System 325

Installation and Troubleshooting Guide

DELL COMPUTER CORPORATION

The following French-language instructions describe how to remove and replace the System 325 computer cover. They have been included to conform to Canadian Standards Association (CSA) labeling requirements.

Comment Enlever le Couvercle de Votre Ordinateur

Se relier à la masse. Eteindre et débrancher l'ordinateur. Tourner la serrure à la position (verticale) déverrouillée. Enlever le cinq vis de montage du couvercle et le tirer vers l'avant de l'appareil en le glissant hors des pattes de métal de situées sur les côtés de l'unité.

Pour replacer et le glisser sur le couvercle, le placer devant l'unité et le glisser sur les pattes de métal jusqu'au fond sans coincer de fils ou de câbles. Replacer les cinq vis de montage.

Canadian DOC Notice

This digital apparatus does not exceed the Class B limits for radio noise emissions from digital apparatus set out in the Radio Interference Regulations of the Canadian Department of Communications.

Cet appareil numérique n'émet pas de bruits radioélectriques dépassant les limites applicable aux appareils numériques de la Classe B prescrites dans les Règlements d'Interférence Radio du Département des Communications du Canada.

April 1989 P/N 11953 Rev. A00

Safety Instructions

- Except as explained elsewhere in this manual, do not attempt to service your computer yourself.
- Always make sure that your computer, monitor, and all attached external devices are turned off and unplugged from electrical outlets before removing the cover of your computer.
- Be sure you use the correct type of ac power (115 V/60 Hz in the U.S. and Canada, and 230 V/50 Hz in the United Kingdom) to avoid damage to your computer or monitor. If you are uncertain about this, contact Dell Computer Corporation for assistance.
- To prevent electric shock, your computer's power cable is equipped with a three-prong plug. Plug this power cable into a properly grounded electrical outlet, and do not use adapter plugs or remove the grounding prong. If you must use an extension cable, use a three-wire extension cable.
- When you disconnect a cable, pull on the plug or connector and not on the cable itself.
- Touch a grounded metal object, or the computer chassis, before touching anything inside your computer.
- Handle components and option cards with care. Avoid touching the components and contacts on a card. If possible, hold a card by its edges or by its metal mounting bracket.
- Handle your computer with care.
- If your computer is dropped or if its chassis is damaged, contact Dell Computer Corporation for technical assistance.
- Be sure that nothing rests on the power cable and that the cable is not located where it can be stepped on or tripped over.
- Before cleaning your computer, unplug it from the electrical outlet. Use a damp cloth for cleaning rather than applying liquid or aerosol cleaners directly to the computer.
- Do not place your computer in a closed-in wall unit or on a bed, sofa, or rug. Doing so may block ventilation ports. Keep your computer away from radiators and heat sources.
- Pushing objects of any kind into the slots of your computer can cause fire or electric shock by shorting out interior components.
- Avoid exposing your computer to liquids of any kind. If the computer gets wet, unplug all system power cables and contact Dell Computer Corporation for technical assistance.

Contents

Chapter 1
Introduction

Your Dell System 325 is designed to grow with you — to be easy to expand as your system requirements increase. This guide familiarizes you with the inside of your System 325 and gives directions for installing its hardware upgrade options. It also provides details on running the System Setup program and offers some basic troubleshooting tips. We believe that you will find upgrading your system to be an interesting, enjoyable experience — even before you reap the added benefits in system performance!

Installation Tips

Before beginning to work on your system, make sure you have adequate lighting and workspace. Additional tips:

- If you need to temporarily disconnect cables or remove expansion cards, remember to note slot and connector locations and orientation to aid correct reassembly.
- Screws of different sizes can look similar. Avoid confusion by storing loose screws in separate small containers.

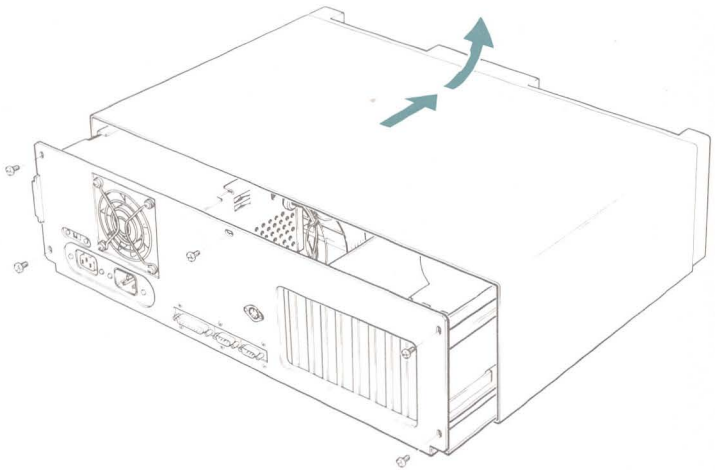
Getting Ready

The next four sections apply every time you install a hardware option. Please read them carefully now, as they are not repeated in detail elsewhere in this guide.

Safety First — For You and Your System 325

Working inside your system is perfectly safe — if you observe the following precautions:

WARNING: First, while the system is still plugged in (it can be turned on or off), GROUND YOURSELF by touching the outside of the fan grid on the back panel. Second, before removing the cover, TURN OFF the computer and all peripherals and DISCONNECT the system from all power sources.



Removing the Computer Cover

Ground yourself. Turn off and unplug your system. Turn the keylock to the unlocked (vertical) position and remove the key. Remove the five cover mounting screws, pull the cover toward the front of the machine, and work it out through the metal tabs on the sides of the unit.

To replace the cover, position it in front of the unit and work it through the side tabs all the way to the back, being careful not to catch any wires or cables. Replace the five cover mounting screws.

Unpacking Your Hardware Option

When you remove an option from its shipping carton, you may find it wrapped in antistatic packaging material designed to protect it from electrostatic damage. Do not remove the material until you are ready to install the option in your computer.

CAUTION: Just before unwrapping the antistatic packaging, ground yourself on the outside of the computer's fan grid (with the computer plugged in) or on the unpainted metal surface of any large electrical device that is plugged into a grounded receptacle.

Inside the System Unit

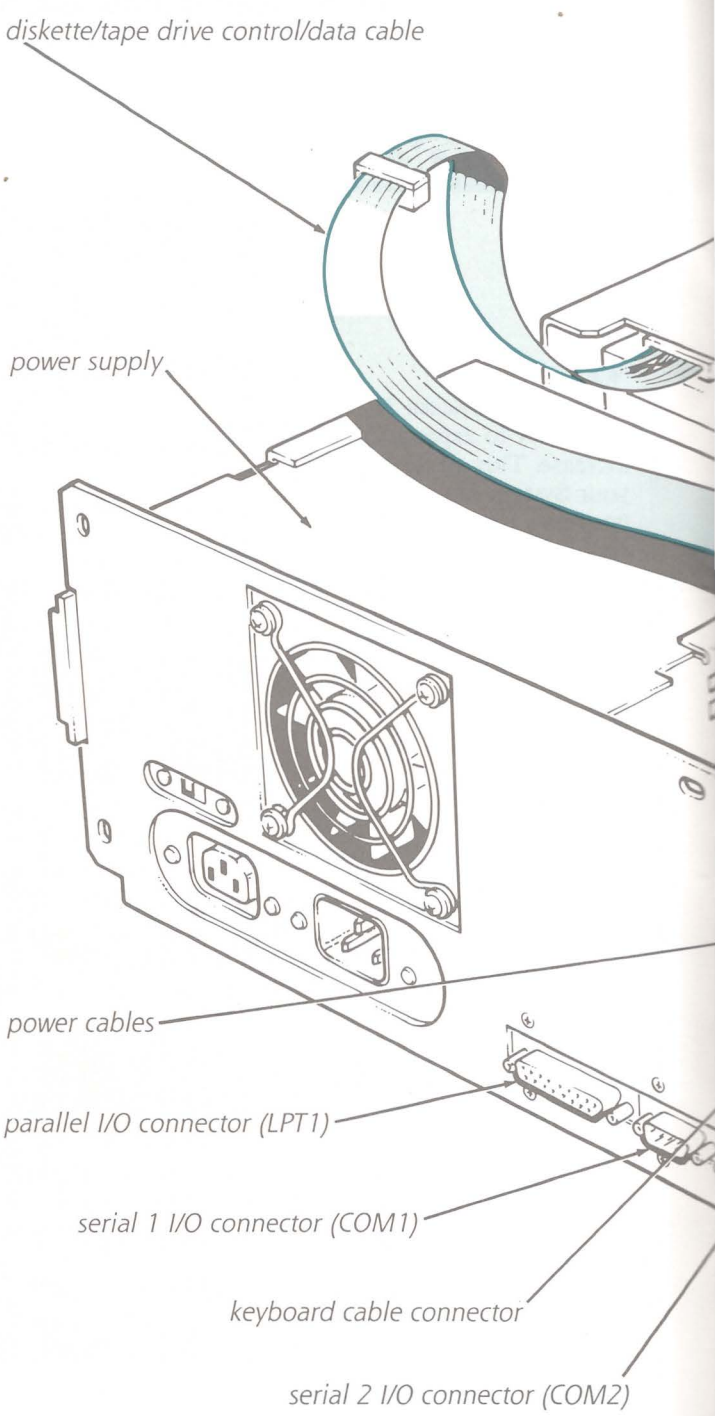
The illustration at right shows the inside of a typical System 325 base unit.

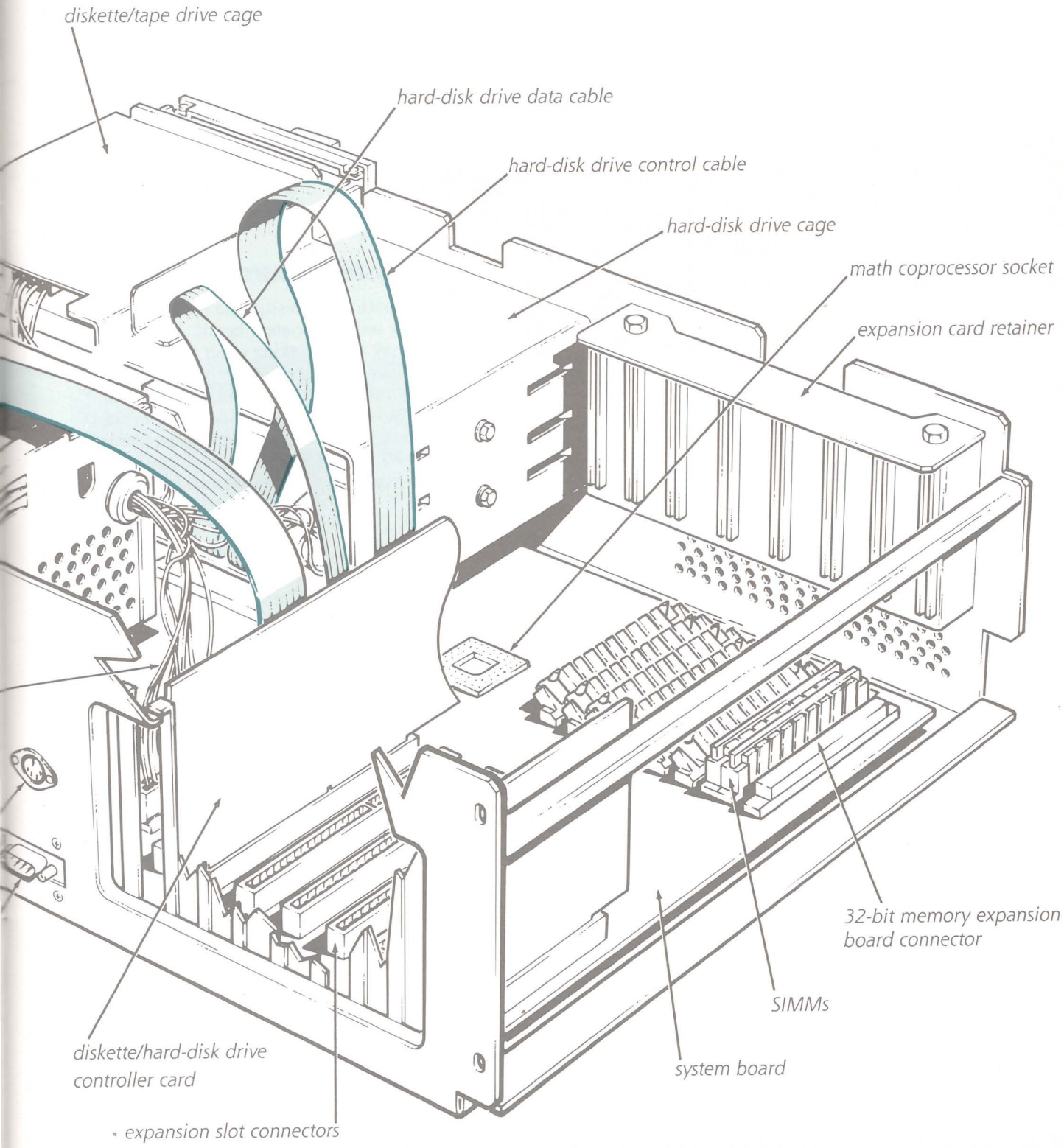
Note the **power cables** coming from the power supply. These cables supply power to the system board, to internally installed diskette drives, hard-disk drives, and tape drives, and to certain expansion cards that connect to external peripherals.

The flat ribbon cables are the **control/data cables** for internally installed drives. In most cases, a control cable connects a drive to a controller card installed in an expansion slot.

The **system board** – the large printed circuit board at the bottom of the chassis – holds the system control circuitry and electronic components. Some of the upgrade options install directly onto the system board.

There is an illustration similar to this – but showing the system from the front – in your *Getting Started* guide. You may find it helpful to refer to both illustrations before attempting to work on your system.



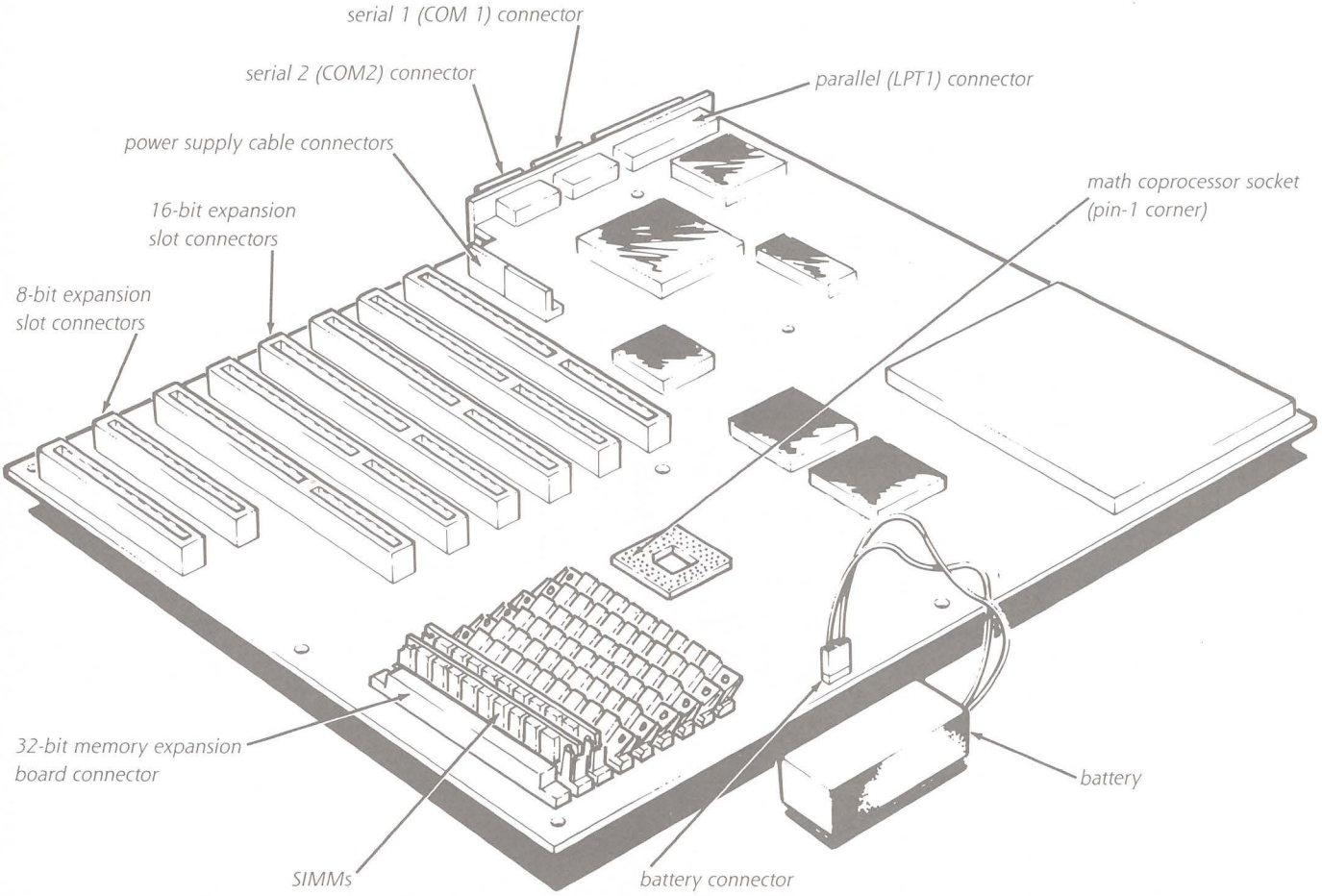

diskette/tape drive cage
hard-disk drive data cable
hard-disk drive control cable
hard-disk drive cage
math coprocessor socket
expansion card retainer
32-bit memory expansion board connector
SIMMs
system board
diskette/hard-disk drive controller card
expansion slot connectors

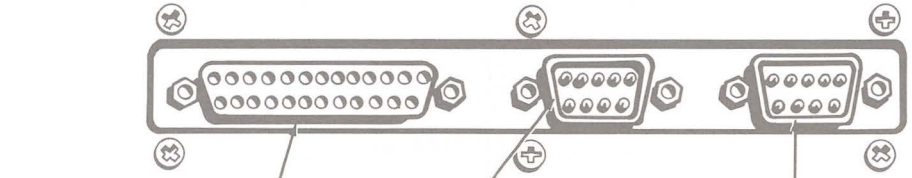
Chapter 2
Installing System Board Options

Pack your system with power! Add extra functionality by installing expansion cards. Enhance system capability with two of the most useful options available – a math coprocessor and a memory upgrade. And make sure you know when and how to replace your battery.

