagnetic environment classifications generally refer to the following harmonized definitions:

- Class A is typically for business or industrial environments.
- Class B is typically for residential environments.

Information Technology Equipment (ITE), including peripherals, expansion cards, printers, input/output (I/O) devices, monitors, and so on, that are integrated into or

connected to the system should match the electromagnetic environment classification of the computer system.

**A Notice About Shielded Signal Cables: Use only shielded cables for connecting peripherals to any Dell device to reduce the possibility of interference with radio communications services. Using shielded cables ensures that you maintain the appropriate EMC classification for the intended environment. For parallel printers, a cable is available from Dell. If you prefer, you can order a cable from Dell on the World Wide Web at http://www.dell.com/products/dellware/index.htm.**

Most Dell computer systems are classified for Class B environments. To determine the electromagnetic classification for your system or device, refer to the following sections specific for each regulatory agency. Each section provides country-specific EMC/EMI or product safety information.

## FCC Notices (U.S. Only)

Most Dell computer systems are classified by the Federal Communications Commission (FCC) as Class B digital devices. However, the inclusion of certain options can change the rating of some configurations to Class A. To determine which classification applies to your computer system, examine all FCC registration labels located on the bottom or back panel of your computer, on card-mounting brackets, and on the cards themselves. If any one of the labels carries a Class A rating, your entire system is considered to be a Class A digital device. If *all* labels carry an FCC Class B rating as distinguished by either an FCC ID number or the FCC logo, (**FC**), your system is considered to be a Class B digital device.

Once you have determined your system's FCC classification, read the appropriate FCC notice. Note that FCC regulations provide that changes or modifications not expressly approved by Dell could void your authority to operate this equipment.

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

- This device may not cause harmful interference.
- This device must accept any interference received, including interference that may cause undesired operation.

### Class A

This equipment has been tested and found to comply with the limits for a Class A digital device pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the manufacturer's instruction manual, may cause harmful interference with radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case you will be required to correct the interference at your own expense.

## Class B

This equipment has been tested and found to comply with the limits for a Class B digital device pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the manufacturer's instruction manual, may cause interference with radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, you are encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and the receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/television technician for help.

The following information is provided on the device or devices covered in this document in compliance with FCC regulations:

- Model number: MMP
- Company name: Dell Computer Corporation
  EMC Engineering Department
  One Dell Way
  Round Rock, Texas 78682 USA
  512-338-4400

# IC Notice (Canada Only)

Most Dell computer systems (and other Dell digital apparatus) are classified by the Industry Canada (IC) Interference-Causing Equipment Standard #3 (ICES-003) as Class B digital devices. To determine which classification (Class A or B) applies to your computer system (or other Dell digital apparatus), examine all registration labels located on the bottom or the back panel of your computer (or other digital apparatus). A statement in the form of "IC Class A ICES-003" or "IC Class B ICES-003" will be located on one of these labels. Note that Industry Canada regulations provide that changes or modifications not expressly approved by Dell could void your authority to operate this equipment.

This Class B (or Class A, if so indicated on the registration label) digital apparatus meets the requirements of the Canadian Interference-Causing Equipment Regulations.

Cet appareil numérique de la Classe B (ou Classe A, si ainsi indiqué sur l'étiquette d'enregistration) respecte toutes les exigences du Reglement sur le Materiel Brouilleur du Canada.

# CE Notice (European Union)

Marking by the symbol $\mathsf{C}\mathsf{E}$ indicates compliance of this Dell system to the EMC Directive and the Low Voltage Directive of the European Union. Such marking is indicative that this Dell system meets the following technical standards:

- EN 55022 — "Limits and Methods of Measurement of Radio Interference Characteristics of Information Technology Equipment."

- EN 50082-1: 1992 — "Electromagnetic compatibility—Generic immunity standard Part 1: Residential, commercial, and light industry."

- EN 60950 — "Safety of Information Technology Equipment."

*NOTE: EN 55022 emissions requirements provide for two classifications:*

- *Class A is for typical commercial areas.*

- *Class B is for typical domestic areas.*

This Dell device is classified for use in a typical Class B domestic environment.

A "Declaration of Conformity" in accordance with the preceding directives and standards has been made and is on file at Dell Computer Corporation Products Europe BV, Limerick, Ireland.

# Battery Disposal

Your computer system uses a lithium ion battery. The lithium ion battery is a long-life battery, and it is very possible that you will never need to replace it. However, should you need to replace it, refer to the section about replacing the battery in your Dell system documentation for instructions.

Do not dispose of the battery along with household waste. Contact your local waste disposal agency for the address of the nearest battery deposit site.

*NOTE: Your system may also include circuit cards or other components that contain batteries. These batteries must also be disposed of in a battery deposit site. For information about such batteries, refer to the documentation for the specific card or component.*

# EN 55022 Compliance (Czech Republic Only)

This device belongs to Class B devices as described in EN 55022, unless it is specifically stated that it is a Class A device on the specification label. The following applies to devices in Class A of EN 55022 (radius of protection up to 30 meters). The user of the device is obliged to take all steps necessary to remove sources of interference to telecommunication or other devices.

Pokud není na typovém štitku počítače uvedeno, že spadá do třídy A podle EN 55022, spadá automaticky do třídy B podle EN 55022. Pro zařízení zařazená do třídy A (ochranné pásmo 30m) podle EN 55022 platí následující. Dojde-li k rušení telekomunikačních nebo jiných zařízení, je uživatel povinen provést taková opatření, aby rušení odstranil.

# VCCI Notice (Japan Only)

Most Dell computer systems are classified by the Voluntary Control Council for Interference (VCCI) as Class B information technology equipment (ITE). However, the inclusion of certain options can change the rating of some configurations to Class A. ITE, including peripherals, expansion cards, printers, input/output (I/O) devices, monitors, and so on, integrated into or connected to the system, should match the electromagnetic environment classification (Class A or B) of the computer system.

To determine which classification applies to your computer system, examine the regulatory labels/markings (see Figures C-1 and C-2) located on the bottom or back panel of your computer. Once you have determined your system's VCCI classification, read the appropriate VCCI notice.

## Class A ITE

この装置は、情報処理装置等電波障害自主規制協議会 (VCCI) の基準に基づくクラス A 情報技術装置です。この装置を家庭環境で使用すると電波妨害を引き起こすことがあります。この場合には使用者が適切な対策を講ずるよう要求されることがあります。

This is a Class A product based on the standard of the Voluntary Control Council for Interference (VCCI) for information technology equipment. If this equipment is used in a domestic environment, radio disturbance may arise. When such trouble occurs, the user may be required to take corrective actions.

# VCCI-A

**Figure C-1. VCCI Class A ITE Regulatory Mark**

### Class B ITE

この装置は、情報処理装置等電波障害自主規制協議会（VCCI）の基準
に基づく クラス B 情報技術装置です。この装置は家庭環境で使用するこ
とを目的としていますが、ラジオやテレビジョン受信機に近接して使用され
ると、受信障害を引き起こすことがあります。
　取扱説明書に従って正しい取り扱いをしてください。

This is a Class B product based on the standard of the Voluntary Control Council for Interference (VCCI) for information technology equipment. If this equipment is used near a radio or television receiver in a domestic environment, it may cause radio interference. Install and use the equipment according to the instruction manual.



**Figure C-2.  VCCI Class B ITE Regulatory Mark**

# MIC Notice (Republic of Korea Only)

To determine which classification (Class A or B) applies to your computer system (or other Dell digital device), examine the Republic of Korean Ministry of Information and Communications (MIC) registration labels located on your computer (or other Dell digital device). The MIC label may be located separately from the other regulatory marking applied to your product. Line three of the label identifies the emissions class for the product—"(A)" for Class A products or "(B)" for Class B products.

*NOTE: MIC emissions requirements provide for two classifications:*

- *Class A devices are for business purposes.*
- *Class B devices are for nonbusiness purposes.*

### Class A Device

| 기 종 별 | 사 용 자 안 내 문 |
|---|---|
| A급 기기<br>(업무용 정보통신기기) | 이 기기는 업무용으로 전자파적합등록을 한 기기이오니 판매자 또는 사용자는 이 점을 주의하시기 바라며 만약 잘못 판매 또는 구입 하였을 때에는 가정용으로 교환하시기 바랍니다. |

Please note that this device has been approved for business purposes with regard to electromagnetic interference. If you find that this device is not suitable for your use, you may exchange it for a nonbusiness-purpose device.



1. 기기의 명칭(모델명) :
2. 인증번호 :
3. 인증받은 자의 상호 : (A)
4. 제조년월일:
5. 제조자/제조국가 :

### Class B Device

| 기종별 | 사용자 안내문 |
|---|---|
| B급 기기 (가정용 정보통신기기) | 이 기기는 가정용으로 전자파적합등록을 한 기기로서 주거지역에서는 물론 모든 지역에 서 사용할 수 있습니다. |

Please note that this device has been approved for nonbusiness purposes and may be used in any environment, including residential areas.



