Dell Precision™ WorkStation 610
Mini Tower Systems

SERVICE MANUAL

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Contents

Figures

Tables

Read This First

A prerequisite for using this manual to service Dell computer systems is a basic knowledge of IBM®-compatible PCs and prior training in IBM-compatible PC troubleshooting techniques. In addition to information provided in this manual and the *User's Guide* that came with the system, Dell provides the *Diagnostics and Troubleshooting Guide* for troubleshooting procedures and instructions on using the Dell diagnostics to test the computer system.

Warnings, Cautions, and Notes

Throughout this manual, there may be blocks of text printed in bold type or in italic type. These blocks are warnings, cautions, and notes, and they are used as follows:

WARNING: A WARNING indicates the potential for bodily harm and provides instructions for how to avoid the problem.

CAUTION: A CAUTION indicates either potential damage to hardware or loss of data and provides instructions for how to avoid the problem.

NOTE: A NOTE provides helpful information about using the computer system.

CHAPTER 1
System Overview

Dell Precision™ 610 systems are high-speed, upgradable workstations designed around Intel® Pentium® II Xeon™ microprocessors with MMX™ technology. These Dell® systems support the high-performance Peripheral Component Interconnect (PCI) bus and the accelerated graphics port (AGP) bus. Each system also has an Industry-Standard Architecture (ISA) design with one ISA slot that allows you to configure the computer system to your initial requirements and then upgrade it as necessary.

The Pentium II Xeon microprocessor contains a built-in clock multiplier circuit, which increases the microprocessor's internal operating frequency to a multiple of the system clock frequency. The microprocessors for Dell Precision 610 mini tower systems operate at a frequency of 400 MHz, derived from a system clock frequency of 100 MHz.

System Features

The system includes the following features:

- Dual-processor capability
- Advanced combination PCI expansion and ISA subsystem
- Plug and Play capability
- Enhanced dual-interface enhanced integrated drive electronics (EIDE) subsystem
- SCSI support using two integrated SCSI channels
  - The primary (Adaptec AIC-7890) channel provides Ultra2/Wide low-voltage differential (LVD) (80-MB/sec) support for high-performance SCSI hard-disk drives and an optional redundant arrays of independent disks (RAID) subsystem.
  - The secondary (Adaptec AIC-7880) channel provides internal Ultra/Narrow and external Ultra/Wide (40-MB/sec) support for SCSI CD-ROM and tape drives, optical drives, scanners, and so forth.
- 16-bit integrated 3D audio controller
- 2X AGP or PCI graphics adapter card with one AGP expansion slot
- Integrated 10/100-Mbps 3Com® PCI 3C905b-TX Ethernet network interface controller (NIC) with Wakeup On LAN support
- Integrated USB controller
- Thermal sensors to shut down the system if it overheats
- Main system memory consisting of 64 MB to 512 MB of unbuffered SDRAM DIMMs, or up to 2048 MB of registered SDRAM DIMMs
- Secondary cache of 512 KB of SRAM in the Slot 2 single-edge contact (Slot 2 SEC) cartridge providing ECC capability
- Self-Monitoring Analysis and Reporting Technology (SMART)-compliant EIDE hard-disk drives and SMART support in the system BIOS, which warns you at system start-up if an EIDE hard-disk drive has become unreliable

For a complete list of system features, see "Technical Specifications," found later in this chapter.

When following the procedures in this manual, assume that the location or direction relative to the computer is as shown in Figure 1-1.

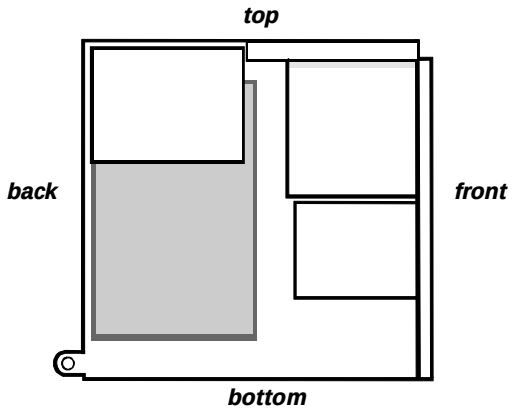


Figure 1-1. Computer Orientation

CAUTION: To avoid possible data or file structure corruptions, the front-panel reset button should be used only when the computer cannot be rebooted by pressing <Ctrl><Alt><Del>. Before you use the reset button to initiate a hardware reset, close any open application programs and files if possible.

Figure 1-2 shows the location of some of the key front-panel features.

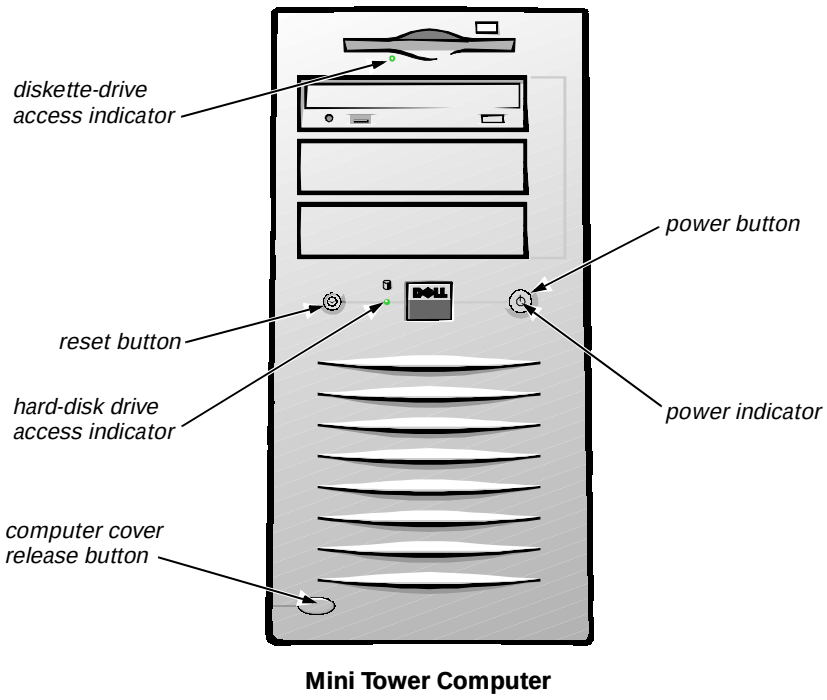


Figure 1-2. Front-Panel Features

Figure 1-3 points out many of the system's internal components and back-panel features.

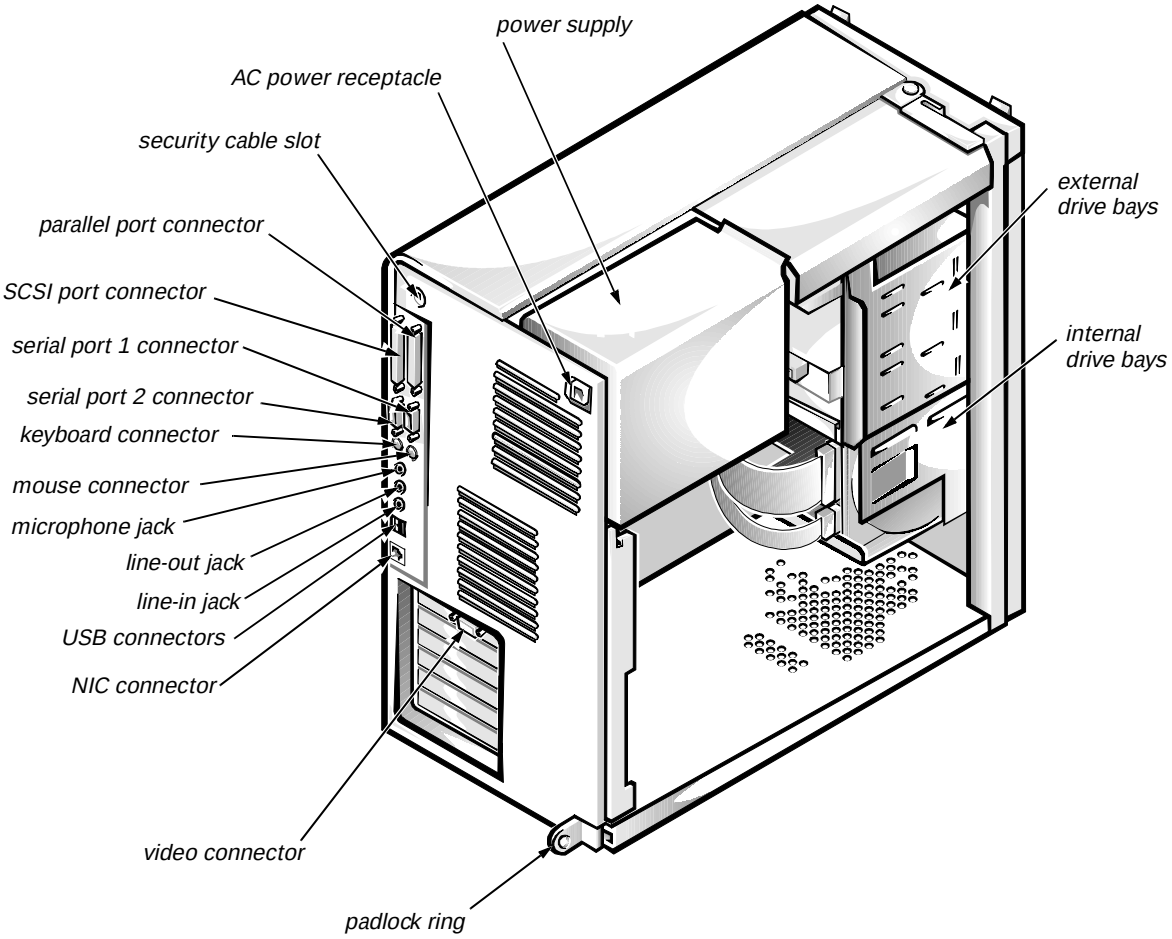


Figure 1-3. Internal View and Back Panel of the Mini Tower Computer

Dual-Processor Capability

With the installation of a second processor Slot 2 SEC cartridge in the secondary Slot 2 SEC cartridge connector on the system board, the computer becomes a dual-processing system. The second processor must be the same type and frequency as the first processor. To take advantage of two processors, dual-processing systems must have multiprocessing operating systems, such as the Microsoft® Windows NT® 4.0 operating system.

Advanced Expansion Subsystem

The Dell Precision 610 mini tower systems offer advanced expansion subsystems that can support a mixture of traditional ISA expansion cards (called *legacy* cards), Plug and Play ISA expansion cards, PCI expansion cards, and a 2X AGP card. The operating system or the ISA Configuration Utility (ICU), included with the system, provides a means of avoiding resource conflicts that might arise from such an arrangement.