Locating System Board Features

You install the math coprocessor and the memory modules directly onto the system board. Installing other options may mean making other types of connections, which are described in the installation instructions for those options. During installation, refer to the following illustration to locate specific connectors, sockets, and other system board features.





parallel I/O connector (LPT1) serial 1 I/O connector (COM1) serial 2 I/O connector (COM2)

Using System 325 I/O Ports

The input/output (I/O) port connectors on the back of the computer connect to the serial and parallel ports built into your system board. These ports are the gateways through which your system communicates with certain external peripherals, such as printers and mice. The System 325 provides one parallel port and two serial ports.

The 25-signal *parallel* port passes data sent in parallel format, where eight bits (making up one byte) are sent simultaneously over eight separate lines. This port is used primarily for printers, plotters, and scanners that use parallel data transmission. The two 9-signal *serial* ports pass data in serial format (one bit at a time over one line). These ports support a variety of devices that require serial data transmission, including external modems, mice, and serial printers.

Port Designations

Most software uses the term *LPT* (for *L*ine *P*rin*T*er) plus a number to designate a parallel port (for example, LPT*1*) and the term *COM* (for *com*munications) plus a number to designate a serial port (for example, COM*1* or COM*2*). The software installation procedures include a step in which you identify the port to which your printer is attached. By designating ports as LPT1, COM1, and so on, you can tell your software where to send its output.

Some software directs its output to the MS-DOS® default printer port, LPT1. You can redirect the parallel printer output to a serial device by using the MODE command as explained in your *MS-DOS User's Reference.*

Adding an Expansion Card Containing Serial or Parallel Ports

Be aware that the built-in ports (COM1, COM2, and LPT1) will be automatically superseded if ports with the same designations and interrupt request settings are installed via an option card. Interrupt requests allow a device to speak with the input/output circuitry. Interrupt request (IRQ) settings for the built-in ports are as follows:

COM1, COM3	IRQ4
COM2, COM4	IRQ3
LPT1	IRQ7
LPT2	IRQ5

If you add an internal modem card that has a port configured as COM1, the computer then sees logical COM1 as the address for the modem card – and automatically disables the built-in serial port designated as COM1. To avoid losing this built-in serial port, you may need to reconfigure the expansion card to change its port designation to the next available COM number such as COM3, and its IRQ setting to an interrupt setting allowable for that card. Before changing the COM designation, check your communications software to make sure that it will talk to the port designation you select. The documentation for your expansion card gives its default port address and allowable interrupt settings, and instructions for readdressing the port and resetting the interrupt, if necessary.

MS-DOS version 3.3 and subsequent versions will support option cards with ports designated as COM3, COM4, LPT2, and LPT3. Use the MODE command to redirect input and output as necessary.

Installing an Expansion Card

Expansion cards, which fit into the expansion slot connectors on the system board, make it possible to add a variety of features to your system.

Expansion cards can be either 16-bit cards, which fit into the 16-bit (long) expansion slots, or 8-bit cards, which work in either the 16-bit or the 8-bit (short) expansion slots. The System 325 can accommodate two 8-bit and six 16-bit cards simultaneously.

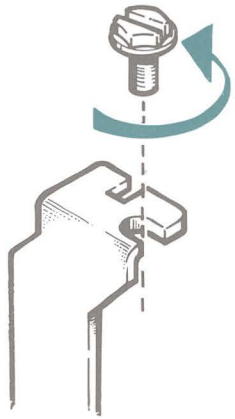
Before installing an expansion card, refer to the documentation that accompanied it for information on configuring the card, making internal connections, or otherwise using it.

Install an expansion card as follows:

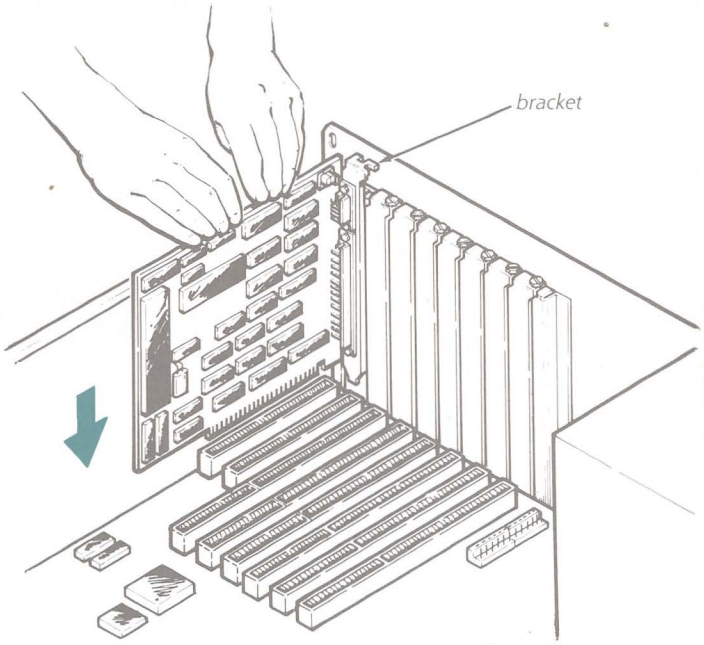
1. **Adjust configuration settings on the card if necessary.**

2. **Ground yourself, turn off your system and disconnect it from all power sources. Remove the computer cover.**

3. **Unscrew and remove the metal filler bracket that covers the back panel opening for the slot you intend to use.**



4. **Insert the card-edge connector firmly into the expansion connector on the system board, gently rocking the card lengthwise while fitting its metal bracket into the opening on the back panel.**



5. **When the card is firmly seated in the connector and its metal bracket is flush with the brackets on either side of it, secure the bracket with the screw you removed in step 3.**
6. **Make any internal connections necessary to carry out the purpose of the card.**
7. **Check all cable connections. Fold cables out of the way, making sure that they do not catch on the cover or block the airflow of the fan or cooling vents.**
8. **Replace your cover, reconnect system power, and turn on your computer.**

Installing a 25-MHz 80387 or WEITEK™3167 Math Coprocessor Chip

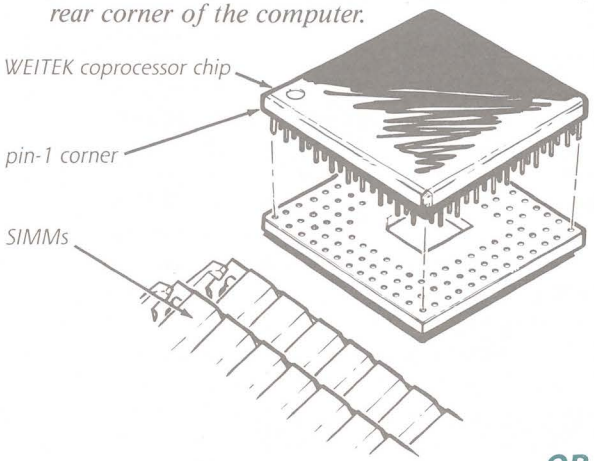
For math-intensive applications, nothing can improve your system's performance more than a math coprocessor – a chip that takes over time-consuming number-crunching duties and frees the microprocessor to perform other computing tasks. Both the 25-MHz 80387 coprocessor and the WEITEK 3167 coprocessor are well-suited to business applications as well as the more demanding engineering and scientific applications.

Install a coprocessor chip as follows:

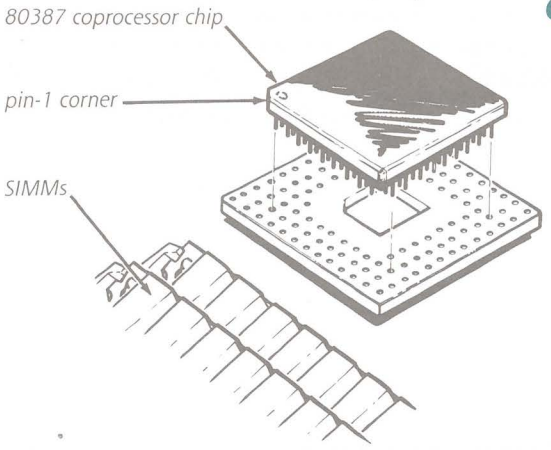
1. **Ground yourself, turn off your system and disconnect it from all power sources. Remove the computer cover.**
2. **Unpack the math coprocessor chip, being careful not to handle it by its pins.**
3. **Find the math coprocessor socket on your system board.**

   See the system board illustration at the beginning of this chapter to locate the math coprocessor socket and identify its *pin-1* corner, which points toward the left rear corner of the computer.
4. **Install the chip in the socket.**

   The pin-1 corner of the coprocessor chip is "marked" somehow — the pin-1 corner of the WEITEK coprocessor bears a small circle; the pin-1 corner of the 80387 is cropped and also bears a circle, as shown. *Position the chip with its pin-1 corner pointing in the same direction as the pin-1 corner of the socket; that is, toward the left rear corner of the computer.*

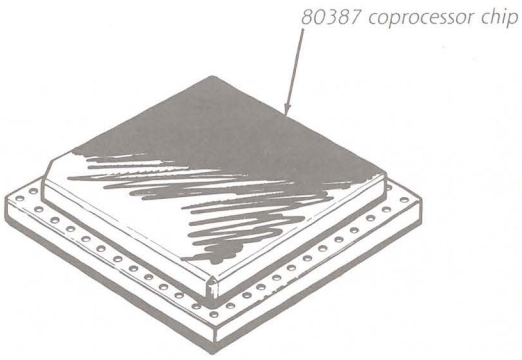


OR



CAUTION: Orienting the chip the wrong way in the socket can damage both the chip and the computer when the computer is turned on.

Align the chip pins with the socket holes. With the 80387, one row of holes should show all the way around the chip as shown.



If you are installing a WEITEK chip, the chip should completely cover the socket.

Be careful not to bend the pins. When you are sure that all pins are headed into the correct holes, press down firmly to seat the chip. Make sure the chip fits flush against the socket on all sides.

5. **Check all cable connections. Fold cables out of the way, making sure that they do not catch on the cover or block the airflow of the fan or cooling vents.**
6. **Replace your cover, reconnect system power, and turn on your computer.**

   As the system boots up, it should detect the presence of the coprocessor and automatically add it to the system configuration memory.
7. **Run the System Setup program (see Chapter 4) to confirm that the system configuration memory has been updated.**
8. **If you have installed an 80387 chip, run the Dell System Analyzer (DSA) to test the chip. If you installed a WEITEK 3167 chip, use the diagnostic software that came with the chip to test it.**

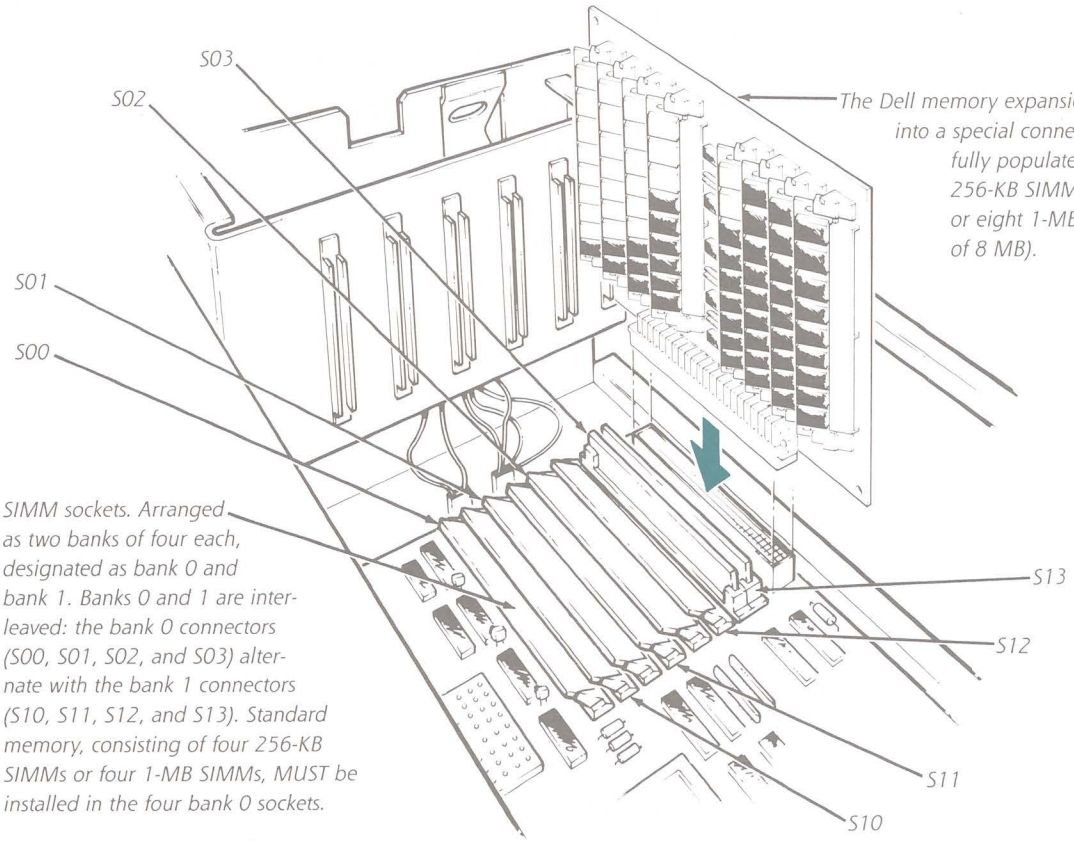
   See your *System Support Manual* for instructions on running the Dell System Analyzer. Instructions on running the WEITEK diagnostic software accompany the chip.

Adding System Board Memory

The System 325 uses dynamic random-access memory (DRAM). System memory is configured using different combinations of single in-line memory modules (SIMMs®) and a 32-bit proprietary memory expansion board.

All eight SIMM sockets must be filled before a System 325 memory expansion board can be installed. However, this restriction does not apply to an industry-standard memory expansion card installed in one of the standard expansion slots. For example, the 16-bit Intel Above™ Board can be used with only the standard memory (four SIMMs) installed in bank 0.

The System 325 supports only SIMMs provided by Dell Computer Corporation.



Standard system memory can be either 1 MB (using 256-KB SIMMs on the system board) or 4 MB (using 1-MB SIMMs on the system board). Out of the standard memory total, 384 KB are reserved for copying system BIOS (basic input/output system) into DRAM for faster system performance. You can attain memory totals of 2, 4, 8, 10, or 16 MB by adding more SIMMs or by adding SIMMs in combination with a memory expansion board.

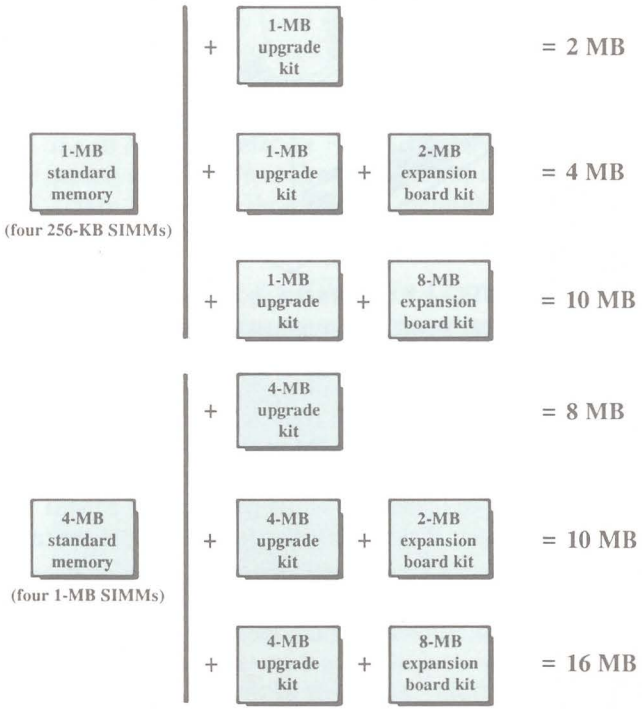
NOTES: SIMMs of different capacities cannot be mixed on either board, but the SIMMs on the expansion board can be different from those on the system board.

Memory Upgrade Kits

Four memory upgrade kits are available for the System 325. The 1-MB and 4-MB upgrade kits consist of four 256-KB SIMMs and four 1-MB SIMMs respectively. The 2-MB and 8-MB memory expansion board kits consist of the respective boards. Using the kits singly or in combination, you can increase your standard memory to achieve specific memory totals as shown in the memory option diagram.

The upgrade kits contain all components necessary to install and use the new memory.

System 325 Memory Options



Performing a Memory Upgrade

Use the following general outline to perform a memory upgrade to the system board.

NOTE: If you have a memory expansion card installed in one of the expansion slots, refer to the section titled "To Users With Memory Expansion Cards" before starting the upgrade procedure.

1. **Ground yourself, turn off your system, and disconnect it from all power sources. Remove the computer cover.**
2. **Install the components (SIMMs or an expansion board) necessary to reach the desired DRAM total. (See the following table.)**

System 325 Memory Configuration Summary

Memory Total	Bank 0: S00,01,02,03	Bank 1: S10,11,12,13	Expansion Board
With a 1-MB standard memory:			
1 MB	4 256-KB SIMMs		
2 MB	4 256-KB SIMMs	4 256-KB SIMMs	
4 MB	4 256-KB SIMMs	4 256-KB SIMMs	2-MB
10 MB	4 256-KB SIMMs	4 256-KB SIMMs	8-MB

System 325 Memory Configuration Summary, (Cont.)