1. 기기의 명칭(모델명) :
2. 인증번호 :
3. 인증받은 자의 상호 : (B)
4. 제조년월일:
5. 제조자/제조국가 :

# Polish Center for Testing and Certification Notice

The equipment should draw power from a socket with an attached protection circuit (a three-prong socket). All equipment that works together (computer, monitor, printer, and so on) should have the same power supply source.

The phasing conductor of the room's electrical installation should have a reserve short-circuit protection device in the form of a fuse with a nominal value no larger than 16 amperes (A).

To completely switch off the equipment, the power supply cable must be removed from the power supply socket, which should be located near the equipment and easily accessible.

A protection mark "B" confirms that the equipment is in compliance with the protection usage requirements of standards PN-93/T-42107 and PN-EN 55022: 1996.

## *Wymagania Polskiego Centrum Badań i Certyfikacji*

Urządzenie powinno być zasilane z gniazda z przyłączonym obwodem ochronnym (gniazdo z kołkiem). Współpracujące ze sobą urządzenia (komputer, monitor, drukarka) powinny być zasilane z tego samego źródła.

Instalacja elektryczna pomieszczenia powinna zawierać w przewodzie fazowym rezerwową ochronę przed zwarciami, w postaci bezpiecznika o wartości znamionowej nie większej niż 16A (amperów).

W celu całkowitego wyłączenia urządzenia z sieci zasilania, należy wyjąć wtyczkę kabla zasilającego z gniazdka, które powinno znajdować się w pobliżu urządzenia i być łatwo dostępne.

Znak bezpieczeństwa "B" potwierdza zgodność urządzenia z wymaganiami bezpieczeństwa użytkowania zawartymi w PN−93/T−42107 i PN−EN 55022:1996.

Jeżeli na tabliczce znamionowej umieszczono informację, że urządzenie jest klasy A, to oznacza to, że urządzenie w środowisku mieszkalnym może powodować zakłócenia radioelektryczne. W takich przypadkach można żądać od jego użytkownika zastosowania odpowiednich środków zaradczych.

## *Pozostałe instrukcje bezpieczeństwa*

- Nie należy używać wtyczek adapterowych lub usuwać kołka obwodu ochronnego z wtyczki. Jeżeli konieczne jest użycie przedłużacza to należy użyć przedłużacza 3-żyłowego z prawidłowo połączonym przewodem ochronnym.

- System komputerowy należy zabezpieczyć przed nagłymi, chwilowymi wzrostami lub spadkami napięcia, używając eliminatora przepięć, urządzenia dopasowującego lub bezzakłóceniowego źródła zasilania.

- Należy upewnić się, aby nic nie leżało na kablach systemu komputerowego, oraz aby kable nie były umieszczone w miejscu, gdzie można byłoby na nie nadeptywać lub potykać się o nie.

- Nie należy rozlewać napojów ani innych płynów na system komputerowy.

- Nie należy wpychać żadnych przedmiotów do otworów systemu komputerowego, gdyż może to spowodować pożar lub porażenie prądem, poprzez zwarcie elementów wewnętrznych.

- System komputerowy powinien znajdować się z dala od grzejników i źródeł ciepła. Ponadto, nie należy blokować otworów wentylacyjnych. Należy unikać kładzenia luźnych papierów pod komputer oraz umieszczania komputera w ciasnym miejscu bez możliwości cyrkulacji powietrza wokół niego.

# NOM Information (Mexico Only)

The following information is provided on the device(s) described in this document in compliance with the requirements of the official Mexican standards (NOM):

|   |   |
|---|---|
| Exporter: | Dell Computer Corporation<br>One Dell Way<br>Round Rock, TX 78682 |
| Importer: | Dell Computer de México,<br>S.A. de C.V.<br>Paseo de la Reforma 2620 - 11° Piso<br>Col. Lomas Altas<br>11950 México, D.F. |
| Ship to: | Dell Computer de México,<br>  S.A. de C.V. al Cuidado de Kuehne<br>  & Nagel de<br>  México S. de R.I.<br>Avenida Soles No. 55<br>Col. Peñon de los Baños<br>15520 México, D.F. |
| Supply voltage: | 115/230 VAC |
| Frequency: | 60/50 Hz |
| Input current rating: | 6.0/3.0 A |

# Información para NOM (únicamente para México)

La información siguiente se proporciona en el dispositivo o en los dispositivos descritos en este documento, en cumplimiento con los requisitos de la Norma Oficial Mexicana (NOM):

| | |
|---|---|
| Exportador: | Dell Computer Corporation<br>One Dell Way<br>Round Rock, TX 78682 |
| Importador: | Dell Computer de México,<br>S.A. de C.V.<br>Paseo de la Reforma 2620 - 11° Piso<br>Col. Lomas Altas<br>11950 México, D.F. |
| Embarcar a: | Dell Computer de México, S.A. de<br>   C.V. al Cuidado de Kuehne & Nagel<br>   de México S. de R.I.<br>Avenida Soles No. 55<br>Col. Peñon de los Baños<br>15520 México, D.F. |
| Tensión<br>alimentación: | 115/230 VAC |
| Frecuencia: | 60/50 Hz |
| Consumo de<br>corriente: | 6.0/3.0 A |

# BSMI Notice (Taiwan Only)

> ## 警告使用者：
> 這是甲類的資訊產品，在居住的環境中使用時，
> 可能會造成射頻干擾，在這種情況下，使用者會
> 被要求採取某些適當的對策。

# APPENDIX D

# *Limited Warranty and Return Policy*

## *Three-Year Limited Warranty (U.S. Only)*

Dell Computer Corporation ("Dell") manufactures its hardware products from parts and components that are new or equivalent to new in accordance with industry-standard practices. Dell warrants that the hardware products it manufactures will be free from defects in materials and workmanship. The limited warranty term is three years beginning on the date of invoice, as described in the following text.

Damage due to shipping the products to you is covered under this limited warranty. Otherwise, this limited warranty does not cover damage due to external causes, including accident, abuse, misuse, problems with electrical power, servicing not authorized by Dell, usage not in accordance with product instructions, failure to perform required preventive maintenance, and problems caused by use of parts and components not supplied by Dell.

This limited warranty does not cover any items that are in one or more of the following categories: software; external devices (except as specifically noted); accessories or parts added to a Dell system after the system is shipped from Dell; accessories or parts added to a Dell system through Dell's system integration department; accessories or parts that are not installed in the Dell factory; or DellWare™ products. Monitors, keyboards, and mice that are Dell-branded or that are included on Dell's standard price list are covered under this limited warranty; all other monitors, keyboards, and mice (including those sold through the DellWare program) are not covered. Batteries for portable computers are covered only during the initial one-year period of this limited warranty.

### *Coverage During Year One*

During the one-year period beginning on the invoice date, Dell will repair or replace products covered under this limited warranty that are returned to Dell's facility. To request warranty service, you must call Dell's Customer Technical Support within the warranty period. Refer to the chapter titled "Getting Help" in your system's troubleshooting documentation or, for some systems, the section titled "Contacting Dell" in your system's online guide to find the appropriate telephone number for obtaining customer assistance. If warranty service is required, Dell will issue a Return Material Authorization Number. You must ship the products back to Dell in their original or

equivalent packaging, prepay shipping charges, and insure the shipment or accept the risk of loss or damage during shipment. Dell will ship the repaired or replacement products to you freight prepaid if you use an address in the continental U.S., where applicable. Shipments to other locations will be made freight collect.

*NOTE: Before you ship the product(s) to Dell, back up the data on the hard-disk drive(s) and any other storage device(s) in the product(s). Remove any removable media, such as diskettes, CDs, or PC Cards. Dell does not accept liability for lost data or software.*

Dell owns all parts removed from repaired products. Dell uses new and reconditioned parts made by various manufacturers in performing warranty repairs and building replacement products. If Dell repairs or replaces a product, its warranty term is not extended.

### Coverage During Years Two and Three

During the second and third years of this limited warranty, Dell will provide, on an exchange basis and subject to Dell's Exchange Policy in effect on the date of the exchange, replacement parts for the Dell hardware product(s) covered under this limited warranty when a part requires replacement. You must report each instance of hardware failure to Dell's Customer Technical Support in advance to obtain Dell's concurrence that a part should be replaced and to have Dell ship the replacement part. Dell will ship parts (freight prepaid) if you use an address in the continental U.S., where applicable. Shipments to other locations will be made freight collect. Dell will include a prepaid shipping container with each replacement part for your use in returning the replaced part to Dell. Replacement parts are new or reconditioned. Dell may provide replacement parts made by various manufacturers when supplying parts to you. The warranty term for a replacement part is the remainder of the limited warranty term.