After all legacy cards have been configured by the operating system or with the ICU, the computer automatically assigns any required memory space, IRQ lines, and DMA channels to any installed Plug and Play ISA expansion cards and PCI expansion cards the next time the computer is rebooted. Chapter 4, "Using the ISA Configuration Utility," in the *Dell Precision WorkStation 610 Mini Tower Systems User's Guide* describes the ICU and provides instructions for using it to configure the computer.

There are seven expansion-card connectors (see Figure 1-4) on the system board. Expansion-card connectors PCI1 through PCI5 support 32-bit PCI expansion cards; expansion-card connector AGP supports a 32-bit 2X AGP expansion card; and expansion-card connector ISA1 can accommodate an 8- or 16-bit ISA expansion card.

NOTES: Connector ISA1 shares expansion-slot space with connector PCI5. Therefore, only one card of either type can be installed in this slot.

PCI4 has a connector extension to support a PCI RAID controller (see Figure 1-11 for the location of the PCI connectors).

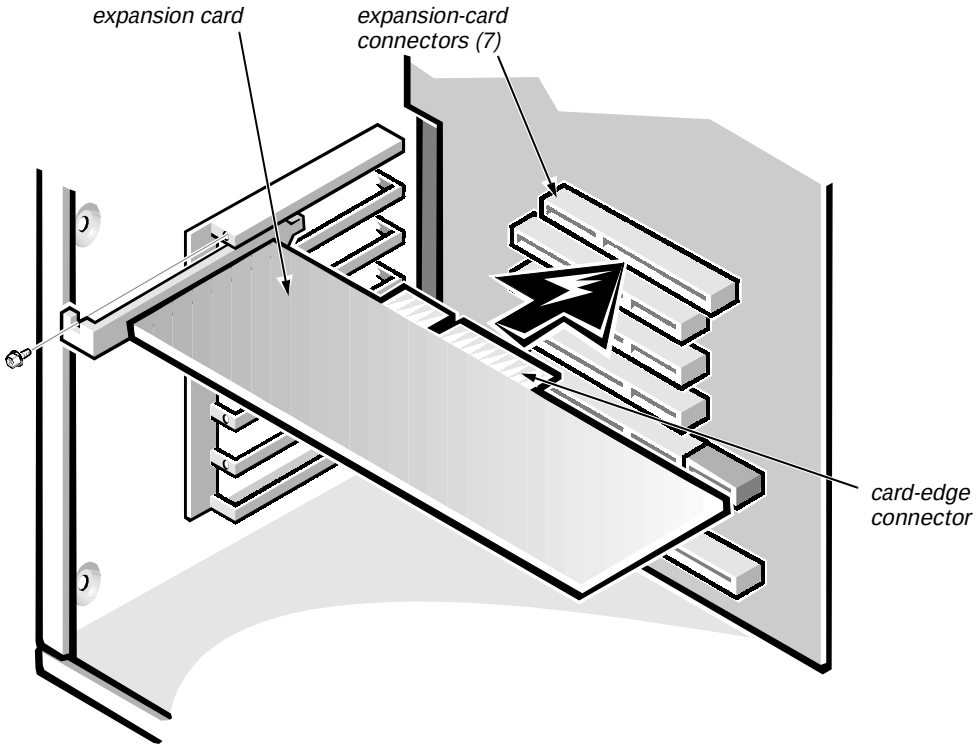


Figure 1-4. Expansion-Card Connectors

Hard-Disk Drive Options

Dell Precision 610 mini tower systems have eight drive bays for installing the following types of drives (see Figure 1-5):

- The externally accessible drive bays at the front of the computer consist of one 3.5-inch drive bay (dedicated to a 3.5-inch slimline diskette drive) and three 5.25-inch drive bays that can hold up to three half-height, 5.25-inch devices—typically tape drives or CD-ROM drives. Alternately, 3.5-inch devices can be installed in the 5.25-inch bays using adapters available from Dell.
- The four-bay hard-disk drive cage below the externally accessible bays can hold up to four 1-inch or up to two 1-inch and two 1.6-inch hard-disk drives installed vertically. The maximum number of hard-disk drives must be either two EIDE hard-disk drives or up to four SCSI hard-disk drives.

NOTE: For detailed information about installing SCSI devices, see Chapter 10, "Installing Drives," in the User's Guide*.*

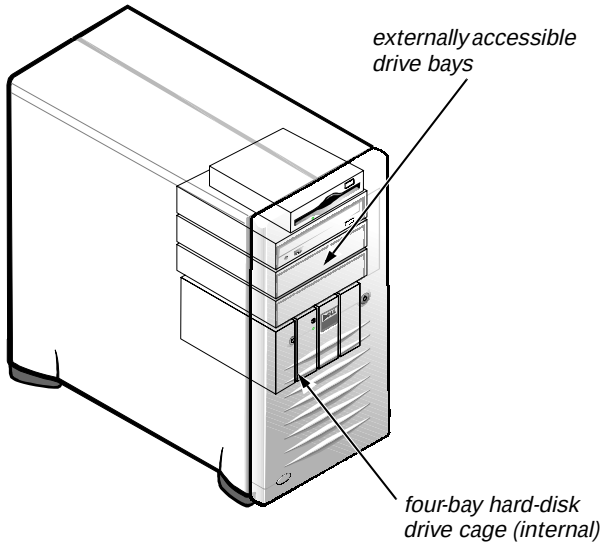


Figure 1-5. Drive Locations

Enhanced Dual-Interface EIDE Subsystem

The enhanced dual-interface EIDE subsystem supports two EIDE interfaces (primary and secondary), each of which can support up to two EIDE devices. The EIDE controller resides on the high-speed PCI bus.

The primary EIDE interface (IDE1) provides support for up to two high-performance EIDE devices. The computer's boot drive should be connected to the primary EIDE interface.

The secondary EIDE interface (IDE2) also provides support for up to two high-performance EIDE devices, typically EIDE tape drives or CD-ROM drives.

NOTE: The externally accessible drive bays at the front of the computer are normally used for diskette drives, CD-ROM drives, and/or tape drives. Hard-disk drives should be installed in the internal hard-disk drive positions described in "Hard-Disk Drive Options" found earlier in this chapter. For detailed information about the data storage subsystem, see Chapter 10, "Installing Drives," in the User's Guide*.*

SCSI Support

SCSI drives are supported by using two integrated SCSI channels:

- The primary (Adaptec AIC-7890) channel provides Ultra2/Wide LVD (80-MB/sec) support for high-performance SCSI hard-disk drives and an optional RAID subsystem.

  NOTE: To achieve 80-MB/sec support, all of the installed SCSI devices must support the Ultra2 specification's 80-MB/sec transfer rate. If they do not, the transfer rate will default to the speed of the slowest device in the SCSI chain.

- The secondary (Adaptec AIC-7880) channel provides internal Ultra/Narrow and external Ultra/Wide (40-MB/sec) support for SCSI CD-ROM and tape drives, optical drives, scanners, and so forth.

Audio Controller

The system board has an onboard 16-bit Crystal CS4237B audio controller chip and connectors on the back panel for connecting the computer to external audio devices such as speakers/headphones and microphone. The controller supports all sound functions contained on the Sound Blaster Pro expansion card from Creative Laboratories, Inc.

Chapter 6, "Using the Integrated Audio Controller," in the *User's Guide* provides instructions for connecting the computer to external audio devices and configuring the integrated audio controller to avoid resource conflicts.

Video Subsystem

The video subsystem consists of either a high-speed, high-resolution 2X AGP or a PCI graphics adapter card. (For more information, see the documentation that came with the graphics adapter card.) AGP greatly improves graphics performance by providing a dedicated bus for a faster interface between the video subsystem and system memory. AGP also allows conventional memory to be used for video-related tasks.

NIC

Dell Precision 610 mini tower systems contain an integrated 10/100-Mbps 3Com PCI 3C905b-TX NIC (uses a 3Com 3C917 application-specific integrated circuit [ASIC]). The NIC subsystem connects to the Ethernet network through a single RJ45 connector on the back panel of the computer.

The 10/100-Mbps NIC supports a 10-Mbps direct connection to either a Category 3 or a Category 5 Ethernet cable. When the NIC operates in the 100-Mbps mode, a Category 5 Ethernet cable must be used.

Chapter 5, "Using the Network Interface Controller," in the *User's Guide* provides instructions for connecting the computer to, and configuring it for use on, an Ethernet network.

USB

USB capability simplifies connection of peripheral devices such as mice, printers, and computer speakers. The USB connectors on the computer's back panel provide a single connection point for multiple USB-compliant devices. USB-compliant devices can be connected and disconnected while the computer is running.

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

Thermal Protection

If a processor or hard-disk drive exceeds its recommended operating temperature range, a system event triggers a system management interrupt (SMI), which alerts the BIOS. If the Dell ThermalShutdown Service is installed, the power indicator flashes and a message appears on the monitor to alert the user that the system will shut down in an orderly manner, preventing the loss of data. If the service is unable to shut down the system within approximately 3 minutes, the BIOS powers down the computer. If the ThermalShutdown Service is not installed, the computer turns off immediately.

NOTE: The BIOS powers down the computer in the event of a thermal alert only if the Thermal Power-Off category is set to ENABLED in the System Setup program.

Computer Service

The following subsections provide service-related information about the computer.

System Power Supply

The 330-W system power supply can operate from an AC power source of 115 VAC at 60 Hz or 230 VAC at 50 Hz. The system power supply provides the DC operating voltages and currents listed in Table 1-1.

NOTE: The power supply produces DC voltages only under its loaded condition. Therefore, when you measure these voltages, the DC power connectors must be connected to their corresponding power input connectors on the system board or drives.