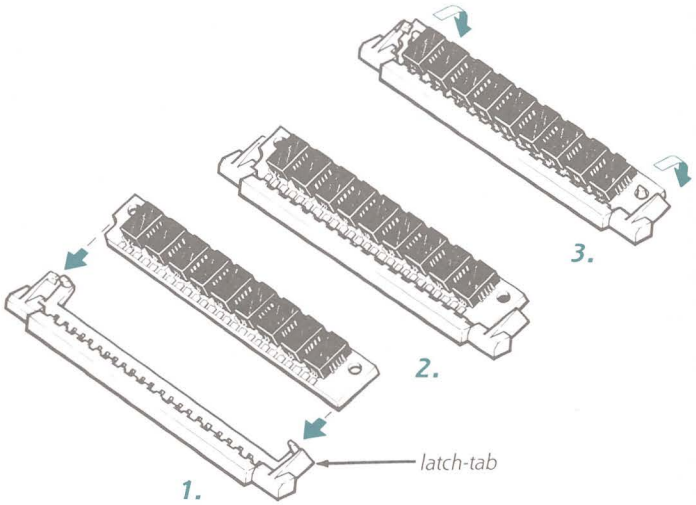
Memory Total	Bank 0: S00,01,02,03	Bank 1: S10,11,12,13	Expansion Board
With a 4-MB standard memory:			
4 MB	4 1-MB SIMMs		
8 MB	4 1-MB SIMMs	4 1-MB SIMMs	
10 MB	4 1-MB SIMMs	4 1-MB SIMMs	2-MB
16 MB	4 1-MB SIMMs	4 1-MB SIMMs	8-MB

NOTE: In the following instructions, "left" and "right" refer to your left and right as you stand facing the front of the computer.

When you install SIMMs, install them from right to left. That is, fill the sockets beginning with the rightmost socket.

The System 325 has eight SIMM sockets. The six sockets on the right are slanted, to make room for long expansion cards. The two sockets on the left are upright. SIMMs are installed differently into upright and slanted sockets as explained in this step.

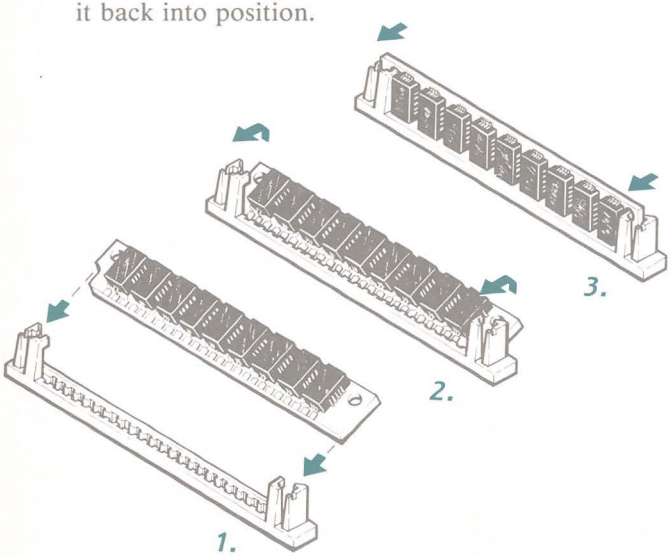
Installing a SIMM in a Slanted Socket: Hold the SIMM above its socket at a 45-degree angle with the connector edge down and the chips facing the left side of the computer. Firmly insert the SIMM connector edge into the "gutter" running down the center of the socket. Then push the top edge of the SIMM *back and down* until it snaps into place.



Installing a SIMM in an Upright Socket: If, as in most cases, you are installing a SIMM immediately to the left of an already-installed slanted or upright SIMM, the installed SIMM may interfere with the insertion of the new one. If necessary, disengage the already-installed SIMM from its tabs (see "Removing an Upright SIMM") and lean it backward out of the way.

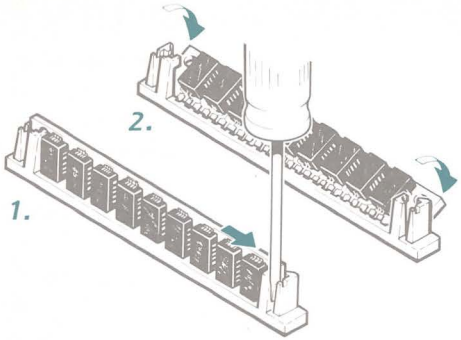
Then hold the new SIMM slightly to the right of its socket, connector side down and chips facing the left side of the computer. Keeping it at a backward slant, insert it firmly into the "gutter" running down the center of the socket. Then push it *upright* until the small plastic tabs at each end of the socket snap into place around the SIMM.

If you have disengaged a right-hand SIMM, snap it back into position.



Removing a Slanted SIMM: Small plastic tabs latch around each end of a slanted SIMM to hold it in place. Face the chip (left) side of the slanted SIMM banks. Gently push the latch-tabs away from each other. (Use as much control as possible; be careful not to snap off the tabs.) The SIMM snaps forward slightly, out of the latch-tabs.

Removing an Upright SIMM: Small plastic tabs latch around each end of an upright SIMM to hold it in place. To remove an upright SIMM, insert a small tool such as a screwdriver as shown, between the latch-tab and the orienting nub that extends through the hole on the SIMM. *(Do NOT insert the screwdriver between the nub and its neighboring chip!)*



For each end of the SIMM, insert the screwdriver's flat side against the latch-tab. Press gently against the tab until it moves out and frees the SIMM. Too much pressure can break the tab. If you do not have the right tool and if space allows, remove the SIMM manually. Face it from the noncomponent side and push the latch-tabs out with your thumbs while pressing the SIMM toward you. Work carefully; don't snap off the tab.

Installing and Removing a Memory Expansion Board: To install a board, position it over its special connector (shown in the large illustration). Carefully work it down over the connector and into the front card guide at the same time; press down firmly until the two connectors mate. (Remember that you must fill all eight SIMM sockets before you can add a memory expansion board.)

You may need to remove a memory expansion board temporarily in order to reach and remove SIMMs. Remove the board by gently working it up and out of the connector and card guide.

3. **When all components are installed, replace the cover, plug in your system unit and peripherals, and turn on your system.**
   After the system completes its power-on self-test, it should display base, reserve, and extended memory totals that include all new memory. However, it detects a mismatch with the old information in your system configuration memory, and displays this error message as your system attempts to boot:

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

4. **Press the <F2> key. Follow the directions on the screen to enter the System Setup program and check your configuration memory.**
   (Chapter 4 tells you more about how System Setup works.)

The system should have already changed the extended memory total to reflect the new memory. Verify the new total as follows:

In the System 325, all memory above the standard 1 MB is designated as extended memory. Therefore, the **EXTENDED MEMORY** field on the System Setup screen should reflect the new DRAM total *minus* 1 MB. Note that the extended memory total is given in kilobytes, according to the following table:

Megabyte-to-Kilobyte Conversion

New DRAM Total	Extended Memory: Megabytes	Kilobytes
2 MB	1 MB	1024 KB
4 MB	3 MB	3072 KB
8 MB	7 MB	7168 KB
10 MB	9 MB	9216 KB
16 MB	15 MB	15104 KB

An incorrectly installed SIMM or memory expansion board may cause a wrong total to be displayed. Turn off and unplug your system, remove the cover, and check *all* memory components for seating and proper location. Then perform steps 3 and 4 again.

5. **When the EXTENDED MEMORY total is correct, insert the System Support diskette into drive A and then press the <ESC> key to reboot from the System Support diskette.**

   The Support Menu appears, displaying the available support programs.

6. **Use the Dell System Analyzer to test all installed DRAM.**

   See your *System Support Manual* for details on the Dell System Analyzer.

To Users With Memory Expansion Cards

If you have a memory expansion card installed in a standard expansion slot, you must reconfigure the card to prevent memory address conflicts with your new memory. To reconfigure the card and verify the new memory, you need to remove the card temporarily.

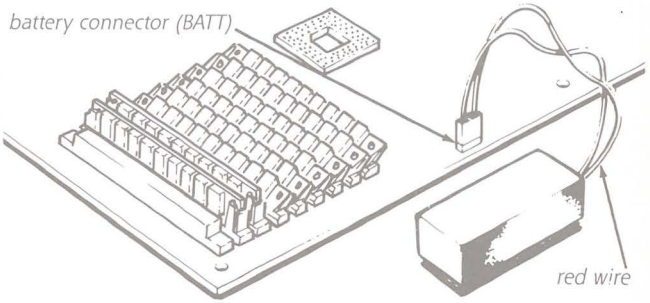
Remove the card after performing step 1 of the previous procedure. After completing the system board upgrade, reconfigure the card to start at the next available address, converted to the addressing notation used by the card. (All memory addresses must be sequential.) To calculate the card's new starting address, find the total *extended* memory on the system board (in KB) and add 1024 KB. For example, if you have 9 MB, or 9216 KB, of extended memory on your system board, add 1024 KB to get the starting address for your card: 10240. Your card's documentation tells how to reconfigure it.

Replacing the Battery

The 4.5-volt alkaline battery maintains system configuration, date, and time information in special memory when the system is turned off. Mounted with Velcro® to the front floor of the chassis, the battery connects to the connector labeled **BATT** on the system board.

Battery operating life ranges from two to five years. An invalid time or date at bootup may mean that the battery needs replacing. To confirm this, reenter the time and date through the System Setup program, turn your system off for about fifteen minutes, and turn it on again. If the problem persists, replace the battery with another Velcro-mounted, 4.5-volt alkaline battery with a keyed connector, such as the Rayovac™ 844.

1. **Turn off and unplug your system. Remove the computer cover.**
2. **Disconnect the battery leads from the BATT connector on the system board and pull the battery up from the mounting strip.**



3. **Mount the new battery on the Velcro strip and connect it to the BATT connector on the system board. (The connector is keyed to ensure proper connection.)**
4. **Replace the computer cover, reconnect the system to ac power, and turn on the computer.**
5. **Run the System Setup program and reenter the time, date, and configuration information if necessary.**

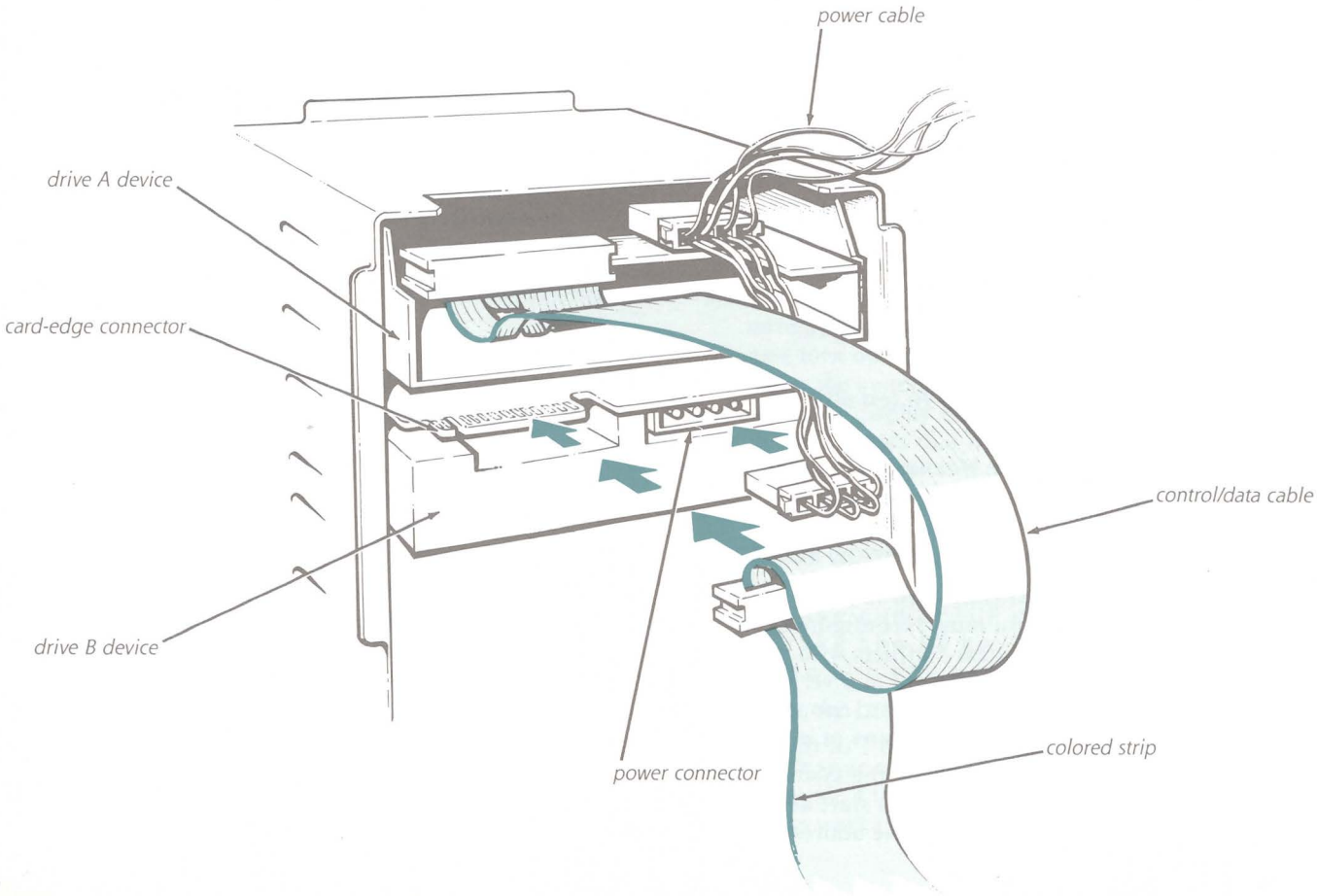
Chapter 3
Installing Drives

This chapter explains how to install the following options in your Dell System 325 computer:

- Diskette drives
- Internal and external tape drives
- Hard-disk drives

The installation instructions often refer you to your *drive specification* for information about jumper settings and terminating resistors. The drive specification is a short booklet that accompanies your drive and contains information specific to your type and brand of drive.

The installation procedures for all internal drives involve similar steps and a number of look-alike connectors. The next three main sections describe certain features you need to deal with when installing most internal drives. The remaining sections cover each type of drive individually.

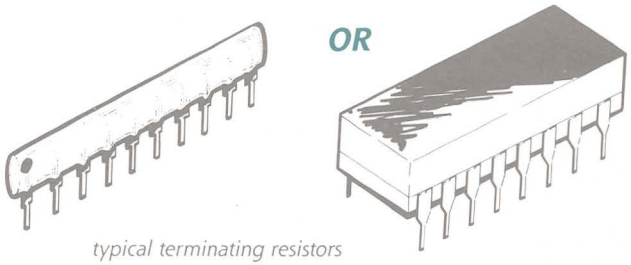


Configuring Your Drive

Before you install your drive, you may need to tailor it to work with your system by making certain physical changes to it.

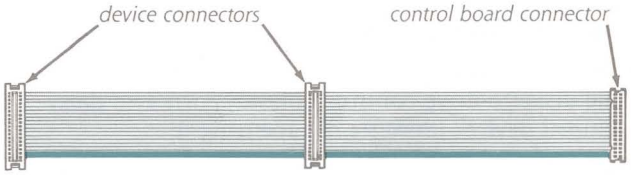
Terminating Resistors

Depending on a drive's position on its control cable as well as the characteristics of the specific drive, you may have to remove a *terminating resistor* from the drive before installing it.



typical terminating resistors

To determine how you need to deal with a terminating resistor, first consider the drive's position on its control cable (the broad, flat ribbon cable that attaches to the back of the drive). Many internal drives are connected in a *daisy-chain* configuration, in which two drives are attached in series to the same control cable. For example, the control cable for the right-hand drive cage has two drive connectors and can daisy-chain two devices, either two diskette drives or one diskette drive and one tape drive. Two half-height hard-disk drives can be daisy-chained in the hard-disk drive cage.



typical daisy-chain cable

Generally speaking, a terminating resistor must be present on the drive connected to the *last* (end) device connector on a daisy chain. A drive attached to the *second* (inner) connector on a daisy chain must have its terminating resistor removed before it is installed.

Exceptions to the general rule:

- Some drives have permanently installed terminating resistors that you disable with jumpers rather than by removing them. You can usually identify one of these permanent resistors by the silver-colored solder around the pins. In this case, your drive specification will describe how to bypass the resistor.
- Some drives have terminating resistors that are never removed or disabled, regardless of the drive's position in a daisy chain. Be sure to check your drive specification to see if this is the case with your drive.
- In a system with a single hard-disk drive, the drive is normally connected to the inner connector on the control cable provided by Dell; however, the drive retains its terminating resistor.

If the drive's position in a daisy-chain seems to dictate the removal or bypassing of its terminating resistor, see your drive specification for further information about terminating resistors.

Jumpers and Switches

Sometimes drives incorporate jumpers or switches that must be set to reflect your configuration.

Jumpers are a means of adjusting system logic to support your configuration. Jumper blocks consist of two or more pins  over which you can fit plugs  to connect two pins together. This guide represents jumper blocks as follows:

shows pins ***2*** and ***3*** of a three-pin block jumpered together; 

shows the same block unjumpered, with the jumper plug installed on pin ***1*** only, ready for use if needed.

You may be required to reset jumpers as part of a hardware installation. To change a jumper setting, pull the jumper plug up off its pin(s) and carefully fit it down onto the pin(s) indicated.

A drive purchased through Dell should already be factory-set to work with your system, but it is a good idea to compare its jumper and switch settings with the settings in your drive specification and make any necessary alterations.

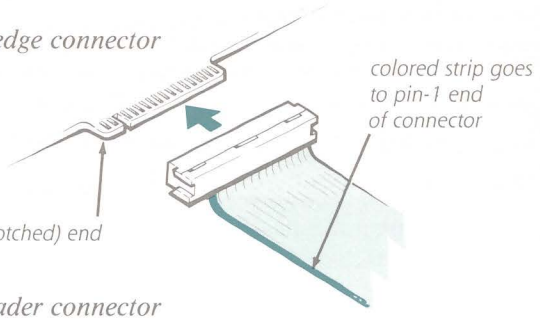
Connecting Your Drive

During each installation procedure, you must complete several connections on the back of the drive after you place the drive in its bay. The large illustration at the front of this chapter shows power and ribbon cable connections typical of most drives.

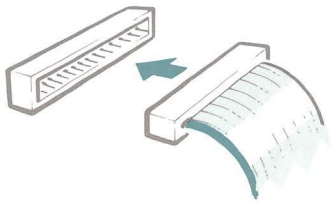
Your drive's power connectors will resemble those shown; however, their locations on the back of the drive may vary.