You will pay Dell for replacement parts if the replaced part is not returned to Dell. The process for returning replaced parts, and your obligation to pay for replacement parts if you do not return the replaced parts to Dell, will be in accordance with Dell's Exchange Policy in effect on the date of the exchange.

You accept full responsibility for your software and data. Dell is not required to advise or remind you of appropriate backup and other procedures.

### General Provisions

THIS LIMITED WARRANTY GIVES YOU SPECIFIC LEGAL RIGHTS WHICH VARY FROM STATE TO STATE (OR JURISDICTION TO JURISDICTION). DELL'S RESPONSIBILITY FOR MALFUNCTIONS AND DEFECTS IN HARDWARE IS LIMITED TO REPAIR AND REPLACEMENT AS SET FORTH IN THIS LIMITED WARRANTY STATEMENT. ALL EXPRESS AND IMPLIED WARRANTIES FOR THE PRODUCT, INCLUDING BUT NOT LIMITED TO ANY IMPLIED WARRANTIES OF AND CONDITIONS OF MERCHANTIBILITY AND FITNESS FOR A PARTICULAR PURPOSE, ARE LIMITED IN DURATION TO THE WARRANTY PERIOD SET FORTH ABOVE AND NO WARRANTIES, WHETHER EXPRESS OR IMPLIED, WILL APPLY AFTER SUCH PERIOD.

SOME STATES (OR JURISDICTIONS) DO NOT ALLOW LIMITATIONS ON HOW LONG AN IMPLIED WARRANTY LASTS, SO THE PRECEDING LIMITATION MAY NOT APPLY TO YOU.

DELL DOES NOT ACCEPT LIABILITY BEYOND THE REMEDIES SET FORTH IN THIS LIMITED WARRANTY STATEMENT OR LIABILITY FOR INCIDENTAL OR CONSE-QUENTIAL DAMAGES, INCLUDING WITHOUT LIMITATION ANY LIABILITY FOR PRODUCTS NOT BEING AVAILABLE FOR USE OR FOR LOST DATA OR SOFTWARE.

SOME STATES (OR JURISDICTIONS) DO NOT ALLOW THE EXCLUSION OR LIMITA-TION OF INCIDENTAL OR CONSEQUENTIAL DAMAGES, SO THE PRECEDING EXCLUSION OR LIMITATION MAY NOT APPLY TO YOU.

These provisions apply to Dell's three-year limited warranty only. For provisions of any service contract covering your system, refer to your invoice or the separate service contract that you will receive.

If Dell elects to exchange a system or component, the exchange will be made in accordance with Dell's Exchange Policy in effect on the date of the exchange. In any instance in which Dell issues a Return Material Authorization Number, Dell must receive the product(s) for repair prior to the expiration of the warranty period in order for the repair(s) to be covered by the limited warranty.

*NOTE: If you chose one of the available warranty and service options in place of the standard three-year limited warranty described in the preceding text, the option you chose will be listed on your invoice.*

# Three-Year Limited Warranty (Canada Only)

Dell Computer Corporation ("Dell") manufactures its hardware products from parts and components that are new or equivalent to new in accordance with industry-standard practices. Dell warrants that the hardware products it manufactures will be free from defects in materials and workmanship. The warranty term is three years beginning on the date of invoice, as described in the following text.

Damage due to shipping the products to you is covered under this limited warranty. Otherwise, this limited warranty does not cover damage due to external causes, including accident, abuse, misuse, problems with electrical power, servicing not authorized by Dell, usage not in accordance with product instructions, failure to per-form required preventive maintenance, and problems caused by use of parts and components not supplied by Dell.

This limited warranty does not cover any items that are in one or more of the follow-ing categories: software; external devices (except as specifically noted); accessories or parts added to a Dell system after the system is shipped from Dell; accessories or parts added to a Dell system through Dell's system integration department; accesso-ries or parts that are not installed in the Dell factory; or DellWare products. Monitors, keyboards, and mice that are Dell-branded or that are included on Dell's standard price list are covered under this limited warranty; all other monitors, keyboards, and mice (including those sold through the DellWare program) are not covered. Batteries for

portable computers are covered only during the initial one-year period of this limited warranty.

## Coverage During Year One

During the one-year period beginning on the invoice date, Dell will repair or replace products covered under this limited warranty that are returned to Dell's facility. To request warranty service, you must call Dell's Customer Technical Support within the warranty period. Refer to the chapter titled "Getting Help" in your system's trouble-shooting documentation or, for some systems, the section titled "Contacting Dell" in your system's online guide to find the appropriate telephone number for obtaining customer assistance. If warranty service is required, Dell will issue a Return Material Authorization Number. You must ship the products back to Dell in their original or equivalent packaging, prepay shipping charges, and insure the shipment or accept the risk of loss or damage during shipment. Dell will ship the repaired or replacement products to you freight prepaid if you use an address in Canada, where applicable. Shipments to other locations will be made freight collect.

*NOTE: Before you ship the product(s) to Dell, back up the data on the hard-disk drive(s) and any other storage device(s) in the product(s). Remove any removable media, such as diskettes, CDs, or PC Cards. Dell does not accept liability for lost data or software.*

Dell owns all parts removed from repaired products. Dell uses new and reconditioned parts made by various manufacturers in performing warranty repairs and building replacement products. If Dell repairs or replaces a product, its warranty term is not extended.

## Coverage During Years Two and Three

During the second and third years of this limited warranty, Dell will provide, on an exchange basis and subject to Dell's Exchange Policy in effect on the date of the exchange, replacement parts for the Dell hardware product(s) covered under this limited warranty when a part requires replacement. You must report each instance of hardware failure to Dell's Customer Technical Support in advance to obtain Dell's concurrence that a part should be replaced and to have Dell ship the replacement part. Dell will ship parts (freight prepaid) if you use an address in Canada, where applicable. Shipments to other locations will be made freight collect. Dell will include a prepaid shipping container with each replacement part for your use in returning the replaced part to Dell. Replacement parts are new or reconditioned. Dell may provide replacement parts made by various manufacturers when supplying parts to you. The warranty term for a replacement part is the remainder of the limited warranty term.

You will pay Dell for replacement parts if the replaced part is not returned to Dell. The process for returning replaced parts, and your obligation to pay for replacement parts if you do not return the replaced parts to Dell, will be in accordance with Dell's Exchange Policy in effect on the date of the exchange.

You accept full responsibility for your software and data. Dell is not required to advise or remind you of appropriate backup and other procedures.

### General Provisions

DELL MAKES NO EXPRESS WARRANTIES OR CONDITIONS BEYOND THOSE STATED IN THIS LIMITED WARRANTY STATEMENT. DELL DISCLAIMS ALL OTHER WARRANTIES AND CONDITIONS, EXPRESS OR IMPLIED, INCLUDING WITHOUT LIMITATION IMPLIED WARRANTIES AND CONDITIONS OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. SOME STATES (OR JURISDICTIONS) DO NOT ALLOW LIMITATIONS ON IMPLIED WARRANTIES OR CONDITIONS, SO THIS LIMITATION MAY NOT APPLY TO YOU.

DELL'S RESPONSIBILITY FOR MALFUNCTIONS AND DEFECTS IN HARDWARE IS LIMITED TO REPAIR AND REPLACEMENT AS SET FORTH IN THIS LIMITED WAR-RANTY STATEMENT. THESE WARRANTIES GIVE YOU SPECIFIC LEGAL RIGHTS, AND YOU MAY ALSO HAVE OTHER RIGHTS, WHICH VARY FROM STATE TO STATE (OR JURISDICTION TO JURISDICTION).

DELL DOES NOT ACCEPT LIABILITY BEYOND THE REMEDIES SET FORTH IN THIS LIMITED WARRANTY STATEMENT OR LIABILITY FOR INCIDENTAL OR CONSE-QUENTIAL DAMAGES, INCLUDING WITHOUT LIMITATION ANY LIABILITY FOR PRODUCTS NOT BEING AVAILABLE FOR USE OR FOR LOST DATA OR SOFTWARE.

SOME STATES (OR JURISDICTIONS) DO NOT ALLOW THE EXCLUSION OR LIMITA-TION OF INCIDENTAL OR CONSEQUENTIAL DAMAGES, SO THE PRECEDING EXCLUSION OR LIMITATION MAY NOT APPLY TO YOU.

These provisions apply to Dell's three-year limited warranty only. For provisions of any service contract covering your system, refer to your invoice or the separate service contract that you will receive.

If Dell elects to exchange a system or component, the exchange will be made in accordance with Dell's Exchange Policy in effect on the date of the exchange. In any instance in which Dell issues a Return Material Authorization Number, Dell must receive the product(s) for repair prior to the expiration of the warranty period in order for the repair(s) to be covered by the limited warranty.