Table 1-1. DC Voltage Ranges

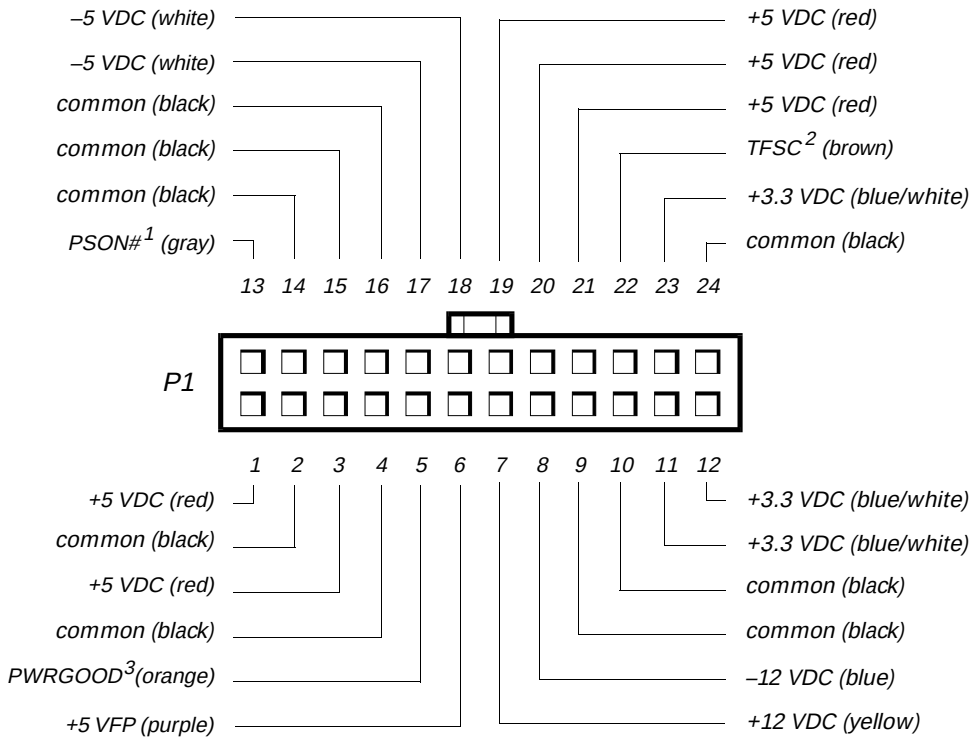
Voltage	Range	Maximum Output Current[1]
+3.3 VDC	+3.15 to +3.45 VDC	18.0 A
+5 VDC	+4.75 to +5.25 VDC	35.0 A
+12 VDC	+11.40 to +12.60 VDC	14.0 A
–12 VDC	–10.80 to –13.20 VDC	0.3 A
–5 VDC	–4.50 to –5.50 VDC	0.3 A
+5 VFP[2]	+4.75 to +5.25 VDC	1.2 A

[1] *Maximum continuous DC output power should not exceed 330 W. Maximum combined load on +5 VDC and +3.3 VDC cannot exceed 200 W.*

[2] *VFP (volts flea power) — sometimes called "standby power."*

Pin Assignments for the DC Power Connectors

The power-supply output voltages can be measured at the back (wire side) of the connectors without disconnecting them. Figures 1-6, 1-7, and 1-8 show the wire side of the connectors.



1 *Pin 13 — PSON# should measure between +4 and +5 VDC except when the power button on the front panel is pressed, taking PSON# to its active-low state.*

2 *Pin 22 — Thermal fan-speed control (TFSC) is a power-supply input signal used to control power-supply fan speed in special applications.*

3 *Pin 5 — PWRGOOD should measure between +4 and +5 VDC when the power supply is operating to indicate that all power-supply output voltages are within the ranges specified in Table 1-1.*

Figure 1-6. DC Power Connector P1

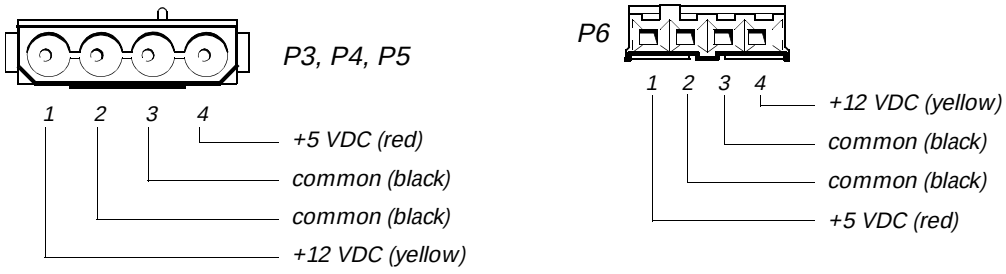


Figure 1-7. DC Power Connectors P3, P4, P5, and P6

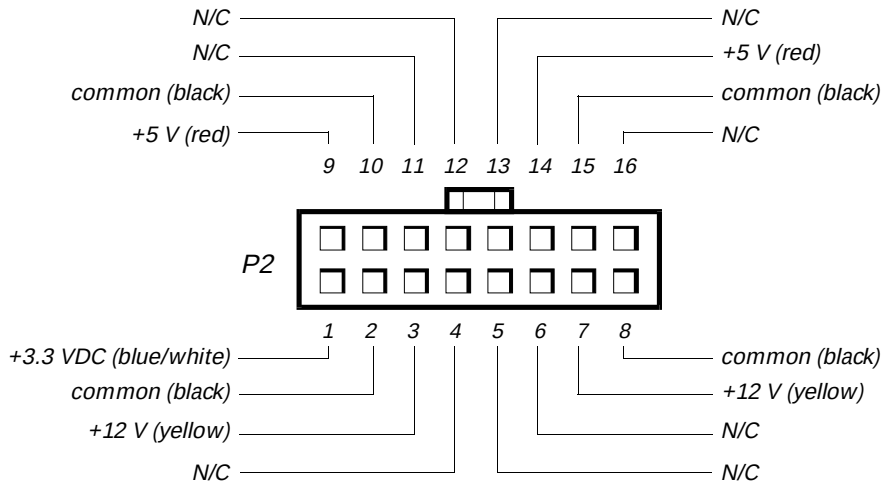


Figure 1-8. DC Power Connector P2

DC Power Distribution

Figures 1-9 and 1-10 provide the following information about DC power distribution:

- Power-supply connector identification
- Power cable connections for diskette, tape, CD-ROM, and hard-disk drives
- Power distribution to sockets and connectors on the system board

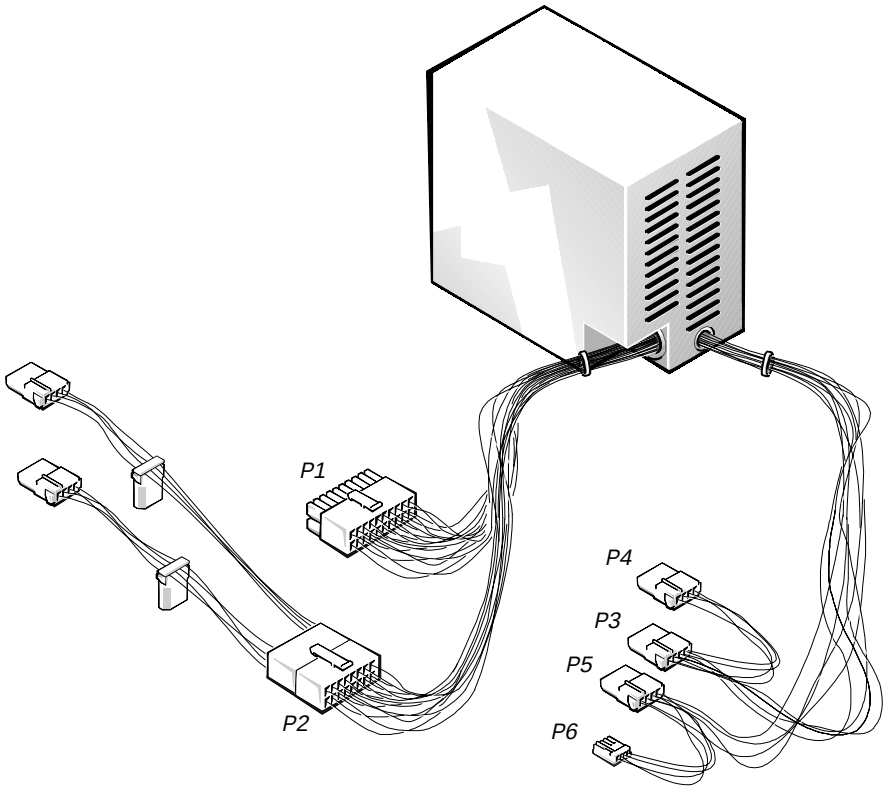


Figure 1-9. DC Power Cables

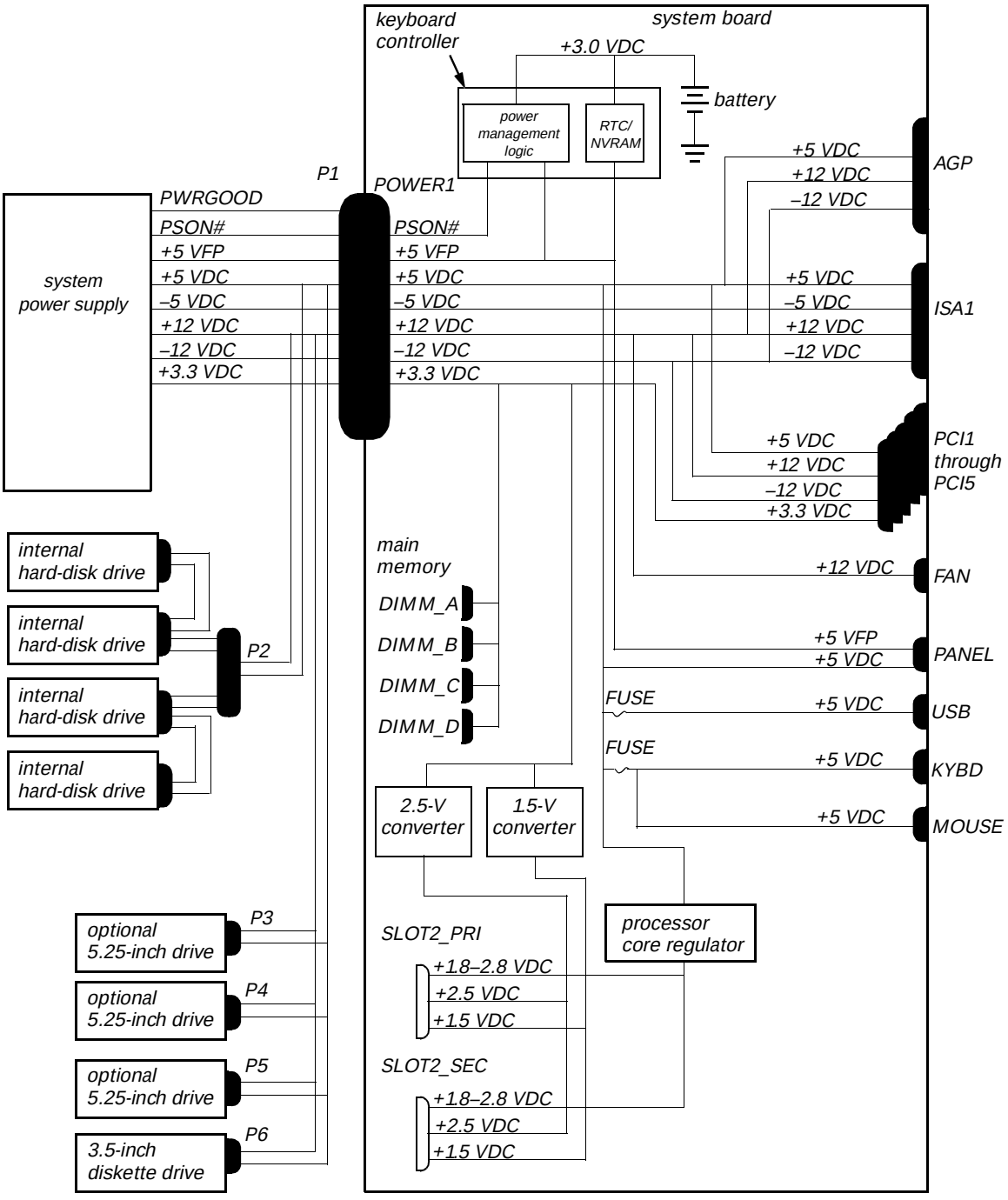


Figure 1-10. Power Distribution

System Board

The subsections that follow provide service-related information about the system board and components, which are shown in Figure 1-11.