The ribbon cable shown in the illustration functions as a control/data cable for diskette drives and tape drives in the right-hand drive cage. Hard-disk drives use similar ribbon cables as separate control and data cables. The ribbon-cable connector on the back of your drive should be one of the following types:

a card-edge connector



or a header connector



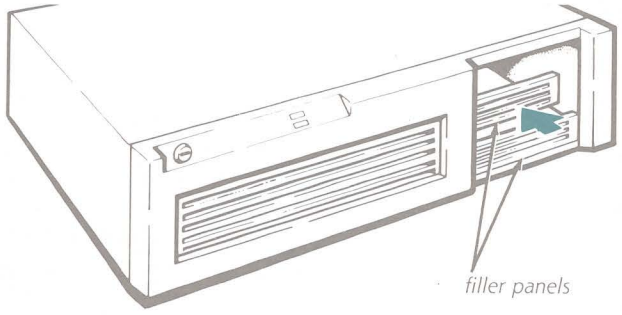
Most connectors and cables are keyed so that you can connect them one way only; check for this by trying them both ways. If the cable connector fits both ways on your drive connector, the connectors are not keyed, and you must **make sure that the colored strip along one edge of the cable goes to the pin-1 ends of the connectors on both ends of the cable.** The pin-1 end of a card-edge connector is often identified by a notch cut about a quarter-inch from the end of the connector. If you need help identifying the pin-1 end of the connector, see your drive specification.

If you need more information on any of the drive connectors, refer to the specification for your drive. Refer to the chassis illustration in Chapter 1 of this guide to identify the cables and system board connectors.

Removing Filler Panels

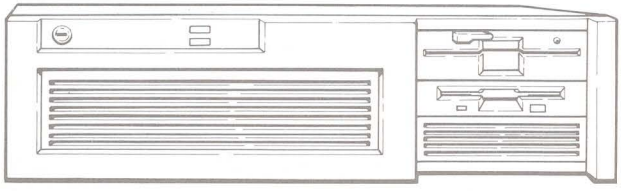
On the front of the chassis cover, filler panels cover unused bays in the right-hand drive cage. Whenever you install a drive in a previously unused bay, you must remove the filler panel for that bay in order to access the drive.

The filler panels fit over small plastic posts, with metal nuts to hold them in place. To remove a filler panel, take the cover off the computer, unscrew the nuts, and lift the filler panel off the posts and set it aside.

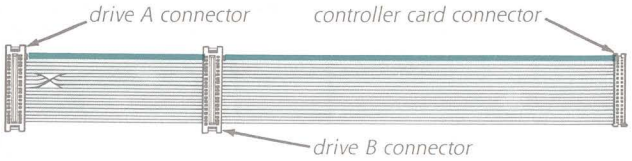


Installing Diskette Drives

Diskette drives can be installed in the top (drive A) and middle (drive B) bays of the right-hand drive cage. The System 325 base configuration has a diskette drive installed in the top bay.



The diskette-drive control cable supports two daisy-chained devices (diskette or tape drives):



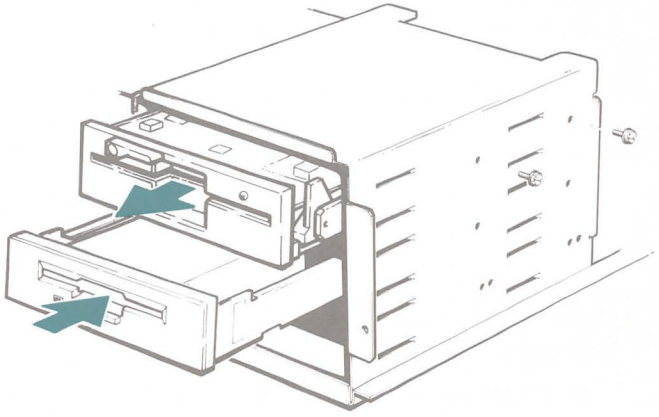
Installing a Diskette Drive in the Middle Bay

The following instructions cover installing a 5.25-inch or 3.5-inch diskette drive in the middle (drive B) bay of your right-hand drive cage, the normal location for a second diskette drive. This procedure assumes that there is a device installed in the top (drive A) bay.

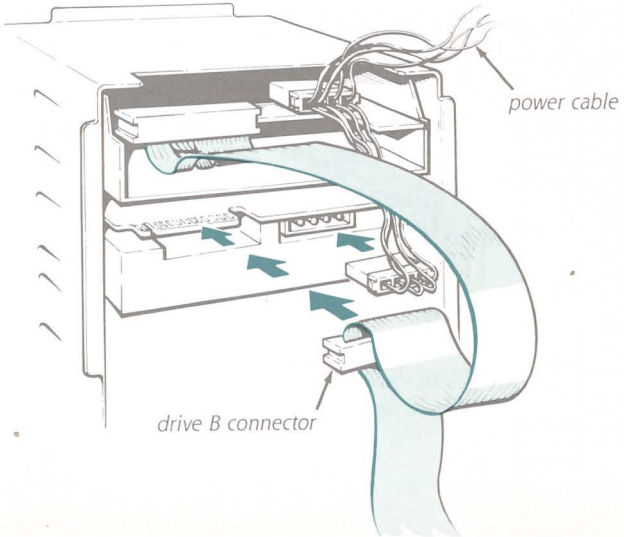
1. **Ground yourself, turn off your system, and disconnect it from all power.**
2. **Prepare the diskette drive for installation.**

   Compare the jumper settings with those in the diskette drive specification; change any settings necessary for your configuration.

   Remove the terminating resistor from the drive. Remove it carefully with needle-nose pliers or, if it is permanently installed, disable it by reconfiguring its jumpers as described in the drive specification.
3. **Remove the computer cover. Remove the appropriate filler panel.**
4. **Remove the securing screws from the side of the drive cage and pull the drive A device about two inches out of its bay to reach the drive B connections more easily. (If you are replacing a device in the middle bay, disconnect the power cable and diskette-drive control cable from the device and remove it.) Insert your new drive all the way into the middle bay.**



5. **Make the connections on the back of the drive:**



   Plug an unused **power cable** into the 4-pin power connector at the back of the drive. Connect the **drive B connector** on the control cable (the second or *inner* connector on the cable) to the 34-pin card-edge or header connector at the back of the drive.

   Match the colored strip on the edge of the cable to the notched (pin-1) end of the drive B edge connector. Then push the cable connector firmly onto the card-edge connector.

CAUTION: Beware of reversing the ribbon cable (placing the colored strip away from pin 1 of the connector). Reversing the cable prevents the drive from operating and could damage the controller, the drive, or both.

6. **Secure the devices in the drive bays.**

   Return the drive A device to its correct position, line up the screw holes, and replace the screws. Use the screws included in your upgrade kit to secure drive B in the middle bay.
7. **Check all cable connections. Fold cables out of the way, making sure they do not catch on the cover or block the airflow of the fan or cooling vents.**
8. **Replace the computer cover and the cover mounting screws.**
9. **Remove the plastic or cardboard shipping protector from the new drive and throw it away.**
10. **Reconnect your computer to an ac power source and turn it on.**
11. **Update the hardware configuration information, using the System Setup program.**

    At the DISKETTE B category, press the right-arrow key to cycle through the options until you reach the correct description for your new drive.

    Insert your System Support diskette in drive A (in preparation for the next step) and press <ESC> to enter your selection, exit System Setup, and reboot with the System Support diskette.
12. **To make sure the drive is installed and working correctly, test it with the Dell System Analyzer Diskette Drive Test.**

    Refer to your *System Support Manual* for information on this diagnostic test.

Installing a Diskette Drive in the Top Bay

To install or replace a device in the top (drive A) bay, you can follow the drive B procedure, but with the following differences:

- In step 2, if there is a second device on the daisy chain, do not remove the terminating resistor on the drive A device. If there is not a second device, you generally leave the resistor in place; however, check your device specification for exceptions to the general rule.
- In step 5, use the drive A (*end*) connector on the diskette-drive control cable instead of the *inner* connector to make the connection on the back of the drive.
- In step 11, update the **DISKETTE A** category with the correct information.

Installing Tape Drives

The following instructions cover installing the tape drives available for your Dell System 325 These include the 40-MB internal and external tape drives and the 150-MB internal tape drives.

The tape drives sold by Dell come with their own operating software and documentation. After you complete the installation, refer to that documentation for instructions on installing and using the backup software.

Installing an Internal 40-MB Tape Drive

The internal 40-MB tape drive sold by Dell uses the existing diskette-drive controller card. Your system configuration determines how and where the drive is installed:

- If there will be only two devices (one diskette drive and one tape drive) installed in the right-hand drive cage, the tape drive is installed in the middle (drive B) bay and connected to the drive B connector on the diskette-drive control cable.
- The diskette-drive control cable handles up to two devices. If there will be *three* devices (two diskette drives and a tape drive) in the right-hand drive cage, you must install the tape drive in the option (bottom) bay and connect a separate tape-drive control cable *and* the diskette-drive control cable to an adapter/multiplexer card installed in an expansion slot. The adapter card in turn connects via cable to the diskette drive connector on the controller card.

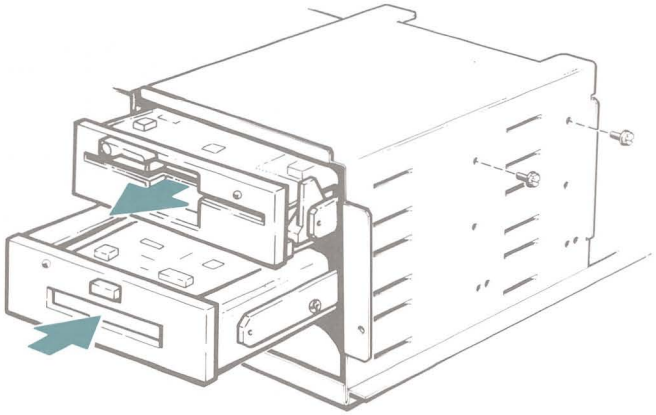
Procedure for a Two-Drive Configuration

Install the tape drive in the middle bay of your computer as follows:

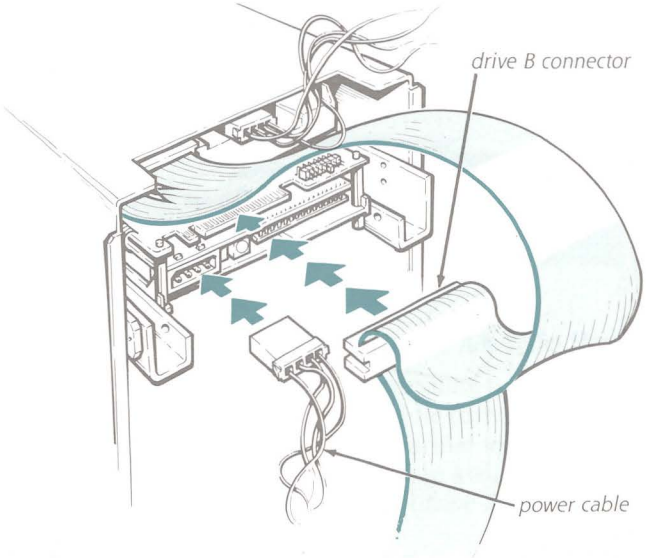
1. **Ground yourself and prepare the tape drive for installation.**

   Unwrap the drive. Remove the terminating resistor. Check your drive specification to confirm that the jumper block has been factory-set for compatibility with your system.

2. **Ground yourself, turn off your system, and disconnect it from all power.**
3. **Remove the computer cover. Remove the appropriate filler panel.**
4. **Remove the securing screws from the side of the drive cage. Pull the drive A device about two inches out of its bay and insert the tape drive all the way into the drive B bay.**



5. **Make the connections on the back of the drive:**



Make the power connection using a spare **power cable.** Connect the **drive B connector** (the second connector on the diskette-drive control cable) to the 34-pin card-edge connector on the back of the tape drive.

Make sure the colored strip on the cable goes to the pin-1 side of the tape drive's card-edge connector.

CAUTION: Reversing the cable (placing the colored strip away from pin 1) on any connector will prevent the drive from operating and could damage the controller, the drive, or both.

6. **Secure all drives in their bays.**

   Position the drives in their bays. Verify that cable connections are tight. Secure the drives with the drive mounting screws, using the screws that came in your upgrade kit to secure the tape drive.

7. **Check all internal cable connections that may have been jarred loose. Fold cables out of the way, making sure that they do not block the airflow of the fan or cooling vents or catch on the cover.**
8. **Replace the computer cover and mounting screws.**
9. **Reconnect your computer to an ac power source.**
10. **Enter the System Setup program to check the system configuration information.**

    See Chapter 4 for more information on the System Setup program.

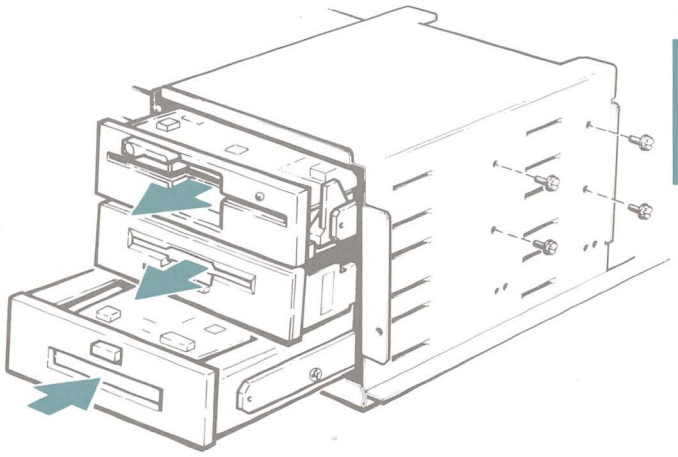
    When a tape drive is attached to the diskette-drive control-cable connector for drive B, the **DRIVE B** category on the System Setup screen must read **NOT INSTALLED.**

    NOTE: Installing a tape drive does not require a Dell System Analyzer test.

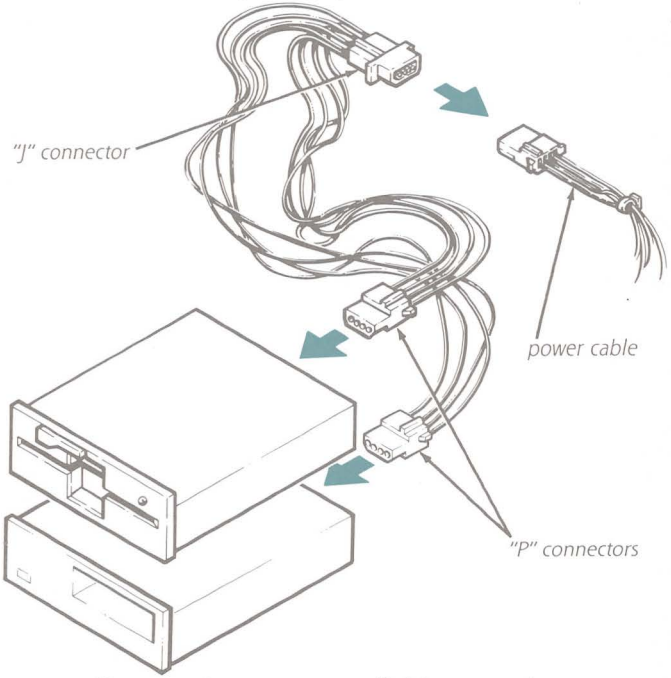
Procedure for a Three-Drive Configuration

Install the tape drive in the option (bottom) bay of the right-hand drive cage as follows:

1. **Follow steps 1–5 of the procedure for the two-drive configuration, with the following exceptions:**
   - In step 4, pull both the drive A *and B* devices partially out of the drive cage. Insert the tape drive into the bottom bay.



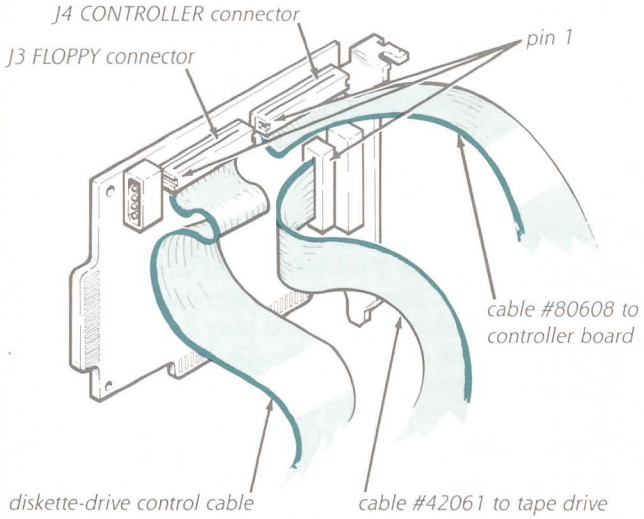
- In step 5, *if you do not have a spare power cable,* use the Y-cable included with your drive as follows: disconnect a power cable from one of the diskette drives and plug it into the "J" connector of the Y-cable. Then plug the two "P" connectors of the Y-cable to the diskette-drive and tape-drive power connectors.



- Because there are no available connectors on the diskette-drive control cable, a *separate control cable* (number 42061) comes with your tape drive. Also in step 5, connect one end of this cable to the 34-pin connector on the back of the tape drive, making sure the colored strip on the cable goes to the pin-1 end of the connector.

2. **Disconnect the diskette-drive control cable from its connector on the controller card.**
3. **Install the adapter/multiplexer card in an expansion slot.**

   The adapter card will work in either an 8-bit or a 16-bit expansion slot. (See "Installing an Expansion Card" in Chapter 2.)



4. **Connect the diskette-drive control cable to the connector labeled J3 FLOPPY on the adapter card.**

   In this step and the following two steps, make sure the colored strip on the cable goes to the pin-1 side of the connector.
5. **Connect cable 42061 (coming from the back of the tape drive) to the INT TAPE connector on the adapter card.**
6. **Plug one end of the cable marked 80608 into the J4 CONTROLLER connector on the adapter card.**
7. **Connect the other end of cable 80608 to the diskette-drive control connector on the controller card.**
8. **Secure all drives in their bays.**

   Verify that cable connections are tight. Secure the drives with the drive mounting screws, using the screws that came in your upgrade kit to secure the tape drive.
9. **Check all internal cable connections that may have been jarred loose. Fold cables out of the way, making sure that they do not block the airflow of the fan or cooling vents or catch on the cover.**
10. **Replace the computer cover and cover mounting screws.**
11. **Reconnect your computer to an ac power source.**

NOTE: You do not need to run the System Setup program in this case, because the tape drive is not attached to the daisy-chain cable. Installing a tape drive does not require a Dell System Analyzer test.