*NOTE: If you chose one of the available warranty and service options in place of the standard three-year limited warranty described in the preceding text, the option you chose will be listed on your invoice.*

# One-Year End-User Manufacturer Guarantee (Latin America and the Caribbean Only)

### Guarantee

Dell Computer Corporation ("Dell") warrants to the end user in accordance with the following provisions that its branded hardware products, purchased by the end user from a Dell company or an authorized Dell distributor in Latin America or the Carib-bean, will be free from defects in materials, workmanship, and design affecting

normal use, for a period of one year from the original purchase date. Products for which proper claims are made will, at Dell's option, be repaired or replaced at Dell's expense. Dell owns all parts removed from repaired products. Dell uses new and reconditioned parts made by various manufacturers in performing repairs and building replacement products.

## Exclusions

This Guarantee does not apply to defects resulting from: improper or inadequate installation, use, or maintenance; actions or modifications by unauthorized third parties or the end user; accidental or willful damage; or normal wear and tear.

## Making a Claim

Claims must be made in Latin America or the Caribbean by contacting the Dell point of sale within the guarantee period. The end user must always supply proof of purchase, indicating name and address of the seller, date of purchase, model and serial number, name and address of the customer, and details of symptoms and configuration at the time of malfunction, including peripherals and software used. Otherwise, Dell may refuse the guarantee claim. Upon diagnosis of a warranted defect, Dell will make arrangements and pay for ground freight and insurance to and from Dell's repair/replacement center. The end user must ensure that the defective product is available for collection properly packed in original or equally protective packaging together with the details listed above and the return number provided to the end user by Dell.

## Limitation and Statutory Rights

Dell makes no other warranty, guarantee or like statement other than as explicitly stated above, and this Guarantee is given in place of all other guarantees whatsoever, to the fullest extent permitted by law. In the absence of applicable legislation, this Guarantee will be the end user's sole and exclusive remedy against Dell or any of its affiliates, and neither Dell nor any of its affiliates shall be liable for loss of profit or contracts, or any other indirect or consequential loss arising from negligence, breach of contract, or howsoever.

**This Guarantee does not impair or affect mandatory statutory rights of the end user against and/or any rights resulting from other contracts concluded by the end user with Dell and/or any other seller.**

**Dell World Trade LP**
One Dell Way, Round Rock, TX 78682, USA

**Dell Computadores do Brasil Ltda (CNPJ No. 72.381.189/0001-10)/**
**Dell Commercial do Brasil Ltda (CNPJ No. 03 405 822/0001-40)**
Avenida Industrial Belgraf, 400
92990-000 - Eldorado do Sul – RS - Brasil

**Dell Computer de Chile Ltda**
Coyancura 2283, Piso 3- Of.302,
Providencia, Santiago - Chile

**Dell Computer de Colombia Corporation**
Carrera 7 #115-33 Oficina 603
Bogota, Colombia

**Dell Computer de Mexico SA de CV**
Rio Lerma #302- 4 Piso
Col. Cuauhtemoc, Mexico, D.F. 06500

# *"Total Satisfaction" Return Policy (U.S. and Canada Only)*

If you are an end-user customer who bought new products directly from a Dell company, you may return them to Dell within 30 days of the date of invoice for a refund or credit of the product purchase price. If you are an end-user customer who bought reconditioned or refurbished products from a Dell company, you may return them to Dell within 14 days of the date of invoice for a refund or credit of the product purchase price. In either case, the refund or credit will not include any shipping and handling charges shown on your invoice. If you are an organization that bought the products under a written agreement with Dell, the agreement may contain different terms for the return of products than specified by this policy.

To return products, you must call Dell Customer Service to receive a Credit Return Authorization Number. Refer to the chapter titled "Getting Help" in your system's troubleshooting documentation or, for some systems, the section titled "Contacting Dell" in your system's online guide to find the appropriate telephone number for obtaining customer assistance. To expedite the processing of your refund or credit, Dell expects you to return the products to Dell in their original packaging within five days of the date that Dell issues the Credit Return Authorization Number. You must also prepay shipping charges and insure the shipment or accept the risk of loss or damage during shipment. You may return software for refund or credit only if the sealed package containing the diskette(s) or CD(s) is unopened. Returned products must be in as-new condition, and all of the manuals, diskette(s), CD(s), power cables, and other items included with a product must be returned with it. For customers who want to return, for refund or credit only, either applications software or an operating system that has been installed by Dell, the whole system must be returned, along with any media and documentation that may have been included in the original shipment.

This "Total Satisfaction" Return Policy does not apply to DellWare products, which may be returned under DellWare's then-current return policy. In addition, reconditioned parts purchased through Dell Spare Parts Sales in Canada are nonreturnable.

# *Glossary*

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

## *A*
Abbreviation for ampere(s).

## *AC*
Abbreviation for alternating current.

## *adapter card*
An expansion card that plugs into an expansion-card connector on the computer's system board. An adapter card adds some specialized function to the computer by providing an interface between the expansion bus and a peripheral device. Examples of adapter cards include network cards, sound boards, and SCSI adapters.

## *ADI*
Abbreviation for Autodesk Device Interface.

## *AI*
Abbreviation for artificial intelligence.

## *ANSI*
Acronym for American National Standards Institute.

## *application program*
Software designed to help you perform a specific task, such as a spreadsheet or word processor. Application programs are distinct from operating system and utility software.

## *ASCII*
Acronym for American Standard Code for Information Interchange. A text file containing only characters from the ASCII character set (usually created with a text editor, such as MS-DOS Editor or Notepad in Microsoft Windows operating system) is called an ASCII file.

## *ASIC*
Acronym for application-specific integrated circuit.

## *ASPI®*
Acronym for Advanced SCSI programming interface.

## *autoexec.bat file*
When you boot your computer, MS-DOS runs any commands contained in the text file, **autoexec.bat** (after running any commands in the **config.sys** file). An **autoexec.bat** file is not required to boot MS-DOS, but provides a convenient place to run commands that are essential for setting up a consistent computing environment—such as loading mouse or network software.

## *backup*
A copy of a program or data file. As a precaution, you should back up your computer's hard-disk drive on a regular basis. Before making a change to the configuration of your computer, you should back up important start-up files, such as **autoexec.bat** and **config.sys** for MS-DOS or **win.ini** and **system.ini** for Microsoft Windows.

**base memory**
Synonym for conventional memory.

**BASIC**
Acronym for Beginner's All-Purpose Symbolic Instruction Code, a programming language. MS-DOS includes a version of BASIC.

**batch file**
An ASCII text file containing a list of commands that run in sequence. Batch files must have a filename extension of **.bat**.

**baud rate**
Data transmission speed. For example, modems are designed to transmit data at one or more specified baud rate(s) through the COM (serial) port of a computer.

**BBS**
Abbreviation for bulletin board service. A computer system that serves as a central location for accessing data or relaying messages by modem. For example, Dell's TechConnect BBS contains the latest version of software such as video drivers and the Dell Directory. If your system has a modem, you can access the BBS and download the most recent version of this software.

**beep code**
A diagnostic system message in the form of a series of beeps from your computer's speaker. See your *Installation and Troubleshooting Guide* for a complete discussion of system beep codes.

**BIOS**
Acronym for basic input/output system. Your computer's BIOS contains programs stored on a ROM chip. The BIOS controls the following functions:

- Communications between the microprocessor and peripheral devices such as the keyboard and the video adapter

- Miscellaneous functions, such as system messages

**bit**
The smallest unit of information interpreted by your computer.

**block**
A typical unit of disk storage consisting of a small number of sectors. This term usually refers to the fundamental unit of storage provided by an operating system. See also block size and striping.

**block size**
The size of a block. See also block and striping.

**boot routine**
When you start your computer, it clears all memory, initializes devices, and loads the operating system. Unless the operating system fails to respond, you can reboot (also called warm boot) your computer by pressing <Ctrl><Alt><Del>; otherwise, you must perform a cold boot by pressing the reset button (if your computer has one) or by turning the computer off and then back on.

**bootable diskette**
You can start your computer from a diskette in drive A. To make a bootable diskette, insert a diskette in drive A, type sys a: at the command line prompt and then press <Enter>. Use this bootable diskette if your computer will not boot from the hard-disk drive.

**bpi**
Abbreviation for bits per inch.

**bps**
Abbreviation for bits per second.

**BTU**
Abbreviation for British thermal unit.

**bus**
A bus forms an information pathway between the components of a computer. Your computer contains an expansion bus that allows the microprocessor to communicate with controllers for all the various peripheral devices connected to the computer. Your computer also contains an address bus and a data bus for

communications between the micro-processor and RAM.