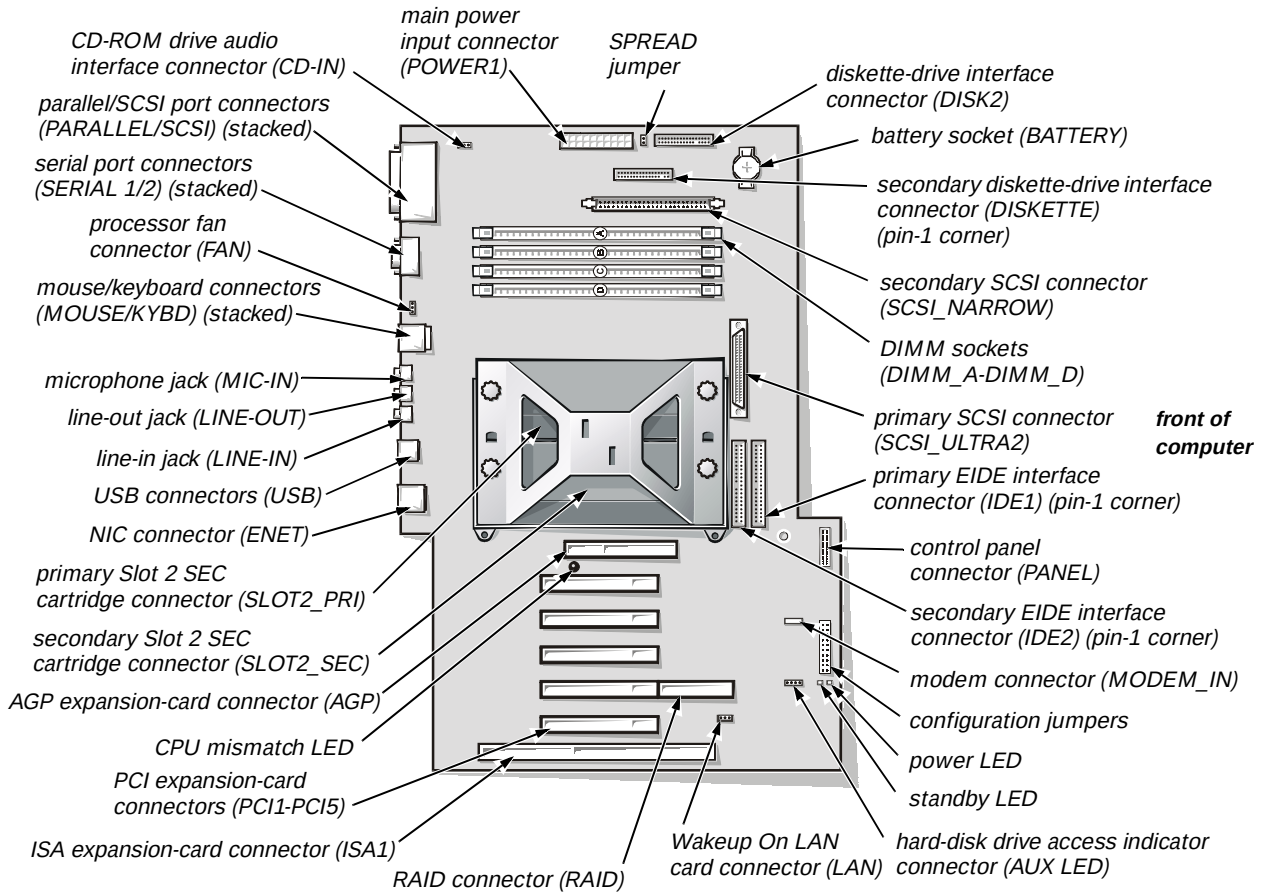


Figure 1-11. System Board Components

Main Memory

The four DIMM sockets on the system board can accommodate combinations of 32-, 64-, and 128-MB DIMMs up to a total memory capacity of 512 MB using unbuffered SDRAM or up to 2048 MB using registered SDRAM DIMMs. A minimum of 64 MB RAM is required.

CAUTION: Unbuffered and registered SDRAM DIMMs cannot be mixed.

There is no requirement that one socket be filled before the other, and empty sockets can be left between installed DIMMs. However, Dell recommends populating the sockets in consecutive order starting with DIMM A. DIMM sockets do not have to contain DIMMs of the same size. DIMMs may be installed in any order.

See "DIMMs" in Chapter 4 for information on removing and replacing DIMMs.

System Board Jumpers

Figure 1-12 shows the location of the system board jumpers, and Table 1-2 shows the system board jumper settings.

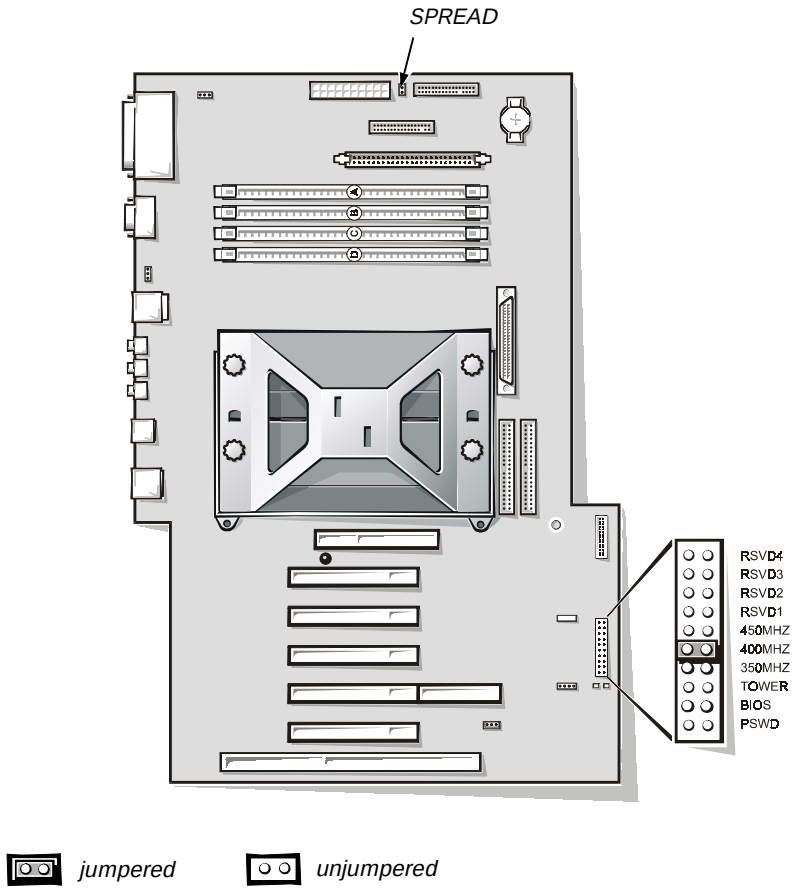


Figure 1-12. Location of System Board Jumpers

System Board Jumper Settings

The following table shows the settings and descriptions for the system board jumpers in Dell Precision 610 mini tower systems.

Table 1-2. System-Board Jumper Settings

Jumper	Setting		Description
SPREAD			Reserved *(do not remove jumper plug).*
RSVD4			Reserved *(do not install jumper plug).*
RSVD3			Reserved *(do not install jumper plug).*
RSVD2			Reserved *(do not install jumper plug).*
RSVD1			Reserved *(do not install jumper plug).*
450MHZ*			Jumpered when the microprocessor's internal speed is 450 MHz.
400MHZ			Jumpered when the microprocessor's internal speed is 400 MHz.
350MHZ*			Reserved *(do not install jumper plug).*
TOWER			System board is installed in a mini tower chassis *(do not install jumper plug).*
BIOS			Reserved *(do not install jumper plug).*
PSWD		default	Password features enabled.
			Password features disabled.

* *One set of the speed jumper pins must have a jumper plug installed; otherwise, the system will operate at an undetermined speed.*

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

 *jumpered*  *unjumpered*

Interrupt Request Assignments

The following table lists the hardware interrupt request (IRQ) assignments for the Dell Precision 610 mini tower system.

Table 1-3. Interrupt Request Assignments

IRQ Line	Used By/Available
IRQ0	System timer
IRQ1	Keyboard controller
IRQ2	Enables IRQ8 through IRQ15
IRQ3 and IRQ4	Serial ports
IRQ5	Available
IRQ6	Diskette drive interface
IRQ7	Parallel port
IRQ8	RTC
IRQ9	Available if ACPI is set to Off in System Setup program
IRQ10	Available
IRQ11	Available
IRQ12	Mouse controller
IRQ13	Math coprocessor
IRQ14	Primary EIDE interface (if Enabled in the System Setup program)
IRQ15	Secondary EIDE interface (if Enabled in the System Setup program)

NOTES: For the full name of an abbreviation or acronym used in the table, see the Glossary in the User's Guide.

The integrated NIC, SCSI, and sound systems will be assigned an interrupt request dynamically during system start-up.

Direct Memory Access Channel Assignments

The following table lists the direct memory access (DMA) channel assignments for the Dell Precision 610 mini tower system.

Table 1-4. DREQ Line Assignments

DREQ Line	Used By/Available
DREQ0	Available
DREQ1	Available
DREQ2	Generated by super I/O controller to initiate DMA cycle for attached diskette drive
DREQ3	Available
DREQ4	Generated by bus controller chip to activate second DMA controller
DREQ5	Available
DREQ6	Available
DREQ7	Available

NOTE: The integrated audio controller is assigned one or two DMA channels automatically during system start-up.

Technical Specifications

The following table lists the technical specifications for the Dell Precision 610 mini tower system.