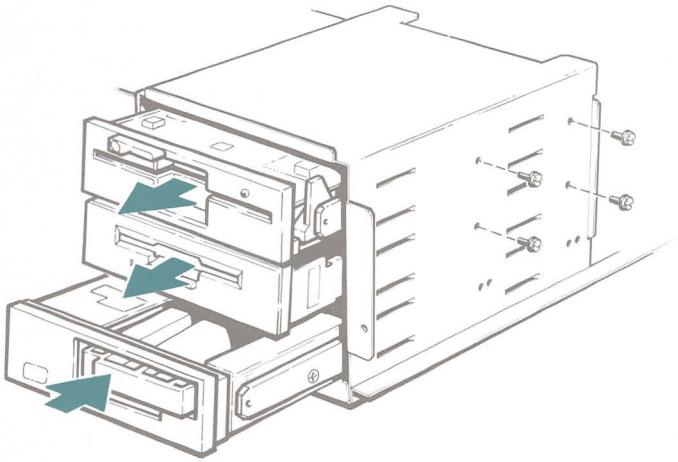
Installing an Internal 150-MB Tape Drive

The 150-MB internal tape drive sold by Dell comes with its own controller card and cable.

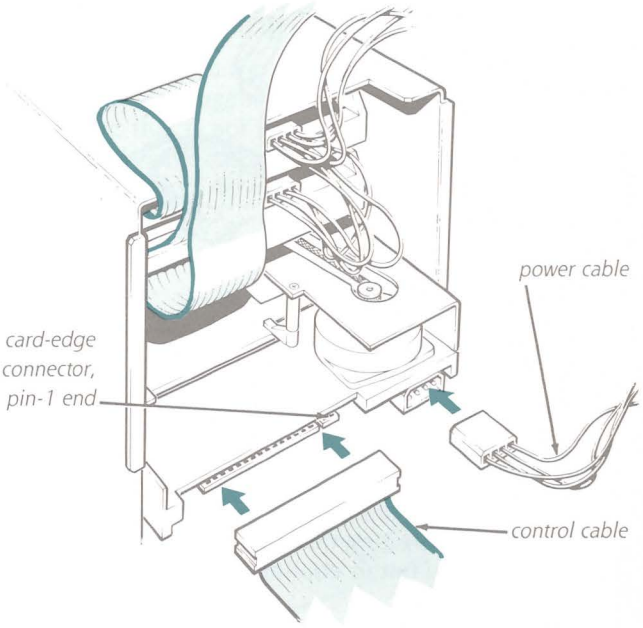
The drive has been factory-set for compatibility with Dell computer systems running under MS-DOS 3.30. If you plan to use an operating system other than MS-DOS 3.30 or if you experience problems operating the drive, refer to the tape drive specification for jumper and DIP switch settings that are compatible with your configuration.

The 150-MB internal tape drive is normally installed in the bottom bay. However, you can install it in the middle bay if you don't plan to use the middle bay for a diskette drive.

1. **Ground yourself, turn off your system, and disconnect the system from all power.**
2. **Remove the computer cover.**
3. **Remove the securing screws from the side of the right-hand drive cage. Pull the installed device(s) about two inches out of the cage and insert the tape drive all the way into its bay.**



4. **Attach a spare power cable to the back of the drive.**

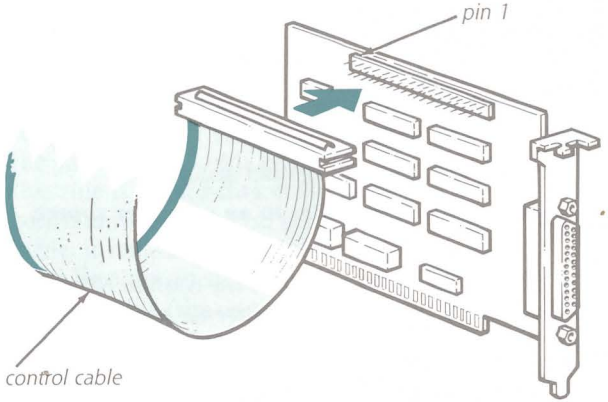


5. **Locate the control cable that came with your drive kit. Attach the card-edge connector on one end of the cable to the card-edge connector on the back of the drive.**

   The connectors are keyed to prevent connecting them incorrectly.

6. **Attach the 50-hole connector end of the control cable to the 50-pin connector at the top of the controller card.**

   Make sure the colored strip goes to the pin-1 side of the connector.



7. **Install the controller card in a spare 8- or 16-bit expansion slot.**

   Follow the directions in "Installing an Expansion Card" in Chapter 2.

8. **Secure all drives in their bays.**

   Return all drives to their correct positions in their bays. Verify that their cable connections are tight. Secure all drives with the drive mounting screws, using the screws that came in your upgrade kit to secure the tape drive.

9. **Check all internal cable connections that may have been jarred loose. Fold cables out of the way, making sure that they do not block the airflow of the fan or cooling vents or catch on the cover.**

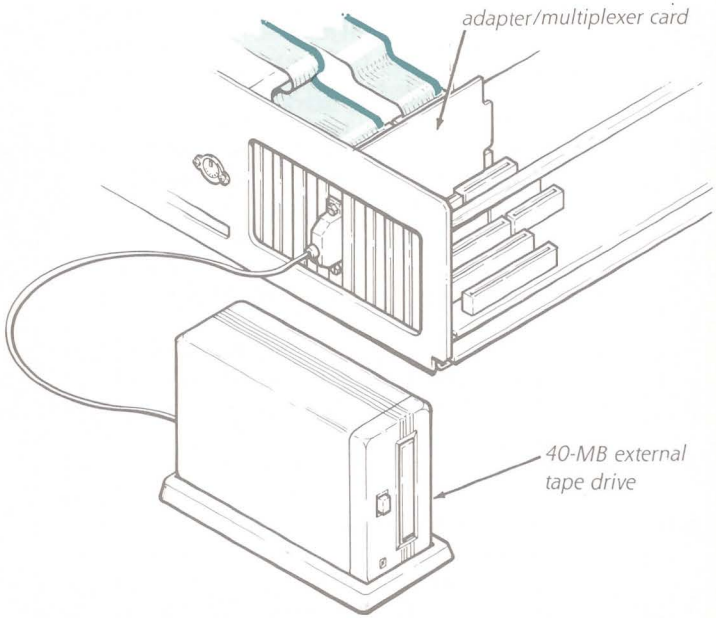
10. **Replace the computer cover and the cover mounting screws.**

11. **Reconnect your computer to an ac power source.**

NOTE: You do not need to run the System Setup program in this case, as the tape drive is not attached to the daisy-chain cable. A tape drive does not require a Dell System Analyzer test.

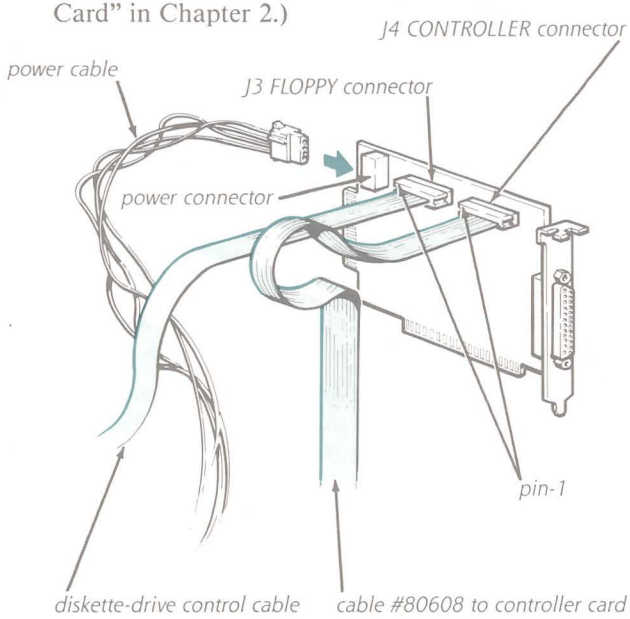
Installing an External 40-MB Tape Drive

The 40-MB external tape drive uses the same adapter/multiplexer card that the 40-MB internal tape drive uses in the three-drive configuration. As with that configuration, you must reroute the diskette-drive control cable.



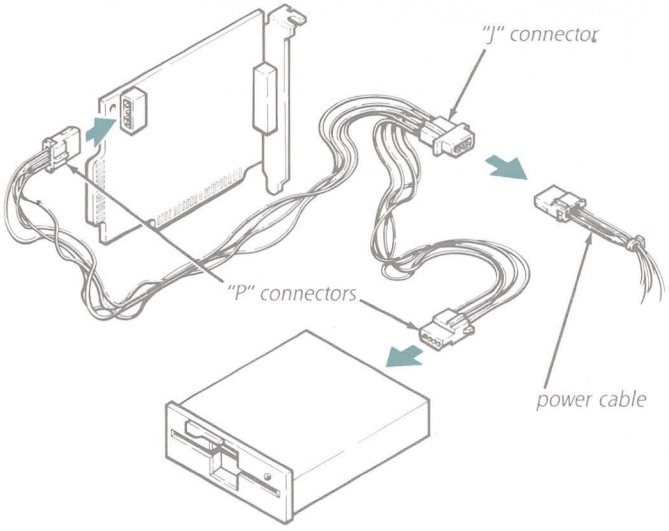
1. **Ground yourself, turn off your system, and disconnect it from all power.**
2. **Remove the computer cover.**
3. **Install the adapter card provided with the drive in an expansion slot near the controller card.**

   The card will work in either an 8- or 16-bit expansion slot. (See "Installing an Expansion Card" in Chapter 2.)

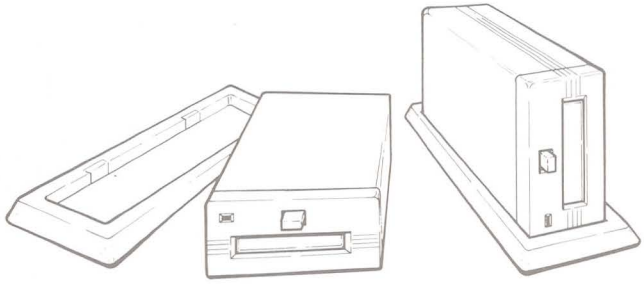


4. **Disconnect the diskette-drive control cable from its connector on the controller card and connect it to the connector labeled J3 FLOPPY on the adapter card.**
5. **Plug one end of the cable marked 80608 (provided with the drive) into the J4 CONTROLLER connector on the adapter card.**
6. **Connect the other end of the 80608 cable to the diskette-drive control connector on the controller card.**
7. **Plug an unused power cable to the power plug on the adapter card.**

   If you do not have a spare power cable, use the Y-cable included with your drive as follows: disconnect a power cable from one of the diskette drives and plug it into the "J" connector of the Y-cable. Then connect the two "P" connectors of the Y-cable to the diskette-drive and adapter-card power connectors.



8. **Check all cable connections. Fold cables out of the way, making sure that they do not block the airflow of the fan or cooling vents or catch on the cover.**
9. **Replace the computer cover and the cover mounting screws.**
10. **Place the external drive near the computer, either flat on its side or mounted vertically in its stand.**



11. **Plug the drive's control cable into the adapter card connector showing through the expansion slot opening on the back panel.**

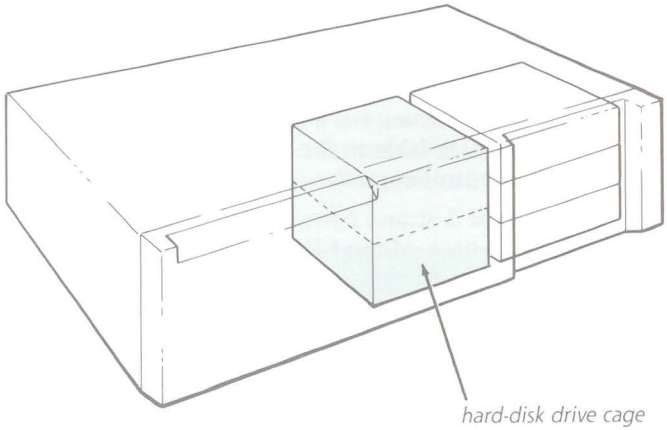
    Screw the connectors together securely.
12. **Reconnect your computer to an ac power source.**

NOTE: You do not need to run the System Setup program when you install an external tape drive. Installing a tape drive does not require a Dell System Analyzer test.

Installing Hard-Disk Drives

Hard-disk drives in formatted capacities ranging from 90 MB to 322 MB are available for the System 325.

These drives are normally installed in the hard-disk drive cage, the cage located near the center of your computer that is not accessible unless you remove the cover. This cage can hold one full-height or two half-height hard-disk drives.



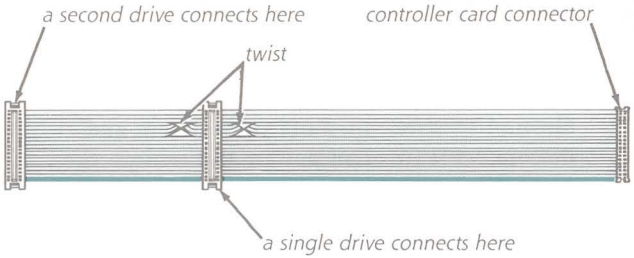
hard-disk drive cage

Drive Addressing in the System 325

If you are using two hard-disk drives together, there is no need to set the drives to different addresses so that the system can differentiate between them. The drives can remain as factory-set to the same address; a physical twist in the 34-pin control cable used in the System 325 reverses the address lines to one of the drives, allowing the system to address the drives as two different devices.

The Terminating Resistor and the Control Cable

The general rule explained in the beginning of the chapter – that the only drive to retain its terminating resistor is the drive connected to the end connector on the cable – still holds true. However, an exception to this rule is a hard-disk drive installed in a single-drive configuration. Because it is the only drive on the cable, it retains its terminating resistor, even though it must be connected to the *inner* connector on the drive control cable (the connector with the reversed address lines) to accommodate the hard-disk-drive addressing scheme.



Note that if you add a second hard-disk drive, you must do the following:

- Remove the terminating resistor from the original drive. If you do not have a specification for the drive and need information about the terminating resistor, call Dell Computer Corporation for technical assistance.
- Connect the second drive to the end connector on the cable, leaving its terminating resistor intact.

If circumstances seem to dictate removing a terminating resistor from a drive, check the drive specification to locate the terminating resistor.

If the resistor is not permanently soldered into its socket, remove it with needle-nose pliers or a chip puller and set it aside. If it is soldered into its socket, check the specification to see whether you should disable it by resetting jumpers or whether you should leave it as is for this particular drive. If you need to disable it, your drive specification will tell you how.

Installing a Hard-Disk Drive

The System 325 hard-disk drive cage accommodates one full-height or two half-height hard-disk drives. The procedure given here covers installing a drive in that cage.

If you want to install a second hard-disk drive in the hard-disk drive cage or in the lower two bays of the right-hand drive cage, you can do so using the same general procedure. To install a hard-disk drive in the right-hand drive cage, you will find it helpful to unscrew the diskette drive in the top bay and pull it an inch or two out of the machine, temporarily, in order to reach the hard-disk drive connections below it. Install a hard-disk drive as follows:

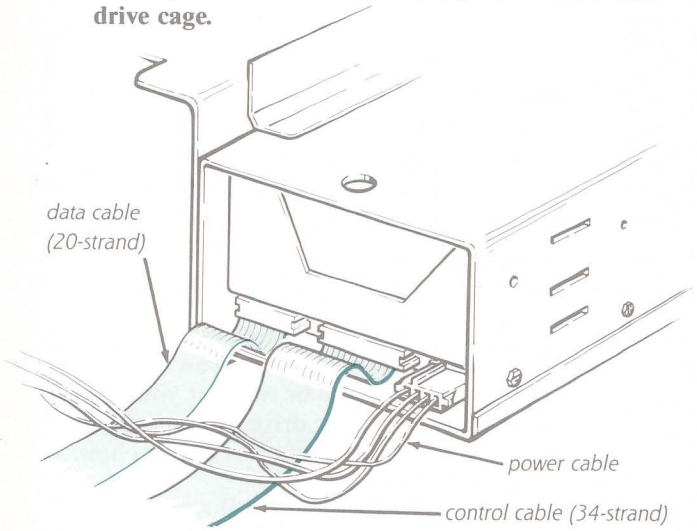
1. **Prepare the drive for installation.**

   Ground yourself and remove the antistatic packaging from around the drive. Compare the jumper settings with the settings shown in the drive specification and make any necessary changes.

Remove or bypass the terminating resistor if necessary (see the previous section called "The Terminating Resistor and the Control Cable").

2. **Ground yourself, turn off your system and disconnect it from all power, and remove the computer cover.**
3. **If you are replacing an installed device with a new one, remove the already installed device.**

   Unscrew the mounting screws from the left side of the cage, disconnect the device, and slide it out of the bay. If you are also replacing an installed controller card, remove the controller card at this time.
4. **Insert your new drive into its bay in the hard-disk drive cage.**



5. **Plug the power cable into the 4-pin power connector.**

   If your system does not have an unused power cable, attach a power cable Y-adapter to an existing power cable to convert one cable into two.