**byte**
Eight contiguous bits of information; the basic data unit used by your computer.

**BZT**
Abbreviation for Bundesamt fur Zulassungen in deer Telecommunication.

**C**
Abbreviation for Celsius.

**cache**
To facilitate quicker data retrieval, a storage area for keeping a copy of data or instructions. For example, your computer's BIOS may cache ROM code in faster RAM. Or a disk-cache utility may reserve RAM in which to store frequently accessed information from your computer's disk drives; when a program makes a request to a disk drive for data that is in the cache, the disk-cache utility can retrieve the data from RAM faster than from the disk drive.

**card-edge connector**
On the bottom of an expansion card, the metal-contact section that plugs into an expansion-card connector.

**CCFT**
Abbreviation for cold cathode fluorescent tube.

**CD-ROM**
Abbreviation for compact disc read-only memory. CD-ROM drives use optical technology to read data from compact discs. CDs are read-only storage devices; you cannot write new data to a CD with standard CD-ROM drives.

**CGA**
Abbreviation for color graphics adapter.

**CIO**
Abbreviation for comprehensive input/output.

**cm**
Abbreviation for centimeter(s).

**CMOS**
Acronym for complementary metal-oxide semiconductor. In computers, CMOS memory chips are often used for NVRAM storage.

**COM**
The MS-DOS device names for the first through fourth serial ports on your computer are COM1, COM2, COM3, and COM4. MS-DOS supports up to four serial ports. However, the default interrupt for COM1 and COM3 is IRQ4, and the default interrupt for COM2 and COM4 is IRQ3. Therefore, you must be careful when you configure software that runs a serial device so that you do not create an interrupt conflict.

**CON**
The MS-DOS device name for the console, which includes your computer's keyboard and text displayed on the screen.

**config.sys file**
When you boot your computer, MS-DOS runs any commands contained in the text file **config.sys** (before running any commands in the **autoexec.bat** file). A **config.sys** file is not required to boot MS-DOS, but provides a convenient place to run commands that are essential for setting up a consistent computing environment—such as loading device drivers with a device= statement.

**controller**
A chip or expansion card that controls the transfer of data between the micro-processor and a peripheral such as a diskette drive or the keyboard.

**conventional memory**
The first 640 KB of RAM. Unless they are specially designed, MS-DOS programs are limited to running in conventional memory. See also EMM, expanded memory, extended memory, HMA, memory manager, upper memory area, and XMM.

**coprocessor**
A coprocessor relieves the computer's microprocessor of specific processing tasks. A math coprocessor, for example,

handles numeric processing. A graphics coprocessor handles video rendering. The Intel Pentium microprocessor includes an integrated math coprocessor.

### cpi
Abbreviation for characters per inch.

### CPU
Abbreviation for central processing unit. See also microprocessor.

### cursor
In character-based MS-DOS programs, the cursor is usually a block or an underscore (possibly blinking) that represents the position at which the next character typed will appear. Windows programs can design their own cursors—common cursor symbols include the pointer arrow and the text-insertion I-beam.

### DAT
Acronym for digital audio tape.

### dB
Abbreviation for decibel(s).

### dBA
Abbreviation for adjusted decibel(s).

### DC
Abbreviation for direct current.

### DDC
Acronym for display data channel. A VESA® standard mechanism that allows the system to communicate with the monitor and retrieve information about its capabilities.

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

### DHCP
Acronym for Dynamic Host Configuration Protocol.

### diagnostics
See diskette-based diagnostics.

### DIMM
Acronym for dual in-line memory module.

### DIN
Acronym for Deutsche Industrie Norm.

### DIP
Acronym for dual in-line package. A circuit board, such as a system board or expansion card, may contain DIP switches for configuring the circuit board. DIP switches are always toggle switches, with an ON position and an OFF position.



### directory
Directories help keep related files organized in a hierarchical, "inverted tree" structure. Each disk has a "root" directory; for example, a **C:\>** prompt normally indicates that you are at the root directory of hard-disk drive C. Additional directories that branch off of the root directory are called subdirectories. Subdirectories may contain additional directories branching off of them.
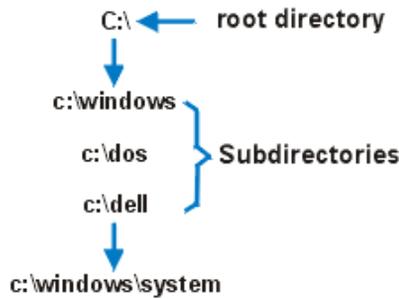
**diskette-based diagnostics**
A comprehensive set of diagnostic tests for your Dell computer. To use the diskette-based diagnostics, you must boot your computer from the *Dell Diagnostics Diskette*. Refer to your *Installation and Troubleshooting Guide* for a complete discussion about how to use the diskette-based diagnostics.

**display adapter**
See video adapter.

**DMA**
Abbreviation for direct memory access. A DMA channel allows certain types of data transfer between RAM and a device to bypass the microprocessor.

**DOC**
Abbreviation for Department of Communications (in Canada).

**dpi**
Abbreviation for dots per inch.

**DPMS**
Abbreviation for Display Power Management Signaling. A standard developed by the Video Electronics Standards Association that defines the hardware signals sent by a video controller to activate power management states in a video display or monitor. A monitor is said to be DPMS-compliant when it is designed to enter a power management state after receiving the appropriate signal from a computer's video controller.

**DRAC**
Acronym for Dell OpenManage Remote Assistant Card.

**DRAM**
Abbreviation for dynamic random-access memory. A computer's RAM is usually made up entirely of DRAM chips. Because DRAM chips cannot store an electrical charge indefinitely, your computer continually refreshes each DRAM chip in the computer.

**drive-type number**
Your computer can recognize a number of specific hard-disk drives. Each is assigned a drive-type number that is stored in NVRAM. The hard-disk drive(s) specified in your computer's System Setup program must match the actual drive(s) installed in the computer. The System Setup program also allows you to specify physical parameters (cylinders, heads, write precomp, landing zone, and capacity) for drives not included in the table of drive types stored in NVRAM.

**DTE**
Abbreviation for data terminal equipment. Any device (such as a computer system) that can send data in digital form by means of a cable or communications line. The DTE is connected to the cable or communications line through a data communications equipment (DCE) device such as a modem.

**ECC**
Abbreviation for error checking and correction.

**ECP**
Abbreviation for Extended Capabilities Port.

**EDO**
Abbreviation for extended-data out. A type of RAM chip that holds data on the chip's output data lines for a longer period of time than fast-page mode RAM chips. The EDO RAM chips are also faster than fast-page mode RAM chips.

**EEPROM**

Acronym for electrically erasable programmable read-only memory.

**EGA**

Abbreviation for enhanced graphics adapter.

**EISA**

Acronym for Extended Industry-Standard Architecture, a 32-bit expansion-bus design. The expansion-card connectors in an EISA computer are also compatible with 8- or 16-bit ISA expansion cards.

To avoid a configuration conflict when installing an EISA expansion card, you must use the EISA Configuration Utility. This utility allows you to specify which expansion slot contains the card and obtains information about the card's required system resources from a corresponding EISA configuration file.

**EMC**

Abbreviation for Electromagnetic Compatibility.

**EMI**

Abbreviation for electromagnetic interference.

**EMM**

Abbreviation for expanded memory manager. A software utility that uses extended memory to emulate expanded memory on computers with an Intel386™ or higher microprocessor. See also conventional memory, expanded memory, extended memory, memory manager, and XMM.

**EMP**

Abbreviation for emergency management port.

**EMS**

Abbreviation for Expanded Memory Specification. See also expanded memory, memory manager, and XMS.

**EPROM**

Acronym for erasable programmable read-only memory.

**ESD**

Abbreviation for electrostatic discharge. See "Safety Instructions" for a complete discussion of ESD.

**ESDI**

Acronym for enhanced small-device interface.

**expanded memory**

A technique for accessing RAM above 1 MB. To enable expanded memory on your computer, you must use an EMM. You should configure your system to support expanded memory only if you run application programs that can use (or require) expanded memory. See also conventional memory, EMM, extended memory, and memory manager.

**expansion bus**

Your computer contains an expansion bus that allows the microprocessor to communicate with controllers for peripheral devices, such as a network card or an internal modem.

**expansion-card connector**

A connector on the computer's system board for plugging in an expansion card.

**extended memory**

RAM above 1 MB. Most software that can use it, such as Windows, requires that extended memory be under the control of an XMM. See also conventional memory, expanded memory, memory manager, and XMM.

**external cache memory**

A RAM cache using SRAM chips. Because SRAM chips operate at several times the speed of DRAM chips, the microprocessor can retrieve data and instructions faster from external cache memory than from RAM.

**F**

Abbreviation for Fahrenheit.

**FAT**

Acronym for file allocation table. The file system structure used by MS-DOS to organize and keep track of file storage. The Microsoft Windows NT operating system

can optionally use a FAT file system structure.