Table 1-5. Technical Specifications

Microprocessor	
Microprocessor type	Intel Pentium II Xeon microprocessor that runs at 400 MHz internally/ 100 MHz externally. A slower compatibility speed can be set through the System Setup program.
Internal cache	32 KB (16-KB data cache; 16-KB instruction cache)
L2 cache	512-KB or 1-MB pipelined burst, four-way set-associative, write-back ECC SRAM on each Slot 2 SEC cartridge
Math coprocessor	internal to the microprocessor
System Information	
System chipset	Intel Slot 2/440GX PCIset
Data bus width	64 bits
Address bus width	32 bits
DMA channels	seven
Interrupt levels	15
System BIOS chip	2 Mb
Audio controller	16-bit Plug and Play Crystal 4237B
Primary SCSI controller	Adaptec 7890 Ultra2/Wide LVD (Adaptec 2940 U2W-equivalent)
Secondary SCSI controller	Adaptec 7880 Ultra/Wide (Adaptec 2940 UW-equivalent)
NIC	3Com PCI 3C905b-TX NIC (uses a 3Com 3C917 ASIC) Wakeup On LAN-capable
I/O controller	National PC 87309

NOTE: For the full name of an abbreviation or acronym used in this table, see the Glossary in the User's Guide.

Table 1-5. Technical Specifications *(continued)*

Expansion Bus	
Bus types	PCI, ISA, and AGP
Bus speed	PCI: 33.3 MHz ISA: 8.33 MHz AGP: 133 MHz
PCI expansion-card connectors	five (one of the PCI connectors shares a card-slot opening with the ISA connector) *NOTE: PCI4 is the only slot that supports an add-in RAID coprocessor card through a 60-pin connector.*
ISA expansion-card connectors	one (the ISA connector shares a card-slot opening with one of the PCI connectors)
AGP expansion-card connectors	one
PCI expansion-card connector size	120 pins
PCI expansion-card connector data width (maximum)	32 bits
ISA expansion-card connector size	98 pins
ISA expansion-card connector data width (maximum)	16 bits
AGP expansion-card connector size	124 pins
AGP expansion-card connector data width (maximum)	32 bits
RAID extension connector size	60 pins
System Clocks	
System clock	100 MHz
SDRAM memory clock	100 MHz
I/O APIC clock	14 MHz
Diskette/communications ports	48 MHz
USB clock	48 MHz

NOTE: For the full name of an abbreviation or acronym used in this table, see the Glossary in the User's Guide.

Table 1-5. Technical Specifications *(continued)*

Memory	
Architecture	72-bit ECC SDRAM
DIMM sockets	four
DIMM capacities	64- and 128-MB unbuffered, 72-bit SDRAM; 256-MB and 512-MB registered, 72-bit SDRAM
Standard RAM	64 MB
Maximum RAM	2048 MB *NOTE: The maximum amount of RAM that can be installed using registered 512 MB DIMMs is 2048 MB. The maximum amount of RAM that can be installed using unbuffered DIMMs is 512 MB.*
BIOS address	F000:0000h–F000:FFFFh
Drives	
Externally accessible bays	one 3.5-inch bay dedicated to a 3.5-inch diskette drive; three 5.25-inch bays for tape drives, CD-ROM drives, or other 5.25-inch peripherals
Internally accessible bays	two 1.6-inch drive bays and two 1-inch drive bays for EIDE or SCSI hard-disk drives installed vertically
Ports and Connectors	
Externally accessible:	
Serial (DTE)	two 9-pin connectors; 16550-compatible
Parallel	one 25-pin connector (bidirectional)
SCSI (secondary channel)	one 68-pin Ultra/Wide SCSI connector
Video	one 15-pin DIN connector (on graphics adapter card)
PS/2-style keyboard	6-pin mini-DIN connector
PS/2-compatible mouse	6-pin mini-DIN connector
NIC	RJ45 connector

NOTE: For the full name of an abbreviation or acronym used in this table, see the Glossary in the User's Guide.

Table 1-5. Technical Specifications *(continued)*

Ports and Connectors *(continued)*	
USB	two USB-compliant 4-pin connectors
Audio line in	1/8-inch miniature audio jack
Audio line out	1/8-inch miniature audio jack
Audio microphone in	1/8-inch miniature audio jack
Internally accessible:	
EIDE drive	two 40-pin connectors on PCI local bus
Primary SCSI channel	one 68-pin Ultra2/Wide SCSI connector
Secondary SCSI channel	one 50-pin Narrow SCSI connector
Diskette drive	one 26-pin connector
CD-ROM drive audio interface	4-pin connector
Wakeup On LAN	3-pin connector
Fan	3-pin connector
Control panel connectors:	
Thermal sensor	3-pin connector
Chassis intrusion	2-pin connector
Speaker	4-pin connector
Video	
Video type	2X AGP or PCI graphics adapter card (see manufacturer's specifications)
Key Combinations	
<Ctrl><Alt><Del>	restarts (reboots) the system
<F2> or <Ctrl><Alt><Enter>	starts System Setup program (during POST only while Dell logo screen is displayed)
Controls and Indicators	
Reset control	push button
Power control	push button
Power indicator/sleep mode indicator	green LED (indicates power) amber LED (indicates sleep mode)
Hard-disk drive access indicator	green LED

NOTE: For the full name of an abbreviation or acronym used in this table, see the Glossary in the User's Guide.

Table 1-5. Technical Specifications *(continued)*

Controls and Indicators *(continued)*	
Link integrity indicator (on NIC connector)	green LED
Network activity indicator (on NIC connector)	yellow LED
Power indicator (on system board)	green LED
Standby power indicator (on system board)	green LED
Power	
DC power supply:	
Wattage	330 W
Heat dissipation	600 BTU/hr (nominal)
Voltage	90 to 135 V at 60 Hz; 180 to 265 V at 50 Hz; Autoranging 90 to 265 V
Backup battery	3-V CR2032 coin cell
Physical	
Height	45.9 cm (18.1 inches)
Width	21.6 cm (8.5 inches)
Depth	43.6 cm (17.6 inches)
Weight	16.0 kg (37.0 lb) or more, depending on options installed
Environmental	
Temperature:	
Operating	10° to 35°C (50° to 95°F)*
Storage	–40° to 65°C (–40° to 149°F)
Relative humidity	20% to 80% (noncondensing)
Maximum vibration:	
Operating	0.25 G at 3 to 200 Hz for 30 min
Storage	0.5 G at 3 to 200 Hz for 30 min

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

NOTE: For the full name of an abbreviation or acronym used in this table, see the Glossary in the User's Guide.

Table 1-5. Technical Specifications *(continued)*

Environmental *(continued)*	
Maximum shock:	
Operating	half-sine wave form: 50 G for 2 ms
Storage	half-sine wave form: 110 G for 2 ms square wave form: 27 G for 15 ms
Altitude:	
Operating	–16 to 3048 m (–50 to 10,000 ft)*
Storage	–16 to 10,600 m (–50 to 35,000 ft)

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

NOTE: For the full name of an abbreviation or acronym used in this table, see the Glossary in the User's Guide.

CHAPTER 2
Basic Troubleshooting

This chapter describes basic troubleshooting procedures that can help you diagnose a computer system problem. These procedures can often reveal the source of a problem or indicate the correct starting point for troubleshooting the system. A brief explanation of how to load and start the Dell Diagnostics is located at the end of the chapter. Dell recommends that you perform the following procedures in the order they are presented in this chapter.

Initial User Contact

When you first contact a user who has a problem, ask the user to describe the problem and the conditions under which it occurs. A verbal description can often indicate the cause of a problem or indicate the appropriate troubleshooting procedure to use. After the user describes the problem, follow these steps:

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

   See the operating system documentation and Appendix D, "Maintaining the System," in the *User's Guide* for information about backing up data.

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

   Can the user duplicate the problem?

   Yes. Proceed to step 3.

   No. Proceed to the next section, "External Visual Inspection."

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

   Is the problem a result of user error?

   Yes. Instruct the user in the proper procedure, or direct him or her to the appropriate user documentation for the correct procedure.

   No. Proceed to the next section, "External Visual Inspection."

External Visual Inspection

The external visual inspection consists of a quick inspection of the exterior of the computer, the monitor, the keyboard, any peripherals, and cables. While performing the visual inspection, make any necessary corrections. To perform the external visual inspection, follow these steps:

1. **Turn off the computer, the monitor, and all peripherals.**

2. **Verify that all power cables are properly connected to the computer, the monitor and peripherals, and their power sources.**

3. **Verify that the keyboard and mouse interface cables are firmly attached to the proper connectors on the back of the computer.**

   For a PS/2-compatible mouse, the keyboard and mouse interface cable connectors are identical except for their labels. If needed, see "System Features" in Chapter 1.

   For a serial mouse, the mouse interface cable must be firmly attached to one of the serial port connectors, and its captive screws must be secure enough to ensure a firm connection.

4. **Verify that any devices connected to the serial ports, parallel port, and USB connectors are properly attached.**

   Each of the serial, parallel, and USB interface cables must be firmly attached to an appropriate connector on the back of the computer as well as to the interface connector on the device. The captive screws that secure these connectors at each end of the interface cable must be secure enough to ensure a firm connection.

5. **Verify that the video interface cable is firmly attached to the connector on the graphics adapter card and to the connector on the back of the monitor.**

   For proper monitor connections, see the documentation for the monitor.

6. **Inspect all external monitor controls for any obvious damage or improper settings.**

   For proper settings of the monitor controls, see the documentation for the monitor.

7. **Inspect the keyboard to ensure that no keys are sticking.**

   If one or more keys are sticking, it may be necessary to replace the keyboard.

8. **Inspect the exterior of the computer, including all controls, indicators, and user-accessible data storage devices for any signs of physical damage.**

   Does the inspection reveal any problems?

   Yes. Proceed to the appropriate procedure in Chapter 4, "Removing and Replacing Parts."

   No. Proceed to the next section, "Observing the Boot Routine."

Observing the Boot Routine

After you have performed an external visual inspection as described in the previous section, you should boot the system and, while the boot routine is running, observe the system for any indications of problems.

NOTE: Most of the steps in this procedure require observation of system functions and indications, some of which can occur simultaneously. It may be necessary to reboot the system several times in order to complete all of these steps.

To observe problem indications during the boot routine, follow these steps:

1. **Insert the *Dell Diagnostics Diskette* into drive A. Turn on all peripherals and the computer. If the computer is already on, press the reset button or <Ctrl><Alt><Del> to reboot the system.**

2. **Check the power supply fan.**

   Does the fan run normally?

   Yes. Proceed to step 3.

   No. Troubleshoot the computer's power supply.

3. **Watch the Num Lock, Caps Lock, and Scroll Lock indicators on the upper-right corner of the keyboard. After all three indicators flash momentarily, the Num Lock indicator should light up and remain on.**

   Do these indicators flash on and off within approximately 10 seconds after the boot routine starts?