   If you are installing a new controller card with your new drive, turn to "Installing an Expansion Card" in Chapter 2 and install the card. Then continue to step 6.
6. **Connect the control and data ribbon cables to the back of the drive.**

   (Use the inner connector if you have a single-drive system. If you are daisy-chaining two hard-disk drives, see a previous section called "The Terminating Resistor and the Control Cable.") Push the 34-strand control and 20-strand data ribbon-cable connectors firmly onto the 34- and 20-pin card edges on the back of the drive. Make sure that the colored strip on the edge of the cables lines up with the pin-1 (notched) side of the card-edge connectors.
7. **Adjust the position of the drive in the bay, insert the two mounting screws provided with the upgrade kit into the holes in the left side of the drive cage, and tighten the screws.**
8. **Connect the unattached ends of the 34-pin control cable and the 20-pin data cable to the appropriate 34-pin and 20-pin connectors on the controller card.**

   Refer to your controller card specification to identify the proper connectors on the card.
9. **Connect the computer's in-use light-emitting-diode (LED) cable to the in-use LED connector on the controller card.**

   Locate the 2-strand twisted cable that emerges from the back of the LED on the front panel. Attach it to the 4-pin in-use LED connector on your controller card.
10. **Check all controller card connectors and device connectors to be certain that they are properly cabled and firmly seated.**
11. **Replace the computer cover and the cover mounting screws.**
12. **Reconnect your computer to an ac power source and turn it on.**
13. **Update the hard-disk drive section in your system configuration information file, using the System Setup program.**

    See Chapter 4 for information on the System Setup program and for instructions for determining your drive's type number.
14. **Logically format and partition your drive, using the commands explained in the "Partitioning and Formatting Your Drive" section following this procedure.**
15. **Test the drive with the Dell System Analyzer Hard-Disk Drive Test.**

    Refer to your *System Support Manual* for information on the disk diagnostic tests.
16. **Install DOS (or your operating system of choice) on your hard-disk drive.**

    Refer to "Installing Your Software" in your *Getting Started* guide.

Partitioning and Formatting Your Drive

Every hard-disk drive must be *physically formatted, partitioned,* and *logically formatted* before it can be used to store data.

The hard-disk drives sold for the System 325 have been physically formatted before leaving the factory. This means that each internal disk has been divided into dozens of concentric magnetic *tracks,* which in turn have been divided into smaller storage segments called *sectors.* A drive may occasionally (although rarely) lose its physical formatting. If this happens, you can recreate it if you are technically experienced by using the DOS Debug program. Appendix B explains how to use the Debug program to physically format your drive. However, if you are not familiar with the use of this program, we recommend that you call Dell for step-by-step instructions on physically formatting your drive.

CAUTION: If you are installing a second hard-disk drive, using the Debug program improperly can corrupt your existing hard-disk drive.

To complete the drive preparation, you must do the following:

- *Partition the drive:* split the physical storage area into two or more logical storage areas known as logical drives, each of which has a separate directory system and identifying letter-prompt.
- *Logically format the drive:* set aside groups of sectors that will store system startup information, sector status information, and DOS directory information.

Use the DOS commands FDISK and FORMAT to perform these procedures. FDISK and FORMAT are explained in the *MS-DOS User's Reference.*

Chapter 4
Using the System Setup Program

Before your System 325 left the factory, a Dell technician used the System Setup program to enter your system configuration information into special memory. The information is maintained by a battery installed inside the front of your computer.

Now, each time you turn on your system, the computer compares the hardware actually installed to the stored configuration information. If it detects a discrepancy between the two, it generates one or more error messages that identify the incorrect configuration setting. It then tells you to enter the System Setup program to correct the setting.

You use the System Setup program as follows:

- To change your system configuration information after you add to, change, or remove any hardware in your system
- To permanently reset the time or date on your system

You can *view* the current settings at any time. When *changing* information, you must reboot the system to initialize it with the new settings.

When you first set up your System 325, we recommend that you run through the System Setup program to familiarize yourself with your system configuration information and optional settings. You also may find it useful to print out the screen, if you can, or write down the information for future reference.

To use the System Setup program, you need to know the kind of diskette drive(s), hard-disk drive(s), and video display, as well as the amount of base memory and extended memory, installed in your system. If you are unsure of any of this information, see the manufacturing report that was shipped with your computer.

How to Enter the System Setup Program

You can enter the System Setup program from the DOS prompt at any time by pressing the <CTRL>, <ALT>, and <ENTER> keys simultaneously. The System Configuration Setup menu replaces your current screen. *(See illustration.)* You can also enter the program by responding to certain error messages. (See "Responding to Error Messages.")

How to Use the Menu

The System Configuration Setup menu displays the current setup and configuration information for each of the categories listed on the screen. Use the following keys as described to change information and/or exit the program.

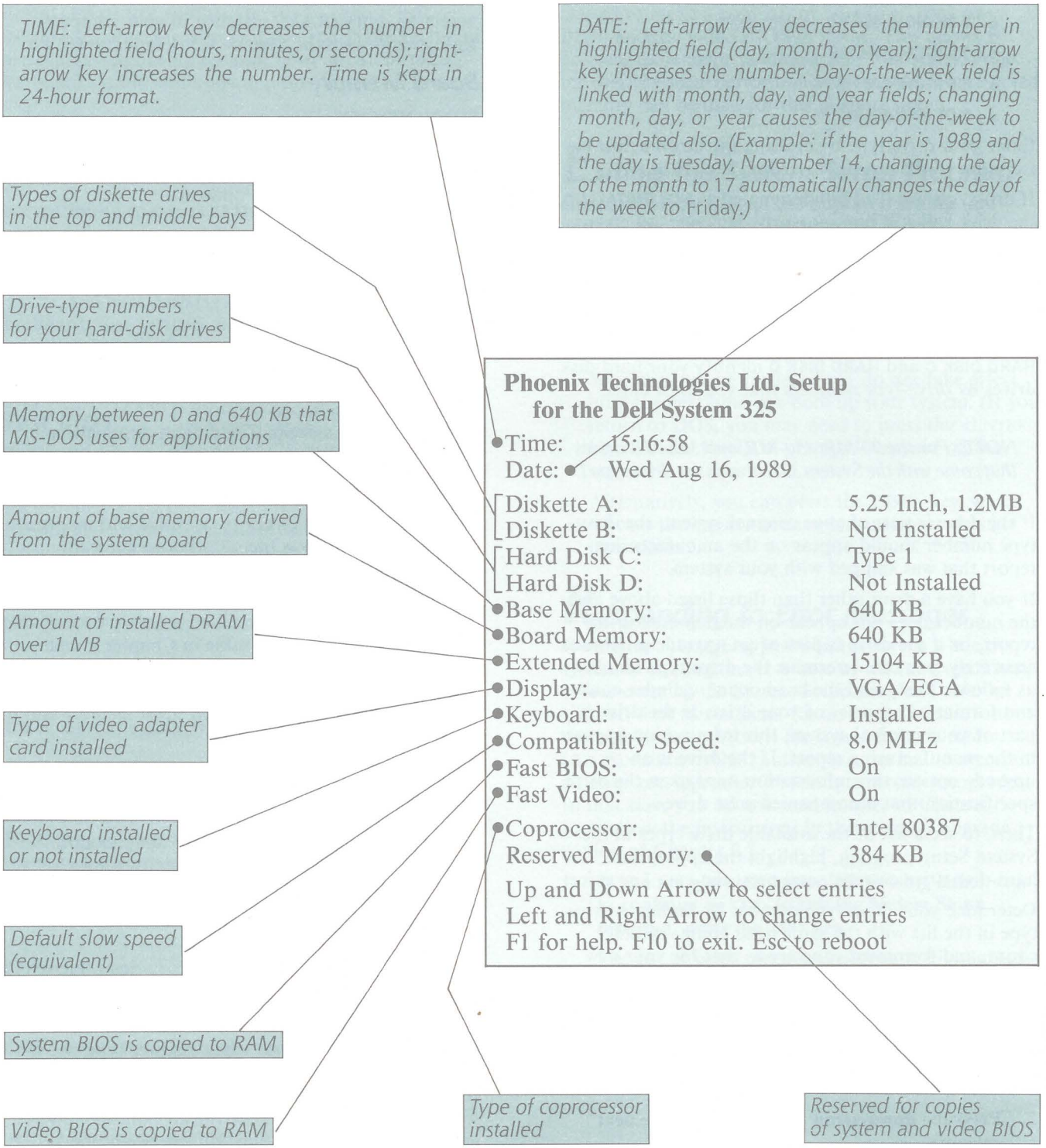
- Use the **up- and down-arrow keys** to move from category to category.
- Use the **left- and right-arrow keys** to change the settings within each category.
- Use the <F1> key to display help information for the currently highlighted category.
- Use the <F10> key to exit the System Setup program and return the system to its previous operation (the boot process or the DOS prompt) without rebooting the system. (If you exit to DOS, you may have to press the <ENTER> key to make the prompt appear on the screen.) The changes you made are recorded but do not take effect until the next time you boot the system.
- Use the <ESC> key to exit the System Setup program, reboot the system, and immediately implement any changes you have just made.

The following sections discuss each category in detail.

Diskette A and Diskette B

DISKETTE A and **DISKETTE B** refer to the diskette drives in your system's top and middle bays respectively. For each drive, highlight the drive location and then use the left- or right-arrow keys to cycle through the

System Configuration Setup Menu



following options until your drive type appears.

- **5.25 INCH, 1.2 MB**
- **5.25 INCH, 360 KB**
- **3.5 INCH, 1.44 MB**
- **3.5 INCH, 720 KB**
- **NOT INSTALLED**

Enter your drive type by pressing the down-arrow key (to move to the next item) or the <ESC> key.

If drive A is installed but designated as **NOT INSTALLED**, the drive will still boot properly. However, all error messages relating to drive A are suppressed during the bootup procedure, and problems may occur when you format a diskette.

Hard Disk C and Hard Disk D

HARD DISK C and **HARD DISK D** identify your hard-disk drives by *drive-type numbers* that you must enter.

NOTE: For the 90-MB, 150-MB, and 322-MB drives that come with the System 325, always use drive type 1.

If the drive is part of your original system, the drive-type number should appear on the manufacturing report that was shipped with your system.

If you have a drive other than those listed above and the number does not appear on the manufacturing report, or if the drive is part of an upgrade purchased separately, you can determine the drive-type number as follows: First, find the head count, cylinder count, and formatted capacity of your drive. If the drive is part of your original system, this information appears in the manufacturing report. If the drive is an upgrade option, this information appears in the drive specification that accompanied your drive.

Then, to see a list of the available drive types in the System Setup program, highlight the appropriate hard-disk drive category and press the <F1> key twice.

Determine your drive-type number by finding a drive type in the list with the same head count, cylinder count, and formatted capacity as that for your new drive. Press any key to return to the System Configuration Setup menu. Then follow these steps:

1. **Press the left- or right-arrow key to cycle through the choices until the correct drive-type number is displayed.**
2. **Press the down-arrow key to move to the next category.**

Base Memory

BASE MEMORY designates the amount of base random-access memory (RAM) installed in your computer. Base memory on the System 325 defaults to **640 KB.**

Board Memory

BOARD MEMORY allows you to specify how much of your base memory is to be derived from the system board. Options are as follows:

- **640 KB** (the default option)
- **512 KB**
- **256 KB**

The default setting is changed only under special circumstances.

Extended Memory

EXTENDED MEMORY designates the amount of dynamic random-access memory (DRAM) over 1 MB installed in your system. The default designation is **NOT INSTALLED**. When you boot up your system after installing additional SIMMs or a memory expansion board, an error message warns of a memory mismatch. You can press the <F1> key to continue and ignore the error, or you can press the <F2> key to enter the System Setup program.

On the System Setup screen, the system should have already entered the new extended memory total in that field, in kilobytes (see the table in Chapter 2 under "Adding System Board Memory"). If the memory total is not correct, check the memory components you added to make sure you installed them securely and in the right location.

When the memory total is correct, press <ESC> to reboot.

Display

DISPLAY indicates the type of video adapter card installed in your system. Options are as follows:

- **VGA/EGA**
- **CGA40**
- **CGA80**
- **MONO**
- **NOT INSTALLED**

If you are unsure of your video adapter type, see the manufacturing report accompanying your computer. If you choose **NOT INSTALLED**, all error messages relating to the monitor are suppressed during bootup; however, an installed monitor should still operate properly.

Keyboard

KEYBOARD indicates whether your keyboard is **INSTALLED** or **NOT INSTALLED**. If you choose **NOT INSTALLED**, all error messages relating to the keyboard are suppressed during bootup; however, an installed keyboard should still operate properly.

Compatibility Speed

COMPATIBILITY SPEED lets you accommodate speed-sensitive applications. Select one of two slower compatibility speeds (**4.77 MHZ** and **8 MHZ** equivalents) as the default compatibility speed. Then, to toggle between the 25-MHz processor speed and the default compatibility speed, press and hold down the <CTRL>, <ALT>, and backslash (\) keys in sequence. (For 102-key keyboards, use <CTRL>-<ALT>-<#>.) A special-sounding beep indicates that the change has taken effect.

Fast BIOS

FAST BIOS can be set to **ON** (the default setting) or **OFF**.

When the system boots with **FAST BIOS ON**, it immediately copies the basic input/output system (BIOS) code from ROM (slow memory) to identical, write-protected memory locations in the faster RAM chips. By operating with system BIOS in RAM, your system can more efficiently execute BIOS code, thereby improving overall system performance.

Fast Video

FAST VIDEO works similarly to **FAST BIOS**. Settings are **ON** or **OFF**; the default setting is **ON**.

FAST VIDEO is used to improve the performance of systems with VGA or EGA video adapter cards. With the option **ON**, the system copies the VGA or EGA BIOS from slower ROM to identical, write-protected memory locations in the faster RAM chips. This allows the system to manipulate video display data much more quickly and easily, improving video performance.

Coprocessor

COPROCESSOR indicates whether a math coprocessor chip has been installed. If the system detects an 80387 math coprocessor, it automatically sets the **COPROCESSOR** category to **INTEL 80387**. If it detects a WEITEK 3167 coprocessor, it sets the category to **WEITEK 3167**. With no coprocessors installed, this setting should be **NOT INSTALLED**.

Reserved Memory

RESERVED MEMORY consists of 384 KB of memory that is used to make a copy of, or "shadow," the system BIOS and the video BIOS in RAM. This allows BIOS accesses to be made at almost zero wait states, improving overall system performance. (The 384 KB of reserved memory can be used for this purpose only.)

Exiting the System Setup Program

Once you verify that all the displayed settings are correct, you can exit the System Setup program in one of two ways:

- You can press <F10> to exit the System Setup program. This either returns you to the introductory boot screen that appears before the power-on self-test, or it returns you to DOS.

  Your changes are recorded but do not take effect until the next time you boot up your system. (If you return to DOS, you may need to press the <ENTER> key to cause the DOS prompt to appear on the screen.)

- Alternatively, you can press the <ESC> key, which reboots the system and implements your changes immediately.

Responding to Error Messages

If an error message appears on the screen while the system is booting, make a note of the message. Then, before entering the System Setup program, refer to Chapter 5 of this manual 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 after installing a memory upgrade. In that case, you do not need to refer to Chapter 5—just follow the instructions in the memory upgrade section of Chapter 2.)

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

   The list of error messages reappears, highlighted, and you are prompted to press any key to continue.

2. **Press any key on your keyboard to display the System Configuration Setup menu.**

Chapter 5
Troubleshooting Basics

This chapter identifies and explains basic troubleshooting aids you can use before calling Dell for technical assistance. These aids are:

- Documentation (hardware and software)
- Dell System Analyzer
- Error messages
- Troubleshooting checklist

NOTES: This chapter describes troubleshooting tips for the DOS and OS/2 operating systems. If you have another operating system, refer to its documentation for equivalent recommendations.

For problems with software or hardware not purchased from Dell, call the software or hardware company or vendor.

Documentation

Most of the problems that you may experience with your System 325 occur when you are configuring or setting up equipment or software. You can solve many of these problems by referring to one or more of the following documents:

- *Getting Started*
- *Installation and Troubleshooting Guide*
- *System Support Manual*
- Operating system documentation
- Documentation supplied with accessories and software

When you cannot solve the problem using the documentation, call Dell Technical Support for assistance – help is only a toll-free phone call away. See the "Getting Help" appendix in this guide for telephone numbers.

Dell System Analyzer

The Dell System Analyzer is a series of diagnostic tests provided by Dell on the System Support diskette. These tests help you troubleshoot problems by verifying the correct operation of several major components of your computer system. Refer to your *System Support Manual* for further instructions on the use of the Dell System Analyzer.

Error Messages

When error messages appear on your screen, write them down and make a note of the circumstances surrounding their occurrence.

Three types of error messages can be displayed by your computer system:

- Basic Input/Output System (BIOS) error messages
- Operating system error messages
- Application software error messages

The following table identifies some of the most common BIOS and operating system error messages and explains how to deal with them. The highlighted portions of the table identify the error messages generated by your operating system.

NOTE: For further information on operating system error messages and application software error messages, refer to your operating system manual or the documentation that accompanied your software for a list of error messages or troubleshooting instructions.

Bad or missing command interpreter	See the section "Hard-Disk Drive Problems."
***xxx* Base Memory, *xxx* Extended**	Not an error message. See Chapter 4, "Using the System Setup Program."
Checksum = *hex value*	See the message entry **Optional ROM bad.**
Diskette drive reset failed	Call Dell for technical assistance.
Diskette read failure – strike F1 to retry	See the section "Diskette Drive Problems."
Display adapter failed; using alternate	Call Dell for technical assistance.
Error loading operating system	See the section "Hard-Disk Drive Problems."
General failure reading drive *x*:	See the section "Diskette Drive Problems."
Hard disk read failure – strike F1 to retry boot	See the section "Hard-Disk Drive Problems."
Hard-disk failure	See the section "Hard-Disk Drive Problems."
Hard-disk initialization error	See the section "Hard-Disk Drive Problems."
I/O card parity *interrupt* at *address*	See the message entry **Optional ROM bad.**
Invalid configuration information – please run SETUP program	See Chapter 4, "Using the System Setup Program."
Invalid DOS version	See the section "Diskette Drive Problems."
Invalid drive specification	See the section "Hard-Disk Drive Problems"
Invalid media or track 0 bad	See the section "Diskette Drive Problems."
Invalid parameter	See the section "Diskette Drive Problems."
Keyboard clock line failure	See the section "Keyboard Problems."
Keyboard controller failure	See the section "Keyboard Problems."
Keyboard is locked: Please unlock	See the section "Keyboard Problems."
Memory tests terminated by keystroke	Not an error message. Memory tests interrupted by keystroke.
No boot device available – strike F1 to retry boot	See the section "Hard-Disk Drive Problems."
No boot sector on hard disk – strike F1 to retry boot	See the section "Hard-Disk Drive Problems."
Non-system disk or disk error	See the section "Diskette Drive Problems."
Not a boot diskette – strike F1 to retry boot	See the section "Diskette Drive Problems."
Optional ROM bad **Checksum = *hex value*** **I/O card parity *interrupt* at *address*** **Type (S)hut off NMI** **(R)eboot, other keys to continue**	When you receive this set of error messages, call Dell for technical assistance.
(R)eboot, other keys to continue	See the message entry **Optional ROM bad.**
Type (S)hut off NMI	See the message entry **Optional ROM bad.**

Troubleshooting Checklist

This section provides a list of questions and symptoms to help you narrow down causes for specific problems that may occur when you set up and operate your computer system.