**FCC**
Abbreviation for Federal Communications Commission.

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

**format**
To prepare a hard-disk drive or diskette for storing files. An unconditional format deletes all data stored on the disk. The format command in MS-DOS 5.0 or higher includes an option that allows you to unformat a disk if you have not yet used the disk for file storage.

**ft**
Abbreviation for foot/feet.

**FTP**
Abbreviation for file transfer protocol.

**g**
Abbreviation for gram(s).

**G**
Abbreviation for gravities.

**GB**
Abbreviation for gigabyte(s). A gigabyte equals 1024 megabytes or 1,073,741,824 bytes.

**graphics coprocessor**
See coprocessor.

**graphics mode**
See video mode.

**guarding**
A type of data redundancy that uses a set of physical drives to store data and a single, additional drive to store parity data. Data is protected from the loss of a single drive. Guarding is sometimes preferred over mirroring because it is more cost-effective in systems with a very high storage capacity. However, guarded configurations are significantly slower for applications that frequently write to the array, because each attempt to write to the array requires multiple read and write commands to maintain the parity information. If this is a problem, mirroring or duplexing is a better choice. See also mirroring, RAID 4, and RAID 5.

**GUI**
Acronym for graphical user interface.

**h**
Abbreviation for hexadecimal. A base-16 numbering system, often used in programming to identify addresses in the computer's RAM and I/O memory addresses for devices. The sequence of decimal numbers from 0 through 16, for example, is expressed in hexadecimal notation as: 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, A, B, C, D, E, F, 10. In text, hexadecimal numbers are often followed by h or preceded by 0x. MS-DOS conventional memory—the first 640 KB of memory addresses—is from 00000h to 9FFFFh; the MS-DOS upper memory area—memory addresses between 640 KB and 1 MB—is from A0000h to FFFFFh.

**heat sink**
A metal plate with metal pegs or ribs that help dissipate heat. Some microprocessors include a heat sink.

**HMA**
Abbreviation for high memory area. The first 64 KB of extended memory above 1 MB. A memory manager that conforms to the XMS can make the HMA a direct extension of conventional memory. See also conventional memory, memory manager, upper memory area, and XMM.

**host adapter**
A host adapter implements communication between the computer's bus and the controller for a peripheral. (Hard-disk drive controller subsystems include integrated host adapter circuitry.) To add a SCSI expansion bus to your system, you must install the appropriate host adapter.

**HPFS**
Abbreviation for the High Performance File System option in the Windows NT operating system.

**Hz**
Abbreviation for hertz.

**I2O**
Abbreviation for intelligent input/output.

**IC**
Abbreviation for integrated circuit.

**ICMB**
Abbreviation for inter-chassis management bus.

**I/O**
Abbreviation for input/output. The keyboard and a printer, for example, are I/O devices. In general, I/O activity can be differentiated from computational activity. For example, when a program sends a document to the printer, it is engaging in I/O activity; when the program sorts a list of terms, it is engaging in computational activity.

**ID**
Abbreviation for identification.

**interlacing**
A technique for increasing video resolution by only updating alternate horizontal lines on the screen. Because interlacing can result in noticeable screen flicker, most users prefer noninterlaced video adapter resolutions.

**internal microprocessor cache**
An instruction and data cache built into the microprocessor. The Pentium microprocessor, for example, includes a 16-KB internal cache, which is set up as an 8-KB read-only instruction cache and an 8-KB read/write data cache.

**IP**
Acronym for Internet Protocol.

**IPX**
Abbreviation for Internetwork Packet eXchange.

**IRQ**
Abbreviation for interrupt request. A signal that data is about to be sent to or received by a peripheral travels by an IRQ line to the microprocessor. Each peripheral connection must be assigned an IRQ number. For example, the first serial port in your computer (COM1) is assigned to IRQ4 by default. Two devices can share the same IRQ assignment, but you cannot operate both devices simultaneously.

**IRTOS**
Abbreviation for I2O real-time operating system.

**ISA**
Acronym for Industry-Standard Architecture. A 16-bit expansion bus design. The expansion-card connectors in an ISA computer are also compatible with 8-bit ISA expansion cards.

**ITE**
Abbreviation for information technology equipment.

**JEIDA**
Acronym for Japanese Electronic Industry Development Association.

**K**
Abbreviation for kilo-, indicating 1000.

**KB**
Abbreviation for kilobyte(s), 1024 bytes.

**KB/sec**
Abbreviation for kilobyte(s) per second.

**Kbit(s)**
Abbreviation for kilobit(s), 1024 bits.

**Kbps**
Abbreviation for kilobit(s) per second.

**key combination**
A command requiring that you press multiple keys at the same time. For example, you can reboot your computer by pressing the <Ctrl><Alt><Del> key combination.

**kg**
Abbreviation for kilogram(s), 1000 grams.

**kHz**
Abbreviation for kilohertz, 1000 hertz.

**LAN**
Acronym for local area network. A LAN system is usually confined to the same building or a few nearby buildings, with all equipment linked by wiring dedicated specifically to the LAN.

**lb**
Abbreviation for pound(s).

**LCD**
Abbreviation for liquid crystal display. A low-power display often used for notebook computers. An LCD consists of a liquid crystal solution between two sheets of polarizing material. An electric current causes each crystal to act like a shutter that can open to allow light past or close to block the light.

**LED**
Abbreviation for light-emitting diode. An electronic device that lights up when a current is passed through it.

**LIF**
Acronym for low insertion force. Some computers use LIF sockets and connectors to allow devices such as the microprocessor chip to be installed or removed with minimal stress to the device.

**LN**
Abbreviation for load number.

**local bus**
On a computer with local-bus expansion capability, certain peripheral devices (such as the video adapter circuitry) can be designed to run much faster than they would with a traditional expansion bus. Some local-bus designs allow peripherals to run at the same speed and with the same-width data path as the computer's microprocessor.

**LPTn**
The MS-DOS device names for the first through third parallel printer ports on your computer are LPT1, LPT2, and LPT3.

**LUN**
Acronym for logical unit number.

**m**
Abbreviation for meter(s).

**mA**
Abbreviation for milliampere(s).

**mAh**
Abbreviation for milliampere-hour(s).

**math coprocessor**
See coprocessor.

**MB**
Abbreviation for megabyte(s). The term megabyte means 1,048,576 bytes; however, when referring to hard-disk drive storage, the term is often rounded to mean 1,000,000 bytes.

**MBR**
Abbreviation for master boot record.

**MDA**
Abbreviation for monochrome display adapter.

**memory**
A computer can contain several different forms of memory, such as RAM, ROM, and video memory. Frequently, the word memory is used as a synonym for RAM; for example, an unqualified statement such as "a computer with 8 MB of memory" refers to a computer with 8 MB of RAM.

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

**memory manager**
A utility that controls the implementation of memory in addition to conventional memory, such as extended or expanded memory. See also conventional memory, EMM, expanded memory, extended memory, HMA, upper memory area, and XMM.

**MGA**
Abbreviation for monochrome graphics adapter.

**MHz**
Abbreviation for megahertz.

**microprocessor**
Because it is the primary computational chip inside the computer, it is customary to refer to the microprocessor as "the computer's brain." The microprocessor contains an arithmetic processing unit and a control unit. Software written for one microprocessor must usually be revised to run on another microprocessor. CPU is a synonym for microprocessor.

**min**
Abbreviation for minute(s).

**mirroring**
A type of data redundancy that uses a set of physical drives to store data and one or more sets of additional drives to store duplicate copies of the data. Mirroring is the preferred data redundancy technique in lower-capacity systems and in systems where performance is extremely important. See also guarding, RAID 1, and RAID 10.

**mm**
Abbreviation for millimeter(s).

**mouse**
A pointing device that controls the movement of the cursor on a screen. Mouse-aware software allows you to activate commands by clicking a mouse button while pointing at objects displayed on the screen.

**MPS**
Abbreviation for multiprocessing specification.

**ms**
Abbreviation for millisecond(s).

**MS-DOS**
Abbreviation for Microsoft Disk Operating System.

**MTBF**
Abbreviation for mean time between failures.

**multifrequency monitor**
A monitor that supports several video standards. A multifrequency monitor can adjust to the frequency range of the signal from a variety of video adapters.

**mV**
Abbreviation for millivolt(s).

**NIC**
Acronym for network interface controller.

**NiCad**
Acronym for nickel cadmium.

**NiMH**
Abbreviation for nickel-metal hydride.

**NLM**
Acronym for NetWare Loadable Module.

**NMI**
Abbreviation for nonmaskable interrupt. A device sends an NMI to signal the microprocessor about hardware errors such as parity errors.

**noninterlaced**
A technique for decreasing screen flicker by sequentially refreshing each horizontal line on the screen.

**ns**
Abbreviation for nanosecond(s), one billionth of a second.

**NTFS**
Abbreviation for the NT File System option in the Windows NT operating system.

**NVRAM**
Abbreviation for nonvolatile random-access memory. Memory that does not lose its contents when you turn off your computer. NVRAM is used for maintaining the date, time, and system setup options.