   Yes. Proceed to step 4.

   No. Troubleshoot the system power supply. If the troubleshooting procedure indicates that the system power supply is operational, troubleshoot the memory.

4. **During the boot routine, observe the system for any of the following:**

   - Diskette-drive and hard-disk drive access indicators

     These indicators light up in response to data being transferred to or from the drives. If either of these indicators fails to light up during the boot routine, troubleshoot the diskette drive or hard-disk drive sub-system, as appropriate.

   - Beep codes

     A beep code is a series of beeps that indicates an error condition. If the system emits a beep code, see Table 3-1.

   - System error messages

     These messages can indicate problems or provide status information. If a system error message is displayed, see Table 3-2.

5. **Observe the monitor screen for the Diagnostics Menu.**

   Does the Diagnostics Menu appear?

   Yes. See "Running the Dell Diagnostics" found later in this chapter.

   No. Proceed to step 6.

6. **Insert another copy of the diagnostics diskette into the diskette drive, and reboot the system.**

   Does the Diagnostics Menu appear?

   Yes. See "Running the Dell Diagnostics" found later in this chapter.

   No. Proceed to the next section, "Internal Visual Inspection."

Internal Visual Inspection

CAUTION: Before you proceed with the internal visual inspection described in this section, ensure that the user has saved all open files and exited all open application programs if possible.

A simple visual inspection of a computer's interior hardware can often lead to the source of a problem, such as a loose expansion card, cable connector, or mounting screw. When you perform the visual inspection, refer to "System Features" in Chapter 1 to locate components in the inspection procedure.

To perform the internal visual inspection, perform the following steps in the sequence indicated.

WARNING FOR YOUR PERSONAL SAFETY AND PROTECTION OF THE EQUIPMENT

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

1. **Turn off the computer and all peripherals.**
2. **Disconnect the computer and peripherals from their AC power sources. Also, disconnect any telephone or telecommunication lines from the computer. Doing so reduces the potential for personal injury or shock.**
3. **If you are disconnecting a peripheral from the computer or are removing a component from the system board, wait 10 to 20 seconds after disconnecting the computer from AC power before disconnecting the peripheral or removing the component to avoid possible damage to the system board.**
4. **Wear a wrist grounding strap, and clip it to an unpainted metal surface, such as the padlock loop on the back of the chassis. If a wrist grounding strap is not available, touch any unpainted metal surface on the back of the computer or on the computer chassis, such as the power supply, to discharge any static charge from your body before touching anything inside the computer.**
5. **While you work, periodically touch an unpainted metal surface on the computer chassis to dissipate any static electricity that might harm internal components. Also avoid touching components or contacts on a card and avoid touching pins on a chip.**
6. **Remove the computer cover.**
7. **Verify that the standby LED is not on. If it is on, you may need to wait 10 to 30 seconds for it to go out (see Figure 1-11).**

8. **Verify that all chips, DIMMs, and expansion cards are fully seated in their sockets or connectors.**

WARNING: The Slot 2 SEC cartridge/heat sink assembly can get extremely hot. Be sure the that assembly has had sufficient time to cool before you touch it.

To ensure that the chips are fully seated in their sockets, press firmly on the top of each chip.

To reseat the microprocessor, remove and reinstall it as described in "Microprocessor Slot 2 SEC Cartridge/Heat Sink Assembly" in Chapter 4.

To reseat a DIMM, remove it from its socket and reinstall it as described in "DIMMs" in Chapter 4.

If you need to reseat an expansion card, use a 1/4-inch nut driver to remove the screw that secures the card-mounting bracket. Grasp the card by its top corners, and carefully pull it out of its connector. Reinsert the card in its connector, and carefully push it in until it is fully seated. Then reinstall the card-mounting bracket's retaining screw (see "Expansion Cards" in Chapter 4 for more information).

9. **Verify that all jumpers are set correctly.**

For information about these jumpers, see "System Board Jumpers" in Chapter 1.

10. **Check all cable connectors inside the computer to verify that they are firmly attached to their appropriate connectors.**

11. **Reinstall the computer cover.**

12. **Reconnect the computer and any attached peripherals to their power sources, and turn them on.**

Does the problem appear to be resolved?

Yes. No further steps are necessary.

No. Proceed to "Eliminating Resource Conflicts," "Running the Dell Diagnostics," and "Getting Help" found later in this chapter.

Eliminating Resource Conflicts

Devices within or connected to the computer may require dedicated memory spaces, interrupt levels, or DMA channels, all of which must be allocated during installation of the devices. Because devices may be installed at different times, it is possible that the same resource is assigned to two or more devices.

Resource conflicts can result in disorderly or erratic system operation or failure of the system to operate at all. If you suspect that resource conflicts might exist, check the system using the Windows NT Diagnostics in the

Administrative Tools folder or the ISA Configuration Utility (ICU), and reassign the resources as necessary. See "Advanced Expansion Subsystem" in Chapter 1 for information on the Device Manager and the ICU. See "Interrupt Request Assignments" in Chapter 1 to help identify possible conflicts. Also review the documentation provided with any installed expansion cards and other devices for additional interrupt information for the specific devices.

Running the Dell Diagnostics

The Dell Diagnostics (included with the system) contains tests that aid in troubleshooting all major components of the computer system.

CAUTION: To prevent damage to the original diagnostics diskette, always use a backup copy of the diagnostics diskette when servicing a user's computer. Dell recommends that users make several copies of this diskette to ensure that one is always available.

To start the Dell Diagnostics, turn off the system, insert a diagnostics diskette into drive A, and then turn on the system.

Starting the diagnostics causes the Dell logo screen to appear on the monitor screen, followed by a message indicating that the diagnostics is loading. Before the diagnostics loads, a program tests the portion of main memory (RAM) required for loading the diagnostics. If a RAM error is detected, a message appears on the screen telling you which DIMM has failed.

If no errors are found in RAM, the diagnostics loads and the Diagnostics Menu appears. This menu lets you choose the following options or exit to the MS-DOS® prompt:

- Run Quick Tests — Runs selected tests from all test groups to quickly locate a failure or to indicate where further testing is needed to isolate a failure
- Run All Tests — Runs all tests for a thorough test of the system
- Run Specific Tests — Tests a particular area or subsystem

Getting Help

If none of the troubleshooting procedures in this chapter or the tests in the Dell Diagnostics reveals the source of the problem or leads to the proper troubleshooting steps for determining the source of the problem, call Dell for technical assistance. For instructions, see the chapter titled "Getting Help" in the *Diagnostics and Troubleshooting Guide.*

CHAPTER 3
Beep Codes and Error Messages

This chapter describes beep codes and system error messages that can occur during system start-up or, in the case of some failures, during normal system operation. The tables in this chapter list faults that can cause a beep code or system error message to occur and the probable causes of the fault in each case.

If a faulty system does not emit beep codes or display system error messages to indicate a failure, you should run the appropriate tests in the Dell Diagnostics to help isolate the source of the problem. See "Running the Dell Diagnostics" in Chapter 2.

POST Beep Codes

If the monitor cannot display error messages during the POST, the system may emit a series of beeps that identifies the problem or that can help you identify a faulty component or assembly. Table 3-1 lists the beep codes that may be generated during the POST. Most beep codes indicate an error that may prevent the system from completing the boot routine until the indicated condition is corrected. If the table does not lead to the source of the problem, run the appropriate tests in the Dell Diagnostics to assist in troubleshooting the problem.

Table 3-1. POST Beep Codes

Beep Code	Error	Probable Causes
1-1-3	NVRAM write/read failure	Defective system board
1-1-4	BIOS checksum failure	Faulty BIOS or defective system board
1-2-1	Programmable interval-timer failure	Defective system board
1-2-2	DMA initialization failure	
1-2-3	DMA page register write/read failure	
1-3-1	Main-memory refresh verification failure	Faulty or improperly seated DIMMs or defective system board
1-3-2	No 100-MHz DIMM installed	No 100-MHz DIMM installed or faulty or improperly seated DIMM
1-3-3	Chip or data line failure in the first 64 KB of main memory	Faulty or improperly seated DIMMs
1-3-4	Odd/even logic failure in the first 64 KB of main memory	
1-4-1	Address line failure in the first 64 KB of main memory	
1-4-2	Parity failure in the first 64 KB of main memory	
2-1-1 through 2-4-4	Bit failure in the first 64 KB of main memory	
3-1-1	Slave DMA-register failure	Defective system board
3-1-2	Master DMA-register failure	
3-1-3	Master interrupt-mask register failure	
3-1-4	Slave interrupt-mask register failure	
3-2-4	Keyboard-controller test failure	Faulty keyboard controller (defective system board)

Table 3-1. POST Beep Codes *(continued)*

Beep Code	Error	Probable Causes
3-3-4	Screen initialization failure	Faulty video subsystem (defective graphics adapter card)
3-4-1	Screen-retrace test failure	
3-4-2	Search for video ROM failure	
4-2-1	No timer tick	Defective system board
4-2-2	Shutdown failure	
4-2-3	Gate A20 failure	
4-2-4	Unexpected interrupt in protected mode	
4-3-1	Memory failure above address 0FFFFh	Faulty or improperly seated DIMMs
4-3-3	Timer-chip counter 2 failure	Defective system board
4-3-4	Time-of-day clock stopped	Bad battery or defective system board
4-4-1	Serial/parallel port test failure	Faulty I/O chip (defective system board)

System Error Messages

Table 3-2 lists (in alphabetical order) system error messages that can appear on the monitor screen. These messages can help you find the source of a problem.

Fatal System Error Messages

Some error messages indicate fatal errors. When a fatal error occurs, the system usually cannot be rebooted until an appropriate hardware change has been made. The following messages indicate that a fatal error has occurred. Their definitions and probable causes are listed in Table 3-2.