Problems Before or During Bootup

■ Is your computer connected to electrical power?

If your computer is plugged into a wall outlet, test the outlet with another electrical device (such as a lamp). If the outlet is not providing power, try connecting the computer to another outlet. If the computer doesn't work when its power cable is connected to an outlet that works, the power cable may need to be replaced.

If you have a surge protector, make sure that its main power switch is turned on. If the switch is on but the computer does not work, try disconnecting the computer's power cable from the surge protector and plugging it directly into the wall outlet. If the computer works when connected to the wall outlet, the surge protector must be replaced with one that works.

If your computer is connected to an extension cable, make sure that the cable has a three-prong plug (is grounded). Test the cable by connecting it to another piece of equipment to determine if it is carrying electricity.

■ Are cables connected properly?

Check and reseat all cables to make sure they are not loose. If cables are loose or disconnected, connect and tighten them. If you do not get good results, inspect the cables for damage. If you find damaged cables, call Dell.

When you check cables, ensure that none of the pins in the connectors are bent or pushed back so as to not make contact.

■ Are cables the appropriate length?

Parallel cables should be no more than 25 feet long. Serial cables should be no more than 50 feet long.

■ Are serial devices cabled properly?

For serial devices, make sure that the cables running from the computer's serial port to your device are plugged in and seated well at both ends. There are two different classes of serial devices, Data Carrier Equipment (DCE) and Data Terminal Equipment (DTE). These classes use different types of data cables. Be sure you use the appropriate cable with your serial equipment. Typically, DCE equipment, such as a modem, uses a straight-through serial cable. DTE equipment, such as most serial printers, uses null-modem serial cables. Check with the vendor of the serial equipment to determine the type of cable needed.

■ Are power switches on?

Make sure these switches are turned *on:*

- Computer's main power switch
- Monitor's power switch
- Surge protector power switch (if any)

■ Are power indicators active?

If the fan inside the computer is running, but you hear no beeps within about 30 seconds after turning on your computer, turn your computer off and call Dell.

■ Is your monitor screen completely blank?

Adjust brightness and contrast. If the monitor still does not display anything, call Dell.

■ Is the cursor and operating system prompt visible?

If the cursor and prompt are not visible, reboot the computer. Write down any error messages that appear. If rebooting still displays only a cursor, call Dell.

■ Is the video "jumping" or scrolling?

Is the computer located near other electrical equipment, or does it share an electrical circuit? Radios, TVs, and household and office appliances can cause interference. If your computer is located near other equipment, relocate it. If the problem still exists, call Dell.

■ Does your video display appear as expected?

If you have a color display, do the colors on the monitor screen appear washed out? If you are unable to display all the colors that should be available, run the Dell System Analyzer Video Test. If this confirms the monitor's inability to display colors correctly, call Dell.

■ Does the ROM BIOS message appear at bootup?

The normal Phoenix 80386 ROM BIOS message that appears on your screen at bootup is:

```
Phoenix 80386 ROM BIOS PLUS
Copyright © 1985-1988 Phoenix
Technologies, Ltd.
All rights reserved
```

If this message does not appear at bootup, if no RAM count is visible, or if the computer system doesn't respond normally, turn the computer off and leave it off for one minute; then turn it back on.

If any of these problems recur, use the System Setup program as explained in Chapter 4 to verify the stored configuration information. In particular, check the hard-disk drive-type number.

Problems During Operation

Expansion Card Problems

■ **Are expansion cards installed and operating correctly?**

Expansion cards added to your computer system's original configuration may cause many kinds of problems too diverse to list here. To determine if problems with your computer are caused by added expansion cards, follow this procedure:

1. Turn off and unplug the computer. Then remove the expansion cards. (See Chapter 2 for instructions on how to remove expansion cards.)
2. Reset the system board switches and jumpers to their original settings.
3. Make sure that the System Setup information is correct. (See Chapter 4 for instructions on using the System Setup program.)
4. Reboot.

If the same problem still occurs with the expansion card(s) taken out, call Dell.

Keyboard Problems

■ **Are keyboard lights on?**

If the three indicator lights on the keyboard are on, your computer may have a problem with the power supply or with the keyboard. First, make sure that the voltage selector switch on the back of the computer is in the proper position:

- 115 volt/60 hertz in the U.S. and Canada
- 230 volt/50 hertz in the U.K.

If the voltage selector switch is set incorrectly, follow these steps:

1. Turn off the computer's main power switch.
2. Change the voltage selector switch.
3. Turn the computer on.

If the lights stay on, try the following procedure:

1. Verify that the voltage selector switch is set properly.
2. Disconnect the keyboard from the computer.
3. Reboot.

   If the computer boots successfully, your keyboard may need replacing. If you have a spare keyboard to replace the keyboard with and the lights are still on, call Dell.

■ **Is your keyboard totally inoperative?**

Check the DIP switches on the underside of your Dell 101- or 102-key keyboard. They are underneath the keyboard indicator lights, inside a small protective cover.

1. Turn off your computer system and disconnect it from electrical power.
2. Use a tool such as a flat blade screwdriver to remove the keyboard DIP switch cover.
3. Write down the positions of switches 1 through 8.
4. Ensure that they are all in the proper position: either all switches **OFF** or switches 1 and 2 **ON**. If necessary, use a narrow tool such as a ballpoint pen to change the switches.
5. Snap the cover back in place, connect the computer system to electrical power, and turn it on.

If the keyboard is still inoperative, call Dell.

■ **Are extended keys inoperative?**

If the gray cursor keys (between the typewriter keys and the numeric keypad) do not work, switch keyboard DIP switches 1 and 2 to the **ON** position.

1. Turn off your computer system and disconnect it from electrical power.
2. Use a tool such as a flat blade screwdriver to remove the DIP switch cover.
3. Write down the positions of switches 1 through 8.
4. Ensure that switches 1 and 2 are **ON**. If necessary, use a narrow tool such as a ballpoint pen to change the switches.
5. Snap the cover back in place, connect the computer system to electrical power, and turn it on.

If the cursor keys remain inoperative, call Dell.

■ **Are you experiencing other keyboard problems?**

If the keyboard exhibits the following symptoms, call Dell.

- Some keys don't work
- Keys respond too easily

■ **Are you receiving any of the following error messages?**

```
Keyboard is locked: Please unlock
```

Unlock the system keylock at the front of the computer.

```
Keyboard clock line failure or
Keyboard data line failure
```

The keyboard cable or the keyboard itself might be malfunctioning. Check the keyboard cable and the DIP switches under the keyboard. Call Dell for technical assistance if necessary.

Hard-Disk Drive Problems

■ **Are you receiving any of the following error messages?**

There are a number of error messages that inform you of different hard-disk drive malfunctions. They appear when you turn on the computer or attempt to boot it. This section lists the hard-disk drive error messages in alphabetical order.

NOTE: This section deals with DOS or OS/2 error messages. If your operating system is different, see the documentation that came with it.

```
Hard disk read failure-strike F1
to retry boot
```

The computer system cannot access the bootup information stored on the hard disk. Try booting from your original MS-DOS diskette. If you cannot determine what is wrong with the hard-disk drive, call Dell for technical assistance.

```
Hard-disk failure or Hard-disk
initialization error
```

1. Make sure the correct drive type is recorded in the System Setup information (see Chapter 4); then reboot.
2. If the error recurs after you ascertain or correct the drive-type number and reboot, put the MS-DOS System diskette into drive A, close the drive, and boot again.

NOTE: Special software is available that can recover data from some malfunctioning hard-disk drives. If you wish, use such software now before you go on to the next procedure.

3. After the computer successfully boots from drive A, type `FDISK` at the A:> prompt, and then press <ENTER>.
   - If the screen becomes blank, and then displays the following message: `NO FIXED DISK PRESENT`, call Dell.
   - If several options appear on the screen, select option 4, `Display partition information`. If partition information appears on the screen, press <ESC> twice. This reboots the system. If the hard-disk drive failure occurs again, call Dell.

CAUTION: The next procedures destroy all data on the hard-disk drive.

   - If the message `No partitions defined` appears, use the DOS commands FDISK and FORMAT to partition and logically format the hard-disk drive. The *MS-DOS User's Guide and User's Reference* explains these commands.

```
No boot device available
```

Check the System Setup information by using the System Setup program, explained in Chapter 4. Make sure that the hard-disk drive category contains the correct drive-type number. Then reboot the computer.

If the drive-type number is correct, and you still get the message `No boot device available` when you attempt to boot from the hard-disk drive, follow this procedure:

1. Put your original MS-DOS System diskette in drive A and close the latch. Then hold down the <CTRL> and <ALT> keys and press the <DEL> key.
2. At the A:> prompt, type the command `SYS C:` and press <ENTER>. The message `SYSTEM TRANSFERRED` appears.
3. At the A:> prompt, type the command `COPY COMMAND.COM C:\` and press <ENTER>. This copies the DOS command interpreter program to the hard-disk drive, and then displays the message `1 file(s) copied`.

4. Type `DIR C: /P` and press <ENTER>. A list of the files on your hard-disk drive should appear, one page at a time. Press any key to go on to the next page. You should see the file name `COMMAND.COM`.
5. Type the command `CHKDSK C:` and press <ENTER>. The message should include the line `2 hidden files`.
6. Open the diskette-drive door and reboot the computer.

If this procedure does not work correctly or if you still receive the message `NO BOOT DEVICE AVAILABLE`, call Dell.

`Error loading operating system` or `No boot sector on hard disk`

This message means that the boot partition on the hard disk (the area storing information necessary for bootup) is not active or does not exist. Boot from drive A using the original MS-DOS System diskette.

NOTE: Special software is available that can recover data from some malfunctioning hard-disk drives. If you wish, use such software now before you go on to the next procedure.

1. Type `FDISK` and press <ENTER>. A menu appears containing several options.
2. Select option 4, `Display partition information`.
   - If partition information is displayed and the STATUS category for Partition 1 is anything other than A, press the <ESC> key to return to the FDISK options. Select the second option, `Change Active Partition`. A prompt appears asking `Which partition do you want to make active?` Type `1` and press <ENTER>. A message appears saying `Partition 1 made active`. Press <ESC> to return to FDISK options. Press <ESC> twice to reboot the computer. If you still get an error message, call Dell.

CAUTION: The next procedures destroy all data on the hard-disk drive.

   - If the message `No Partitions Defined` appears, create hard-disk drive partitions following the instructions for the FDISK command in the DOS manual.

`Bad or missing command interpreter`

This means the file COMMAND.COM has been deleted, is corrupted, is a wrong version, or cannot be found. Boot from the A drive using your original MS-DOS System diskette.

CAUTION: Make sure that the system diskette you use is the same version of DOS that was installed on the computer.

At the A:> prompt, type `SYS C:` and press <ENTER>. If the message `System transferred` appears, type `COPY COMMAND.COM C:\` and press <ENTER>. Open drive A and reboot.

If the message `No room for system on destination disk` appears, call Dell.

`Invalid drive specification`

You have used a letter-prompt for a disk drive when there is no drive on your system with that letter-prompt. For instance, if you have two diskette drives and one hard-disk drive in your computer, there is no drive D.

Diskette Drive Problems

■ **Are you receiving any of the following error messages?**

`Invalid media or track 0 bad` or `Invalid parameter`

This message normally occurs when you try to format a double-density diskette [360 kilobytes (KB), the standard density] in a high-density diskette drive. Use the following commands for formatting diskettes:

1.2-MB and 1.44-MB diskettes	**FORMAT** *(drive)*	ENTER
360-KB diskette in 1.2-MB drives	**FORMAT** *(drive)*/4	ENTER
720-KB diskettes in 1.44-MB drives	**FORMAT** *(drive)*/n:9/t:80	ENTER
Bootable 1.2-MB and 1.44-MB diskettes	**FORMAT** *(drive)*/s	ENTER
Bootable 360-KB diskettes in 1.2-MB drives	**FORMAT** *(drive)*/4/s	ENTER
Bootable 720-KB diskettes in 1.44-MB drives	**FORMAT** *(drive)*/n:9/t:80/s	ENTER

If the same symptoms still appear when you use the correct command, check the System Setup information (see Chapter 4). Make sure the diskette-drive setup is correct. If this does not solve the problem, call Dell.

```
Invalid DOS version
```

This error message occurs when your MS-DOS bootup files are from a different version of MS-DOS than the MS-DOS external file (DIR, DEL, FORMAT and so on) that you are trying to run. Use the following procedure to make the boot files and the external files compatible.

Boot from the A drive using your *original* MS-DOS System diskette.

At the A:> prompt, type `SYS C:` and press <ENTER>. If the message `System transferred` appears, type `COPY *.* C:\` at the A:> and press <ENTER>. Open drive A and reboot.

If the message `No room for system on destination disk` appears, call Dell.

```
Diskette read failure-strike F1
to retry
```

This message appears when you try to boot with a bad or unformatted diskette. Format the diskette or try another one. If the problem recurs, call Dell.

```
Not a boot diskette
```

This message usually means that the diskette in drive A is not bootable – that is, it does not contain the DOS bootup files. Try booting from the original MS-DOS System diskette. If the same message appears, call Dell.

```
Non-system disk or disk error
```

This message usually means that the diskette in the A drive is not bootable – that is, it does not contain the DOS bootup files. Try booting from the original MS-DOS System diskette. If the same message appears, call Dell.

```
Non-system disk or disk error
```

This message usually means that the diskette in drive A is not bootable – that is, it does not contain the DOS bootup files. Try booting from the original MS-DOS System diskette. If the same message appears, call Dell.

```
General failure reading drive x:
```

The diskette in the drive referred to is not formatted or there is a fault in the drive itself.

Testing External Peripherals

Initialization and Self-Test

Computers and printers go through an initialization sequence as part of their power-on self-test (POST). Some printers must initialize themselves or are incompatible with the initialization codes sent by the computer during power-up. Others *must* receive the computer's initialization codes. If the printer will not come on line while connected to the computer, disconnect the printer from the computer and note whether or not it will come on line with the data cable disconnected. If it does, the problem may be incompatible initialization. Try turning the printer on after the computer has completed bootup. If this doesn't help, turn it on before you turn on the computer.

Some types of serial devices require software. Modems require communications software, which is readily available. Mice come with software. Most serial devices include a self-test. Sometimes the test is a function of the software. Refer to the manuals provided with your serial device and software to ensure that the software is not defective or improperly loaded, and to find out how to run the self-test.

Most parallel devices such as printers also have a self-test. If the self-test does not run automatically when you turn on the device, check the manual to find out how to run the test.

DOS Commands Affecting Serial Devices

Problems with serial devices can be caused by incorrect configuration – via a DOS command entered through the keyboard or a command contained in the AUTOEXEC.BAT or CONFIG.SYS files. These commands and files are explained in the *MS-DOS User's Guide and User's Reference.*

The MODE command is important in the use of serial devices because you must change mode configuration and redirect the signal from the default parallel print device to the serial port. The default print device under DOS is LPT1. The DOS command MODE can be used to set up a serial port as the default print device. Refer to the *MS-DOS User's Reference* for information on the MODE command, and refer to the documentation that accompanied your printer to find the serial parameters needed to configure the device.

Appendix A
System 325 Technical Specifications

Bus type	=	Industry standard architecture (ISA)
Microprocessor	=	80386
Cache controller	=	Intel 82385 with 32 KB of 25-ns SRAM
Microprocessor clock speed	=	25 MHz
Compatibility speeds	=	8 MHz, 4.77 MHz
Standard memory	=	1 MB or 4 MB of installed DRAM
Maximum installable memory	=	16 MB
Math coprocessor (optional)	=	25-MHz Intel 80387 (or) 25-MHz WEITEK 3167
Diskette drives (standard)	=	one 5.25-inch 1.2-MB (internal) diskette drive (or)
	=	one 3.5-inch 1.44-MB (internal) diskette drive
Diskette drives (optional)	=	one 5.25-inch 360-KB (internal) diskette drive (or)
	=	one 5.25-inch 1.2-MB (internal) diskette drive (or)
	=	one 3.5-inch 1.44-MB (internal) diskette drive
Tape drive (optional)	=	one 40-MB (or) 150-MB tape drive
Hard-disk drives	=	90 MB to 322 MB (formatted capacity)
Ports (built-in)	=	two 9-pin serial ports
	=	one 25-pin parallel port
Expansion slots	=	six 16-bit, two 8-bit
Battery	=	4.5-volt
ac voltage	=	115 volt/60 Hz (or) 230 volt/50 Hz
dc power supply	=	200-watt steady-state supply

Environmental Requirements

Temperature (operating)	=	15°C to 32°C (59°F to 90°F)
Relative humidity (operating)	=	8% to 80% (noncondensing)

Appendix B
Physically Formatting Hard-Disk Drives

The controller card used with 90-, 150-, and 322-MB hard-disk drives contains its own drive preparation utilities. Through the DOS Debug program, you can access these utilities to physically, or *low-level*, format those drives. We recommend that only experienced users perform these routines on their own.

NOTE: Before performing a low-level format on your drive, enter the System Setup program and make sure that the drive is designated as drive type 1.

WARNING: The Low-Level format and Surface Analysis routines destroy existing formatting and data on the specified drive. If you already have a working drive installed and you are formatting a second drive, make certain that you SPECIFY THE CORRECT DRIVE (drive 0 or drive 1) as you perform these routines. SPECIFYING THE WRONG DRIVE WILL ERASE DATA ON YOUR WORKING DRIVE.

Accessing the Utilities

A *defect list* attached to the top of your drive lists the "bad spots" detected on your drive during testing. (The list may also be called a *bad track list, flag track log,* or something similar.) If there is not a second, separate copy of the list included with your shipment, carefully copy the list before you install your drive.

Then install the drive as described in Chapter 3. If you have a working drive 0, boot up on it as usual; if not, boot up with the DOS diskette that contains the Debug program in drive A. (The diskette containing Debug varies, depending on your DOS version and diskette size.)