**OTP**
Abbreviation for one-time programmable.

**parallel port**
An I/O port used most often to connect a parallel printer to your computer. You can usually identify a parallel port on your computer by its 25-hole connector.

**parameter**
A value or option that you specify to a program. A parameter is sometimes called a switch or an argument.

**partition**
You can divide a hard-disk drive into multiple physical sections called partitions with the **fdisk** command. Each partition can contain multiple logical drives. For example, you could partition a 2-GB hard-disk drive into two physically separate partitions with three logical drive assignments, as shown in the following table.

| Physical Partitions and Sizes |
| --- |
| Partition 1 - 1.2 GB / Partition 2 - 800 MB |

| Logical Drive Assignments and Sizes |
| --- |
| Drive C - 1.2 GB / Drive D - 500 MB / Drive E - 300 MB |

After partitioning the hard-disk drive, you must format each logical drive with the format command.

**PC Card**
Slightly larger than a credit card, a PC Card is a removable I/O card—such as a modem, LAN, SRAM, or flash memory card—that adheres to the PCMCIA standards. See also PCMCIA.

**PCI**
Abbreviation for Peripheral Component Interconnect. A standard for local-bus implementation developed by Intel Corporation.

**PCMCIA**
Abbreviation for Personal Computer Memory Card International Association. See also PC Card.

**PDC**
Acronym for primary domain controller.

**PERC**
Acronym for PowerEdge Expandable RAID controller.

**peripheral device**
An internal or external device—such as a printer, a disk drive, or a keyboard—connected to a computer.

**PGA**
Abbreviation for pin grid array, a type of microprocessor socket that allows you to remove the microprocessor chip.

**pixel**
Arranged in rows and columns, a pixel is a single point on a video display. Video resolution—640 x 480, for example—is expressed as the number of pixels across by the number of pixels up and down.

**POST**
Acronym for power-on self-test. Before the operating system loads when you turn on your computer, the POST tests various system components such as RAM, the disk drives, and the keyboard.

**ppm**
Abbreviation for pages per minute.

**PQFP**
Abbreviation for plastic quad flat pack, a type of microprocessor socket in which the microprocessor chip is permanently mounted.

**program diskette set**
The set of diskettes from which you can perform a complete installation of an application program. When you reconfigure a program, you often need its program diskette set.

**protected mode**
An operating mode supported by 80286 or higher microprocessors, protected mode allows operating systems to implement:

- A memory address space of 16 MB (80286 microprocessor) to 4 GB (Intel386 or higher microprocessor)

- Multitasking

- Virtual memory, a method for increasing addressable memory by using the hard-disk drive

The Windows NT 32-bit operating system runs in protected mode. MS-DOS cannot run in protected mode; however, some programs that you can start from MS-DOS—such as Windows—are able to put the computer into protected mode.

### PS/2
Abbreviation for Personal System/2.

### PSPB
Abbreviation for power-supply paralleling board.

### PVC
Abbreviation for polyvinyl chloride.

### QIC
Abbreviation for quarter-inch cartridge.

### RAID
Acronym for redundant array of independent disks. This phrase was introduced by David Patterson, Garth Gibson, and Randy Katz at the University of California at Berkeley in 1987. The goal of RAID is to use multiple small, inexpensive disk drives to provide high storage capacity and performance while maintaining or improving the reliability of the disk subsystem.

Patterson, Gibson, and Katz described five different methods, which are known as RAID levels 1 through 5. Each level uses one or more extra drives to provide a means of recovering data lost when a disk fails, so that the effective failure rate of the whole disk subsystem becomes very low.

### RAID 0
RAID 0 is commonly called striping. This was not originally defined as a RAID level but has since come into popular use. In this array configuration, data is written sequentially across the available disks and no redundancy is provided. RAID 0 configurations provide very high performance but relatively low reliability. RAID 0 is the best choice when controller cards are duplexed. See also striping.

### RAID 1
RAID 1 is commonly called mirroring. RAID 1 also uses striping, so RAID 1 may be regarded as the mirroring of RAID 0 configurations. RAID 1 is the best choice in high-availability applications that require high performance or relatively low data capacity. See also mirroring, RAID 10, striping.

### RAID 4
RAID 4 is commonly called guarding. It uses data striping, like RAID 0, but adds a single, dedicated parity drive. The parity data stored on this drive can be used to recover data lost from a single failed drive. RAID 4 configurations write data slowly because parity data has to be generated and written to the parity drive, and the generation of the parity data frequently requires reading data from multiple physical drives. See also guarding and striping.

### RAID 5
RAID 5, like RAID 4, is commonly called guarding. RAID 5 is identical to RAID 4, except that the parity data is distributed evenly across all physical drives instead of a parity drive. In configurations using a large number of physical drives in which a large number of simultaneous small write operations are being performed, RAID 5 offers potentially higher performance than RAID 4. RAID 4 and RAID 5 configurations are appropriate in high-availability applications where performance is less critical or where high data capacity is required. See also guarding.

### RAID 10
RAID 10 is a mirroring technique in which data is duplicated across two identical RAID 0 array or hard-disk drives. All data on a physical drive in one array is duplicated, or mirrored, on a drive in the second array. Mirroring offers complete redundancy of data for greater data security. See also mirroring, RAID 1, and striping.

**RAM**

Acronym for random-access memory. The computer's primary temporary storage area for program instructions and data. Each location in RAM is identified by a number called a memory address. Any information stored in RAM is lost when you turn off your computer.

**RAMDAC**

Acronym for random-access memory digital-to-analog converter.

**RCA**

Acronym for Resource Configuration Add-in.

**RCU**

Acronym for Resource Configuration Utility.

**read-only file**

A read-only file is one that you are prohibited from editing or deleting. A file can have read-only status if: Its read-only attribute is enabled. It resides on a physically write-protected diskette.

It is located on a network in a directory to which the system administrator has assigned read-only rights to you.

**real mode**

An operating mode supported by 80286 or higher microprocessors, real mode imitates the architecture of an 8086 microprocessor. Designed to run in real mode, MS-DOS (unassisted by additional software techniques) can address only 640 KB of conventional memory.

**refresh rate**

The frequency, measured in Hz, at which the screen's horizontal lines are recharged. A monitor's refresh rate is also referred to as its vertical frequency.

**REN**

Abbreviation for ringer equivalence number.

**RFI**

Abbreviation for radio frequency interference.

**RGB**

Abbreviation for red/green/blue.

**ROM**

Acronym for read-only memory. Your computer contains some programs essential to its operation in ROM code. Unlike RAM, a ROM chip retains its contents even after you turn off your computer. Examples of code in ROM include the program that initiates your computer's boot routine and the POST.

**rpm**

Abbreviation for revolutions per minute.

**RTC**

Abbreviation for real-time clock. Battery-powered clock circuitry inside the computer that keeps the date and time after you turn off the computer.

**SCSI**

Acronym for small computer system interface. An I/O bus interface with faster data transmission rates than standard ports. You can connect up to seven devices to one SCSI interface.

**SDMS**

Abbreviation for SCSI device management system.

**SDRAM**

Abbreviation for synchronous dynamic random-access memory.

**SDS**

Abbreviation for scalable disk system.

**SEC**

Abbreviation for single-edge contact.

**sec**

Abbreviation for second(s).

**sector**

The fundamental unit of data access for a hard-disk drive. For PC-compatible systems, a sector is usually 512 bytes. See also block and block size.

**serial port**

An I/O port used most often to connect a modem or a mouse to your computer. You

can usually identify a serial port on your computer by its 9-pin connector.

### SIMD
Acronym for single instruction, multiple data.

### shadowing
A computer's system and video BIOS code is usually stored on ROM chips. Shadowing refers to the performance-enhancement technique that copies BIOS code to faster RAM chips in the upper memory area (above 640 KB) during the boot routine.

### SMART
Acronym for Self-Monitoring Analysis and Reporting Technology. A technology that allows hard-disk drives to report errors and failures to the system BIOS, which then displays an error message on the screen. To take advantage of this technology, you must have a SMART-compliant hard-disk drive and the proper support in the system BIOS.

### SMB
Abbreviation for system management bus.

### SMP
Abbreviation for symmetric multiprocessing.

### SNMP
Abbreviation for Simple Network Management Protocol.

### striping
In composite drivers with two or more physical drives, the drive array subsystem uses a method of data storage called striping. With this method, data is divided into a series of pieces called blocks and each data block is stored on a different physical drive. When each drive contains a block of data, the process starts over with the first physical drive. When the size of the data block is carefully selected, the chance that the information needed can be read from or written to multiple physical drives at once is increased, greatly increasing the performance of the composite drive. See also block, block size, and RAID.