- `Alert! Primary processor is out of rev. System halted`
- `Alert! Secondary processor is out of rev. System halted`
- `Bad error-correction code (ECC) on disk read`
- `Controller has failed`
- `Data error`
- `ECC memory error`
- `Gate A20 failure`
- `Hard disk controller failure`
- `Hard disk drive read failure`
- `Hard disk failure`
- `Keyboard clock line failure`
- `Keyboard controller failure`
- `Keyboard data line failure`
- `Keyboard stuck key failure`
- `No timer tick interrupt`
- `Shutdown failure`
- `Timer chip counter 2 failed`

Table 3-2. System Error Messages

Message	Definition	Probable Causes
`Address mark not found`	BIOS found faulty disk sector or could not find particular disk sector.	Faulty diskette/tape drive subsystem or hard-disk drive subsystem (defective system board), faulty interface cable or connector.
`Attachment failed to respond`	Diskette drive or hard-disk drive controller cannot send data to associated drive.	
`Alert! Cover was previously removed.`	Cover was previously removed.	Cover was previously removed.
`Alert! Hard disk drive thermal probe failure detected.`	Hard-disk drive thermal probe has failed.	No hard-disk drive thermal probe installed, defective thermal probe, or thermal cable not connected to the control panel.
`Alert! One or more of the Memory DIMMs are out of rev.`	System detected that one or more of the DIMMs are not the correct revision.	DIMMs do not meet Intel's SPD 1.2 specification or 66-MHz DIMMs are installed.
`Alert! Previous fan failure.`	System fan failed during the previous operating session.	No fan installed, defective fan, or fan cable not connected.
`Alert! Previous hard-disk drive thermal failure.`	The hard-disk drive(s) exceeded its recommended operating temperature during the previous operating session.	Operating environment is too hot (above 35°C). The system vents may be blocked, causing the system to overheat.
`Alert! Previous processor thermal failure.`	The microprocessor exceeded its recommended operating temperature during the previous operating session.	Operating environment is too hot (above 35°C). The system vents may be blocked, causing the system to overheat.
`Alert! Previous voltage failure.`	System voltage exceeded or fell below an acceptable threshold.	Defective power supply.

Table 3-2. System Error Messages *(continued)*

Message	Definition	Probable Causes
`Alert! Primary processor is out of rev.`	System detected that the primary processor is not the correct revision. If the system contains more than 512 MB of RAM, this message will be followed by a `System Halted` message.	Processor is a type not supported by Dell.
`Alert! Processor thermal probe failure detected.`	Processor or system board has failed.	Faulty processor or defective system board.
`Alert! Secondary processor is out of rev.`	System detected that the secondary processor is not the correct revision. If the system contains more than 512 MB of RAM, this message will be followed by a `System Halted` message.	Processor is a type not supported by Dell.
`Alert! Single-bit memory error previously detected in XXXXh.`	Single-bit ECC error was detected during the previous operating session.	Faulty or improperly seated DIMMs or defective system board.
`Alert! System fan was not detected.`	System fan was not detected.	No fan installed, defective fan, or fan cable not connected.
`Alert! Unbuffered and registered SDRAM DIMMs cannot be mixed.`	Mixing of unbuffered and registered SDRAM DIMMs is not supported.	Two different types (unbuffered and registered) of SDRAM DIMMs have been installed together and may not be compatible.
`Alert! Uncorrectable memory error previously detected in XXXXh.`	Multibit ECC error was detected during the previous operating session.	Faulty or improperly seated DIMMs or defective system board.
`Auxiliary Device failure. Verify that mouse and keyboard are securely attached to connectors.`	System detected a mouse failure.	Faulty mouse, or faulty mouse controller or keyboard is attached to the mouse connector.

Table 3-2. System Error Messages *(continued)*

Message	Definition	Probable Causes
`Bad command or file name`	Command entered does not exist, is faulty, or is not in pathname specified.	Faulty command and syntax, or incorrect filename.
`Bad error-correction code (ECC) on disk read`	Diskette drive or hard-disk drive controller detected an uncorrectable read error.	Faulty diskette/tape drive subsystem or hard-disk drive subsystem (defective system board).
`Boot: Couldn't find NTLDR`	A nonbootable diskette formatted with Windows NT was detected in the diskette drive.	A nonbootable diskette is preventing the system from booting. Remove the diskette to boot the system from the hard-disk drive or from a bootable diskette.
`Controller has failed`	Hard-disk drive or associated controller is defective.	Faulty hard-disk drive subsystem or defective system board.
`Data error`	System received unrecoverable data-read error from diskette or hard-disk drive.	Faulty diskette, diskette drive, or hard-disk drive.
`Decreasing available memory`	Read/write failure during POST prevents system from using available memory.	One or more DIMMs are faulty or improperly seated.

`Diskette drive 0 seek failure`
 	
`Diskette drive 1 seek failure`
	Diskette/tape drive controller could not locate specific sector or track.	Faulty or improperly inserted diskette, incorrect settings in System Setup program, loose diskette/tape drive interface cable, or loose power cable.

`Diskette read failure`	Failure occurred while system attempted to read diskette.	Faulty diskette, faulty or improperly connected diskette/tape drive interface cable, or loose power cable.
`Diskette subsystem reset failed`	System could not successfully issue reset command to diskette controller.	Faulty diskette/tape drive controller (defective system board).
`Diskette write protected`	Diskette write-protect feature was activated.	Diskette is write-protected.

Table 3-2. System Error Messages *(continued)*

Message	Definition	Probable Causes
`Drive not ready`	Diskette is missing from or is improperly inserted in diskette drive.	Missing, defective, unformatted, or improperly inserted diskette.
`ECC memory error`	Uncorrectable multibit ECC memory error is detected.	Faulty or improperly seated DIMMs or defective system board.
`Gate A20 failure`	Gate A20 of the keyboard controller malfunctioned.	Faulty keyboard controller (defective system board).
`General failure`	Operating system cannot execute command.	Corrupted or improperly installed operating system.

`Hard disk controller failure`
 	
`Hard disk drive read failure`
 	
`Hard disk failure`
	Hard-disk drive failed to initialize.	Incorrect configuration settings in System Setup program, improperly connected hard-disk drive cable, faulty hard-disk controller subsystem (defective system board), or loose power cable.

`Invalid configuration information - please run SETUP program`	System Setup program contains incorrect system configuration settings.	Incorrect configuration settings in System Setup program or faulty battery.

`Keyboard clock line failure`
 	
`Keyboard failure`
 	
`Keyboard data line failure`
 	
`Keyboard stuck key failure`
	System cannot communicate with keyboard.	Keyboard cable connector loose or improperly connected, defective keyboard, or defective keyboard/mouse controller (defective system board).

`Keyboard controller failure`	Keyboard/mouse controller failed.	Defective keyboard/mouse controller (defective system board).

Table 3-2. System Error Messages *(continued)*

Message	Definition	Probable Causes
Memory address line failure at *address*, read *value* expecting *value* Memory data line failure at *address*, read *value* expecting *value* Memory double word logic failure at *address*, read *value* expecting *value* Memory odd/even logic failure at *address*, read *value* expecting *value* Memory write/read failure at *address*, read *value* expecting *value*	During memory test, value read at *address* was incorrect.	Faulty or improperly seated DIMMs or defective system board.
Memory allocation error	Software in use conflicts with operating system, application program, or utility.	Faulty application program or utility.
Memory tests terminated by keystroke	Memory test did not complete.	POST memory test terminated by user pressing <Spacebar>.
Network card is not present in the system	System does not detect NIC.	Incorrect NIC drivers installed.
No boot device available	System does not recognize diskette drive or hard-disk drive from which it is trying to boot.	Faulty diskette, diskette/tape drive subsystem, hard-disk drive, hard-disk drive subsystem, or no boot disk in drive A.

Table 3-2. System Error Messages *(continued)*

Message	Definition	Probable Causes
`No boot sector on hard-disk drive`	Incorrect configuration settings in System Setup program, or corrupted operating system.	Incorrect configuration settings in System Setup program, or no operating system on hard-disk drive.
`No timer tick interrupt`	Timer on system board is malfunctioning.	Defective system board.
`Non-system disk or disk error`	Diskette in drive A or hard-disk drive does not have bootable operating system installed on it.	Faulty diskette, diskette/ tape drive subsystem, or hard-disk drive sub-system (defective system board).
`Not a boot diskette`	No operating system on diskette.	No operating system on diskette.
`Plug and Play Configuration Error`	System encountered problem in trying to configure one or more expansion cards.	System resource conflict.
`Read fault`	MS-DOS cannot read from diskette or hard-disk drive.	Faulty diskette, diskette/ tape drive subsystem, or hard-disk drive sub-system (defective system board).
`Requested sec-tor not found`	System could not find particular sector on disk, or requested sec-tor is defective.	
`Reset failed`	Disk reset operation failed.	Improperly connected diskette/tape drive, hard-disk drive interface cable, or power cable.
`Sector not found`	MS-DOS is unable to locate sector on dis-kette or hard-disk drive.	Defective sectors on dis-kette or hard-disk drive.
`Seek error`	MS-DOS is unable to locate specific track on diskette or hard-disk drive.	Defective diskette or hard-disk drive.
`Seek operation failed`	System could not find particular address mark on disk.	Faulty diskette or hard-disk drive.
`Shutdown failure`	System board chip is faulty.	Defective system board.

Table 3-2. System Error Messages *(continued)*

Message	Definition	Probable Causes
`System halted`	System locked up because the processor is not the correct revision.	System processor is not a type supported by Dell and more than 512 MB of RAM is installed.
`Time-of-day clock stopped`	System battery is low.	Defective battery or faulty chip (defective system board).
`Time-of-day not set`	Time or Date settings in System Setup program are incorrect, or the system battery does not work.	Incorrect Time or Date settings, or defective system battery.
`Timer chip counter 2 failed`	Timer circuit on system board is malfunctioning.	Defective system board.
`WARNING: Dell's Disk Monitoring System has detected that drive [0/1] on the [0/1] EIDE controller is operating outside of normal specifications. It is advisable to immediately back up your data and replace your hard-disk drive by calling your support desk or Dell Computer Corporation.`	POST queried EIDE drive for status. Drive detected possible error conditions.	Unreliable or defective drive.

`Write fault`
 	
`Write fault on selected drive`
	MS-DOS cannot write to diskette or hard-disk drive.	Faulty diskette or hard-disk drive.

CHAPTER 4
Removing and Replacing Parts

This chapter provides procedures for removing the components, assemblies, and subassemblies in the Dell Precision 610 mini tower systems.

Unless otherwise noted, each procedure assumes the following:

- You have performed the steps in "Precautionary Measures" found later in this chapter.
- You have removed the computer cover.
- You can replace or reinstall a part by performing the removal procedure in reverse order unless additional information is provided.

Recommended Tools

Most of the procedures in this chapter require the use of one or more of the following tools:

- Small flat-blade screwdriver
- Wide flat-blade screwdriver
- #1 and #2 Phillips-head screwdrivers
- 1/4-inch nutdriver
- Tweezers or long-nose pliers

Also, use a wrist grounding strap as explained in the next section, "Precautionary Measures."

Precautionary Measures

Before you perform any of the procedures in this chapter, take a few moments to read the following warning for your personal safety and to prevent damage to the system from ESD.