To run Debug, at the C> or A> prompt, type

```
debug
```

and then press <ENTER>. At the Debug prompt (a hyphen), type

```
g=c800:5 <ENTER>
```

to access the drive preparation utilities.

The Initialization screen appears, showing information about drive 0—number of cylinders, heads, and sectors per track (SPT). If the drive is not installed, the message `***NONE selected or no drive present!***` appears. Press <ENTER> twice, once to display a second line with drive 1 information, and once again to bring up the following menu:

```
Change Drive Types--->      1
Low Level Format--->        2
Surface Analysis--->        3
Verify Drive--->            4
Enter Defect List--->       5
Exit and Reboot--->         6

Enter Choice (1-6)--->
```

A complete low-level formatting operation includes the following steps: First, you choose option 2 to perform the low-level format routine. You then choose EITHER option 5 (to enter the manufacturer's defect, or bad track, list) OR option 3 (to perform a surface analysis routine). Choosing option 5 suffices for most purposes; option 3 takes longer but performs a more thorough check, resulting in a "higher confidence" drive. Finally, you must select the proper drive emulation (given as sectors per track) for your drive and then choose option 6 to exit and reboot, thereby putting your changes into effect. (The Verify Drive routine, not described here, is a nondestructive utility that performs a quick search of your drive for defects.)

Performing a Low-Level Format

At `Enter Choice (1-6)`, type `2` to choose a low-level format.

At `Files will be lost . . . are you sure? (Y/N)`, type `Y` to confirm your choice.

(THIS ROUTINE IS DESTRUCTIVE – PROCEED WITH CARE!) Next, at `Enter drive (0/1)` type `0` or `1` to **specify the drive you want to format.**

Formatting begins immediately. It takes several minutes; the time varies with the size of your drive.

When formatting is complete, a `Format successful . . .` message appears, followed by a `Hit any key to return . . .` message. Press any key to return to the Initialization screen.

Entering the Defect List

Entering the manufacturer's defect (bad spot) list causes the system to assign an alternate sector, if one is available, to a bad spot – thereby making the track usable again. If an alternate sector is unavailable, the system marks the track so that it will not be used.

At the Initialization screen, press <ENTER> twice to make the option menu reappear. In response to the prompts, choose option 5 and then specify drive 0 or 1.

Under the message **ENTER MANUFACTURER'S DEFECT LIST . . .**, you are prompted for the **CYLINDER**, **HEAD**, and **BYTE COUNT AFTER INDEX** (BCAI) of each bad track. Enter each item from your defect list *slowly and carefully.* The cursor automatically moves to the next field if you use the maximum character count for a field; if you do not use the maximum number of characters allowed, you must press <ENTER> to proceed.

If you make a typing error and then complete the line and move to the next line, you have entered a false bad spot. You can either accept it, thereby losing the track if there is no alternate sector available, or you can redo your physical format to erase the incorrect information. (You must reenter all bad spots after doing this.)

If you make a typing error and then complete the line and move to the next line, you have entered a false bad spot. You can either accept it, thereby losing the track if there is no alternate sector available, or you can redo your physical format to erase the incorrect information. (You must reenter all bad spots after doing this.)

When you have entered all the bad tracks, press <ENTER> at the beginning of the next line. Then `Press any key . . .` to return to the Initialization screen.

Performing a Surface Analysis

If you have more time at your disposal (up to several hours, depending on your system), you may want to perform a surface analysis on your drive as an alternative to only entering the bad track list.

You begin a surface analysis by entering the bad track list as described in the previous section. However, the system then performs an additional check for defects not already entered, reassigns alternate sectors where possible, and marks the rest as bad tracks.

(THIS ROUTINE IS DESTRUCTIVE – PROCEED WITH CARE!) At the Initialization screen, press <ENTER> twice to make the option menu reappear. In response to the prompts, choose option 3, type `Y` to confirm, and then specify drive 0 or 1.

In response to the next prompt, enter the bad track list as described in the previous section. When you have entered all the bad tracks, press <ENTER> once again to start the test.

When the test is complete, respond to the prompt by pressing any key to return to the Initialization screen.

Selecting Drive Emulation

The Initialization screen appears with the cursor on the drive 0 information line, where you should now select drive emulation if the drive you formatted was drive 0. If you formatted drive 1, press <ENTER> to move to the drive 1 information line.

By pressing the + (plus) and – (minus) keys on the cursor-control keypad, you can cycle through the possible sector-per-track (SPT) options. (The **CYLINDER** and **HEAD** fields change automatically with the **SPT** field.)

The 90-MB and 150-MB drives available with your system should normally be set to work in their "native mode" – that is, at 34 sectors per track. The 322-MB drive should be set to work at 63 SPT to ensure the full use of all its cylinders. The only other option is 17 SPT, which is demanded by some software, for example, Novell® version 2.0. To set the emulation, use the + and – keys to cycle the correct SPT, and then press <ENTER>.

Exiting

Press <ENTER> once again, if you need to, to display the option menu. Choose option 6 to exit the utilities and the Debug program, and reboot your system from the DOS diskette or your working drive. Your hard-disk drive has been physically formatted. You can now proceed to partition and logically format the drive according to your needs.

Appendix C
System 325 Jumpers and Pinouts

This appendix provides system board jumper information and pinouts for the input/output port connectors and the keyboard connector.

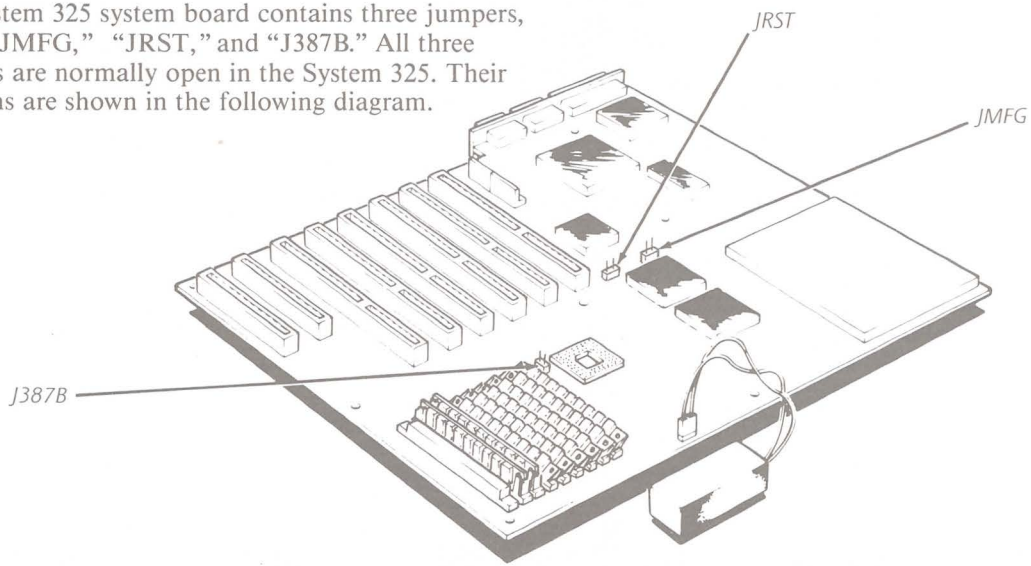
Jumpers

Jumpers are small blocks on a circuit board with two or more pins emerging from them perpendicular to the circuit board. Plastic plugs containing a wire fit down over the pins. The wire connects the pins and creates a circuit. This is a simple and reversible method of changing the circuitry in a circuit board.

A jumper is referred to as *open* when the plug is fitted down over only one pin. No circuit is formed, but the plug is stored safely for future use. When the plug is fitted down over two pins, the jumper is referred to as *jumpered.* Pin 1's *number* (1) is printed on the circuit board so that you can identify each pin based on the location of pin 1.

Some jumpers are ordinarily jumpered, and some are ordinarily open.

The System 325 system board contains three jumpers, called "JMFG," "JRST," and "J387B." All three jumpers are normally open in the System 325. Their locations are shown in the following diagram.



The "JMFG" Jumper: Normally Open

This jumper is used during the manufacture of the System 325 to test the BIOS software. Thereafter it is left unjumpered (open). Do not jumper it unless instructed to do so by a qualified Dell service technician.

The "JRST" Jumper: Normally Open

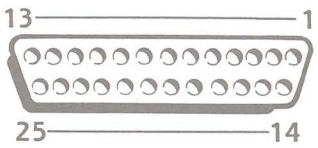
This jumper is normally open (unjumpered). Trained, qualified technicians can use this jumper to reset the system when it does not reboot normally or respond to the keyboard.

The "J387B" Jumper: Normally Open

Jumpering this jumper causes the math coprocessor chip to operate asynchronously with the CPU. Do not change the setting of this jumper except as instructed by qualified Dell service personnel.

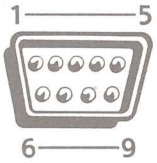
I/O Port and Keyboard Connector Pinout Information

If you intend to reconfigure your hardware in a special way, you may need pin number and signal information for the input/output (I/O) port connectors or the keyboard connector. The pinouts for these connectors are as follows:



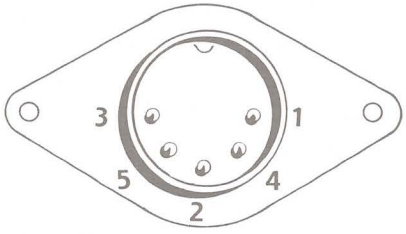
Parallel Port Pinouts

Pin Number	Signal Name
1	-STROBE
2	D0
3	D1
4	D2
5	D3
6	D4
7	D5
8	D6
9	D7
10	-ACK
11	BUSY
12	PE
13	SLCT
14	-AUTOFD
15	-ERROR
16	-INIT
17	-SLCT IN
18–25	GROUND



Serial Port Pinouts

DB9S Connector	DB25P Connector	Signal Name
1	8	DCD (DATA CARRIER DETECT)
2	3	RX (RECEIVE DATA)
3	2	TX (TRANSMIT DATA)
4	20	DTR (DATA TERMINAL READY)
5	7	GND (SIGNAL GROUND)
6	6	DSR (DATA SET READY)
7	4	RTS (REQUEST TO SEND)
8	5	CTS (CLEAR TO SEND)
9	22	RI (RING INDICATOR)



Keyboard Cable Pinouts

Pin Number	Signal Name
1	CLOCK
2	DATA
3	N.C.
4	GROUND (SG)
5	+5 VDC
Shell	GROUND (FG)

Appendix D
Getting Help

If you have a question about your system, or if you think the product you received may require servicing, call Dell Computer Corporation for technical assistance. (For information about receiving technical assistance in the U.K., refer to the "Placing a Service Call" card that came supplied with your computer.) To facilitate your call and to obtain the most accurate information, prepare for the call as follows:

1. **Have the following information available.**
   - Your invoice or purchase order number
   - Your service tag number (found on the back of the computer)

   - The type and version of disk operating system you are using
   - A list of the peripherals you are using
   - A list of the programs you are using and the revision number for each one
   - The contents of your AUTOEXEC.BAT and CONFIG.SYS files
   - Your system documentation

2. **Be prepared to explain the problem you have encountered, such as what you were doing when the error occurred and what error messages you received.**

3. **Call from a telephone at or near your computer so that you can follow step-by-step trouble-shooting instructions (typing commands, switching the computer on and off, and so on).**

WARNING: If you need to remove the cover, be sure to disconnect the power cables from your computer and all peripherals from electrical outlets.

If you have a problem with your order, such as missing parts, wrong parts, or incorrect billing, contact Dell Computer Corporation for customer assistance. Have your invoice or packing slip handy when you call.

Returning Items for Warranty Repair or Credit

All returns, whether for return or credit, should be prepared for shipping as follows:

1. An authorization number must be clearly and prominently written on the outside of the box.
2. A copy of the invoice and a letter describing the reason for return must be included.
3. Any accessories that were included with the item(s) being returned (power cables, data cables, software diskettes, manuals, and so on) must be included if the return is for credit.
4. Returned equipment must be packed in the original packing materials.
5. The purchaser is responsible for return shipping expenses as well as for insuring any product returned and assumes the risk of loss during shipping to Dell Computer Corporation. C.O.D. packages are not accepted.

Returns received without any of the above will be refused at our receiving dock and returned to you.

If you need information about additional Dell Computer Corporation products or would like to place an order, a sales specialist will be glad to help.

Contact Numbers in the U.S.

Customer Technical Support (Return Material Authorization Numbers – warranty repairs)	1-800-624-9896 (or) (512) 338-4402
Customer Account Services (Credit Return Authorization Numbers)	1-800-624-9897 (or) (512) 338-4403
Sales (catalogs)	1-800-426-5150
Bulletin Board	(512) 338-8528
FAX	(512) 339-6721
TELEX	9103808386 PC LTD

Contact Numbers in the U.K.

Technical Support (Return Material Authorization Numbers – warranty repairs)	(0800) 414575
Customer Support (Credit Return Authorization Numbers)	(0800) 414585
Sales (catalogs)	(0800) 414535
FAX	(0344) 860187

Contact Numbers in Canada

Customer Technical Support (Return Material Authorization Numbers – warranty repairs)	1-800-387-5757
Customer Account Services (Credit Return Authorization Numbers)	(416) 881-3513
Sales (catalogs)	1-800-387-5752
FAX	(416) 881-4706
Central Switchboard	(416) 881-3513

Appendix E
Warranty and Return Policy

Limited One-Year Warranty
(U.S. Only)

Dell Computer Corporation ("Dell") warrants that the hardware products it sells will be free from defects in materials and workmanship. The warranty term is one year beginning on the date of delivery.

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

Dell will repair or replace products returned to Dell's facility. To request warranty service, you must call Dell within the warranty period. Refer to the appendix called "Getting Help" to find the appropriate phone number for 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 packaging or equivalent, prepay shipping charges, and you must 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.

Dell owns all parts removed from repaired products. Dell uses new and equivalent to new parts made by various manufacturers in performing warranty repairs and building replacement products. If Dell repairs a product, its warranty term is not extended; if Dell replaces a product, the replacement is warranted for the remainder of the original term or 60 days, whichever is longer.

DELL MAKES NO EXPRESS WARRANTIES BEYOND THOSE STATED HERE. ALL IMPLIED WARRANTIES, INCLUDING MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, ARE LIMITED TO THE DURATION OF THE WARRANTY SET FORTH ABOVE. SOME STATES DO NOT ALLOW LIMITATIONS ON HOW LONG AN IMPLIED WARRANTY LASTS, 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 ABOVE. THESE WARRANTIES GIVE YOU SPECIFIC LEGAL RIGHTS AND YOU MAY ALSO HAVE OTHER RIGHTS WHICH VARY FROM STATE TO STATE.

DELL DOES NOT ACCEPT LIABILITY BEYOND THE REMEDIES SET FORTH IN THIS WARRANTY STATEMENT, INCLUDING ANY LIABILITY FOR PRODUCTS NOT BEING AVAILABLE FOR USE OR FOR LOST DATA OR SOFTWARE.

SOME STATES DO NOT ALLOW THE EXCLUSION OR LIMITATION OF INCIDENTAL OR CONSEQUENTIAL DAMAGES, SO THE ABOVE LIMITATION OR EXCLUSION MAY NOT APPLY TO YOU.

Limited One-Year Warranty

(Canada Only)

Dell Computer Corporation ("Dell"), 2 East Beaver Creek Road, Richmond Hill, Ontario, warrants that the hardware products it sells will be free from defects in materials and workmanship. The warranty term is one year beginning on the date of delivery. This warranty is transferrable with the warranted products.

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

Dell will repair or replace products returned to Dell's facility. To request warranty service, you must call Dell within the warranty period. Refer to the appendix called "Getting Help" to find the appropriate telephone number for 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 packaging or equivalent, prepay shipping charges, and you must 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.

Dell owns all parts removed from repaired products. Dell uses new and equivalent to new parts made by various manufacturers in performing warranty repairs and building replacement products. If Dell repairs a product, its warranty term is not extended except as may be required by law; if Dell replaces a product, the replacement is warranted for the remainder of the original term or 60 days, whichever is longer.

DELL MAKES NO EXPRESS WARRANTIES BEYOND THOSE STATED HERE. ALL IMPLIED WARRANTIES AND CONDITIONS, INCLUDING MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, ARE LIMITED TO THE DURATION OF THE WARRANTY SET FORTH ABOVE. SOME JURISDICTIONS DO NOT ALLOW LIMITATIONS ON HOW LONG AN IMPLIED WARRANTY LASTS, SO THIS LIMITATION MAY NOT APPLY TO YOU.

DELL'S RESPONSIBILITY FOR MALFUNCTIONS AND DEFECTS IN HARDWARE IS LIMITED TO REPAIR, REPLACEMENT AND REFUND AS SET FORTH ABOVE. THESE WARRANTIES GIVE YOU SPECIFIC LEGAL RIGHTS AND YOU MAY ALSO HAVE OTHER RIGHTS WHICH VARY FROM ONE JURISDICTION TO ANOTHER.

DELL DOES NOT ACCEPT LIABILITY BEYOND THE REMEDIES SET FORTH IN THIS WARRANTY STATEMENT, INCLUDING ANY LIABILITY FOR PRODUCTS NOT BEING AVAILABLE FOR USE OR FOR LOST DATA OR SOFTWARE.

SOME JURISDICTIONS DO NOT ALLOW THE EXCLUSION OR LIMITATION OF INCIDENTAL OR CONSEQUENTIAL DAMAGES, SO THE ABOVE LIMITATION OR EXCLUSION MAY NOT APPLY TO YOU.

"Total Satisfaction" Return Policy

If you bought products directly from a Dell company, you may return them to Dell up to 30 days from the day they are delivered for a complete refund of the purchase price. If your company bought the products under a Corporate Performance Agreement (U.S. only) with a Dell company, there are limits on when products may be returned to Dell under this policy. Please consult the person in your company that is the liaison with Dell for more information.

To return products, you must call Dell customer service at the toll-free number shown in the appendix called "Getting Help" to receive a Credit Return Authorization Number. You must ship the products to Dell in their original packaging, 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 diskettes is unopened. Returned products must be in as-new condition, and all of the manuals, diskettes, power cables and other items included with a product must be returned with it.

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