### SRAM
Abbreviation for static random-access memory. Because SRAM chips do not require continual refreshing, they are substantially faster than DRAM chips. SRAM is used mostly for external cache memory.

### SVGA
Abbreviation for super video graphics array. See also VGA.

### switch
See parameter.

### sync negotiation
Sync negotiation is a SCSI feature that allows the host adapter and its attached SCSI devices to transfer data in synchronous mode. Synchronous data transfer is faster than asynchronous data transfer.

### syntax
The rules that dictate how you must type a command or instruction so that the computer will understand it.

### system board
As the main circuit board, the system board usually contains most of your computer's integral components, such as the following:

- Microprocessor
- RAM
- Expansion-card connectors
- Controllers for standard peripheral devices such as the keyboard
- Various ROM chips

Frequently used synonyms for system board are motherboard and logic board.

### system diskette
System diskette is a synonym for bootable diskette.

### system memory
System memory is a synonym for RAM.

### System Setup program

System Setup program options allow you to configure your computer's hardware. Some options in the System Setup program require that you reboot the computer to effect a hardware-configuration change. Because the System Setup program is stored in NVRAM, any options that you set remain in effect until you change them again.

### system.ini file

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

Revising the **Control Panel** settings or running the Windows Setup program may change options in the **system.ini** file. On other occasions, you may need to change or add options to the **system.ini** file man

### TCP/IP

Abbreviation for Transmission Control Protocol/Internet Protocol.

### terminator

Some devices, especially disk drives, contain a terminator to absorb and dissipate excess current. When more than one such device is connected in a series, you may need to remove the terminator—or change a jumper setting to disable it—unless it is the last device in the series. However, some devices have terminators that should never be removed or disabled.

### text editor

An application program for editing text files consisting exclusively of ASCII characters. MS-DOS Editor and Notepad (in Windows) are text editors, for example. Most word processors use proprietary file formats containing binary characters, although some can read and write text files.

### text mode

See video mode.

### TFT

Abbreviation for thin film transistor. A flat-panel display for notebook computers where each pixel is controlled by one to four transistors.

### tpi

Abbreviation for tracks per inch.

### TSR

Abbreviation for terminate-and-stay-resident. A TSR program runs "in the background." Most TSR programs implement a predefined key combination (sometimes referred to as a "hot key") that allows you to activate the TSR program's interface while running another MS-DOS program. When you finish using the TSR program, you can return to the other application program and leave the TSR program resident in memory for later use.

Because MS-DOS is not designed to support multiple programs running simultaneously, TSR programs can sometimes cause memory conflicts. When troubleshooting, rule out the possibility of such a conflict by rebooting your computer without starting any TSR programs.

### UL

Abbreviation for Underwriters Laboratories.

### UMB

Abbreviation for upper memory blocks. See also conventional memory, HMA, memory manager, and upper memory area.

### upper memory area

The 384 KB of RAM located between 640 KB and 1 MB. If the computer has an Intel386 or higher microprocessor, a software utility called a memory manager can create UMBs in the upper memory area, in which you can load device drivers and memory-resident programs. See also conventional memory, HMA, and memory manager.

### UPS

Abbreviation for uninterruptible power supply. A battery-powered unit that automatically supplies power to your

computer in the event of an electrical failure.

### USB
Abbreviation for Universal Serial Bus.

### USOC
Abbreviation for Universal Service Ordering Code.

### utility
A program used to manage system resources—memory, disk drives, or printers, for example. The **diskcopy** command for duplicating diskettes and the **himem.sys** device driver for managing extended memory are utilities included in MS-DOS.

### V
Abbreviation for volt(s).

### VAC
Abbreviation for volt(s) alternating current.

### VCCI
Abbreviation for Voluntary Control Council for Interference.

### VDC
Abbreviation for volt(s) direct current.

### VDE
Abbreviation for Verband Deutscher Elektrotechniker.

### VESA
Acronym for Video Electronics Standards Association.

### VGA
Abbreviation for video graphics array. VGA and SVGA are video standards for video adapters with greater resolution and color display capabilities than EGA and CGA, the previous standards.

To display a program at a specific resolution, you must install the appropriate video drivers and your monitor must support the resolution. Similarly, the number of colors that a program can display depends on the capabilities of the monitor, the video driver, and the amount of memory installed for the video adapter.

### VGA feature connector
On some systems with an integrated VGA video adapter, a VGA feature connector allows you to add an enhancement adapter, such as a video accelerator, to your computer. A VGA feature connector can also be called a VGA pass-through connector.

### video adapter
The logical circuitry that provides—in combination with the monitor or display—your computer's video capabilities. A video adapter may support more or fewer features than a specific monitor offers. Typically, a video adapter comes with video drivers for displaying popular application programs and operating environments in a variety of video modes.

On most current Dell computers, a video adapter is integrated into the system board. Also available are many video adapter cards that plug into an expansion-card connector.

Video adapters can include memory separate from RAM on the system board. The amount of video memory, along with the adapter's video drivers, may affect the number of colors that can be simultaneously displayed. Video adapters can also include their own coprocessor chip for faster graphics rendering.

### video driver
Graphics-mode application programs and operating environments, such as Windows, often require video drivers to display at a chosen resolution with the desired number of colors. A program may include some "generic" video drivers. Any additional video drivers may need to match the video adapter; you can find these drivers on a separate diskette with your computer or video adapter.

### video memory
Most VGA and SVGA video adapters include VRAM or DRAM memory chips in addition to your computer's RAM. The amount of video memory installed

primarily influences the number of colors that a program can display (with the appropriate video drivers and monitor capability).

### video mode

Video adapters normally support multiple text and graphics display modes. Character-based software (such as MS-DOS) displays in text modes that can be defined as *x* columns by *y* rows of characters. Graphics-based software (such as Windows) displays in graphics modes that can be defined as *x* horizontal by *y* vertical pixels by *z* colors.

### video resolution

Video resolution—640 x 480, for example—is expressed as the number of pixels across by the number of pixels up and down. To display a program at a specific graphics resolution, you must install the appropriate video drivers and your monitor must support the resolution.

### virtual 8086 mode

An operating mode supported by Intel386 or higher microprocessors, virtual 8086 mode allows operating environments—such as Windows—to run multiple programs in separate 1-MB sections of memory. Each 1-MB section is called a virtual machine.

### virtual memory

A method for increasing addressable RAM by using the hard-disk drive. (MS-DOS does not support true virtual memory, which must be implemented at the operating-system level.) For example, in a computer with 8 MB of RAM and 16-MB of virtual memory set up on the hard-disk drive, the operating system would manage the system as though it had 24 MB of physical RAM.

### virus

A self-starting program designed to inconvenience you. Virus programs have been known to corrupt the files stored on a hard-disk drive or to replicate themselves until a system or network runs out of memory.

The most common way that virus programs move from one system to another is via "infected" diskettes, from which they copy themselves to the hard-disk drive. To guard against virus programs, you should do the following:

- Periodically run a virus-checking utility on your computer's hard-disk drive.

- Always run a virus-checking utility on any diskettes (including commercially sold software) before using them.

### VL-Bus™

An abbreviation for VESA local bus. A standard for local bus implementation developed by the Video Electronics Standards Association.

### VLSI

Abbreviation for very-large-scale integration.

### Vpp

Abbreviation for peak-point voltage.

### VRAM

Abbreviation for video random-access memory. Some video adapters use VRAM chips (or a combination of VRAM and DRAM) to improve video performance. VRAM is dual-ported, allowing the video adapter to update the screen and receive new image data at the same time.

### W

Abbreviation for watt(s).

### win.ini file

When you start Windows, it consults the **win.ini** file to determine a variety of options for the Windows operating environment. Among other things, the **win.ini** file records what printer(s) and fonts are installed for Windows. The **win.ini** file also usually includes sections that contain optional settings for Windows application

programs that are installed on the hard-disk drive.

Revising the **Control Panel** settings or running the Windows Setup program may change options in the **win.ini** file. On other occasions, you may need to change or add options to the **win.ini** file manually with a text editor such as Notepad.

### *write-protected*
Read-only files are said to be write-protected. You can write-protect a 3.5-inch diskette by sliding its write-protect tab to the open position; you can write-protect a 5.25-inch diskette by placing an adhesive label over its write-protect notch.

### *WWW*
Abbreviation for World Wide Web.

### *XMM*
Abbreviation for extended memory manager, a utility that allows application programs and operating environments to use extended memory in accordance with the XMS. See also conventional memory, EMM, expanded memory, extended memory, and memory manager.

### *XMS*
Abbreviation for eXtended Memory Specification. See also EMS, extended memory, and memory manager.

### *ZIF*
Acronym for zero insertion force. Some computers use ZIF sockets and connectors to allow devices such as the microprocessor chip to be installed or removed with no stress applied to the device.

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