WARNING FOR YOUR PERSONAL SAFETY AND PROTECTION OF THE EQUIPMENT

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

1. **Turn off the computer and all peripherals.**
2. **Disconnect the computer and peripherals from their AC power sources. Also, disconnect any telephone or telecommunication lines from the computer. Doing so reduces the potential for personal injury or shock.**
3. **If you are disconnecting a peripheral from the computer or are removing a component from the system board, wait 10 to 20 seconds after disconnecting the computer from AC power before disconnecting the peripheral or removing the component to avoid possible damage to the system board.**
4. **Wear a wrist grounding strap, and clip it to an unpainted metal surface, such as the padlock loop on the back of the chassis. If a wrist grounding strap is not available, touch any unpainted metal surface on the back of the computer or on the computer chassis, such as the power supply, to discharge any static charge from your body before touching anything inside the computer.**

   While you work, periodically touch an unpainted metal surface on the computer chassis to dissipate any static electricity that might harm internal components. Also avoid touching components or contacts on a card and avoid touching pins on a chip.

5. **Verify that the standby LED is not on. If it is on, you may need to wait 10 to 30 seconds for it to go out (see Figure 4-17).**

Computer Cover

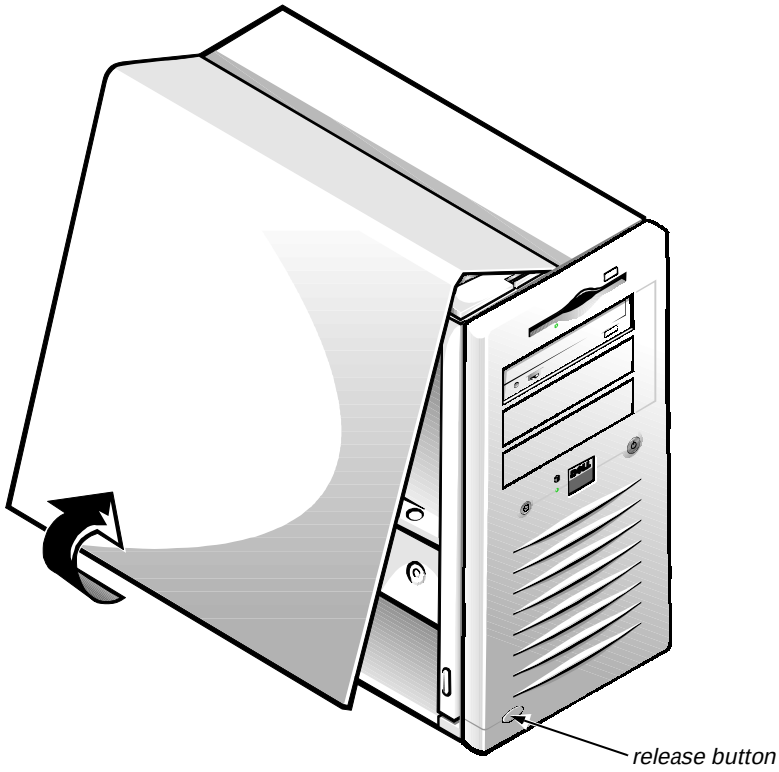


Figure 4-1. Computer Cover Removal

To remove the computer cover, follow these steps:

1. **Remove the padlock from the padlock ring on the back panel of the computer, if one is installed (see Figure 4-2).**

2. **Facing the left side of the computer, press the release button at the bottom-left corner of the front bezel (see Figure 4-1).**

3. **Lift the bottom of the cover, allowing it to pivot up toward you.**

4. **Disengage the tabs that secure the cover to the top of the chassis, and lift the cover away.**

Before you reinstall the cover, fold all cables out of the way so that they do not interfere with the cover or with the proper airflow inside the computer.

When you boot the system, you will need to reset the chassis intrusion detector by entering the System Setup program and changing the Chassis Intrusion setting to Not Detected. See Appendix A for information on the System Setup program. If you need further information, see Chapter 3, "Using the System Setup Program," in the *User's Guide*.

NOTES: After removing and replacing the cover, the chassis intrusion detector will cause the following message to be displayed at the next system start-up:

```
ALERT! Cover was previously removed.
```

If a setup password has been assigned by someone else, contact the network administrator for information on resetting the chassis intrusion detector.

Front Bezel

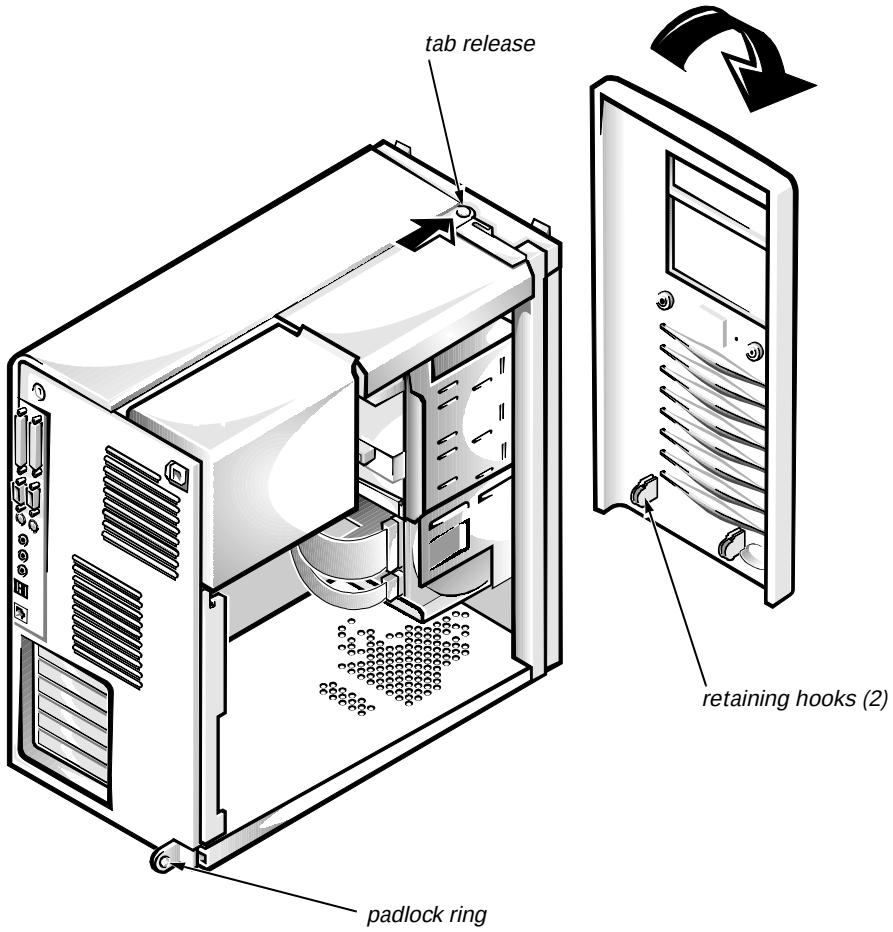


Figure 4-2. Front Bezel Removal

To remove the front bezel, follow these steps:

1. **Press the tab release marked with the icon (see Figure 4-2).**
2. **While still pressing the tab release, tilt the bezel away from the chassis.**
3. **Disengage the two retaining hooks at the bottom of the bezel, and pull the bezel away from the chassis.**

Power and Reset Buttons

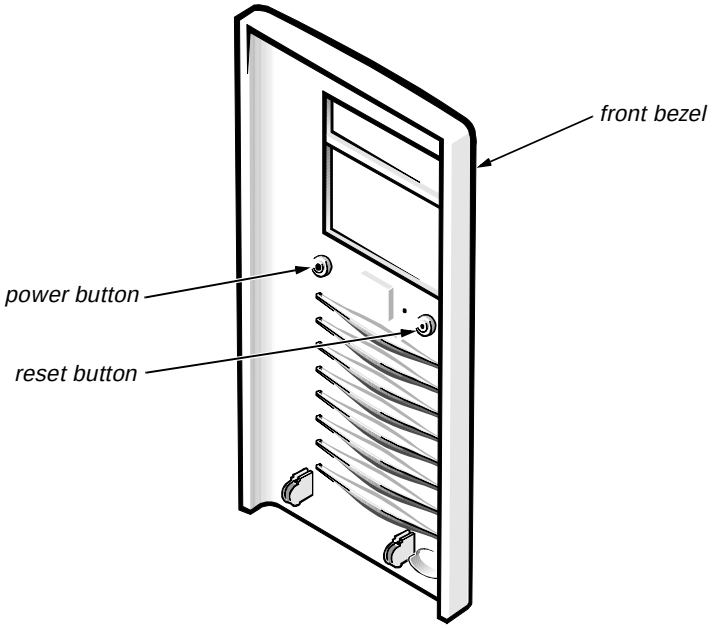


Figure 4-3. Power and Reset Button Removal

To remove the power and reset buttons, follow these steps:

1. **Lay the front bezel (see Figure 4-3) on a flat work surface, with the back of the bezel facing up.**

2. **To remove the power button or the reset button, use a small screwdriver and push in the two or three plastic clips that hold the button to the bezel.**

   When these clips are released, the button comes free from the bezel.

Front-Panel Inserts

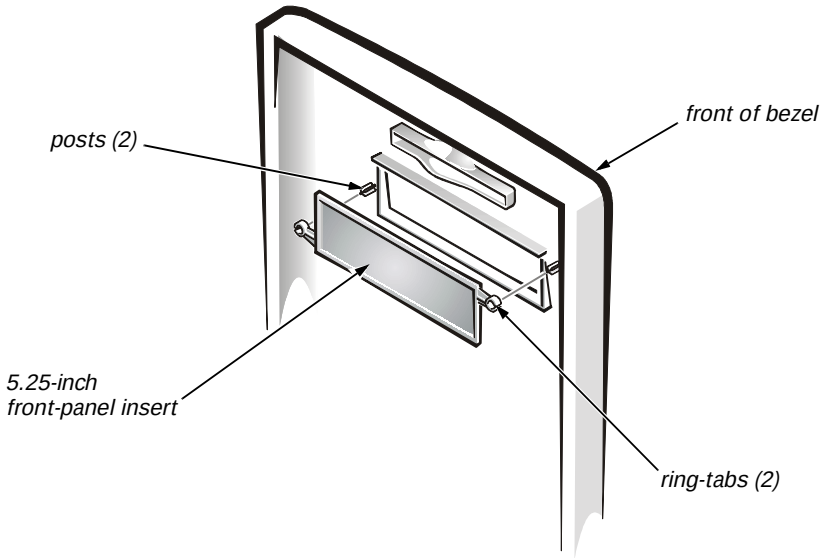


Figure 4-4. 5.25-Inch Front-Panel Insert Removal

To remove a 5.25-inch front-panel insert, follow these steps:

1. **Hold the bezel (see Figure 4-4) with the front facing you.**
2. **From the front of the bezel, use your thumbs to press inward on the insert until it snaps free of the bezel.**

To replace a 5.25-inch front-panel insert, position the two ring-tabs over the posts on the inside of the bay opening, and then press the ring-tabs over the posts.

Card Guide

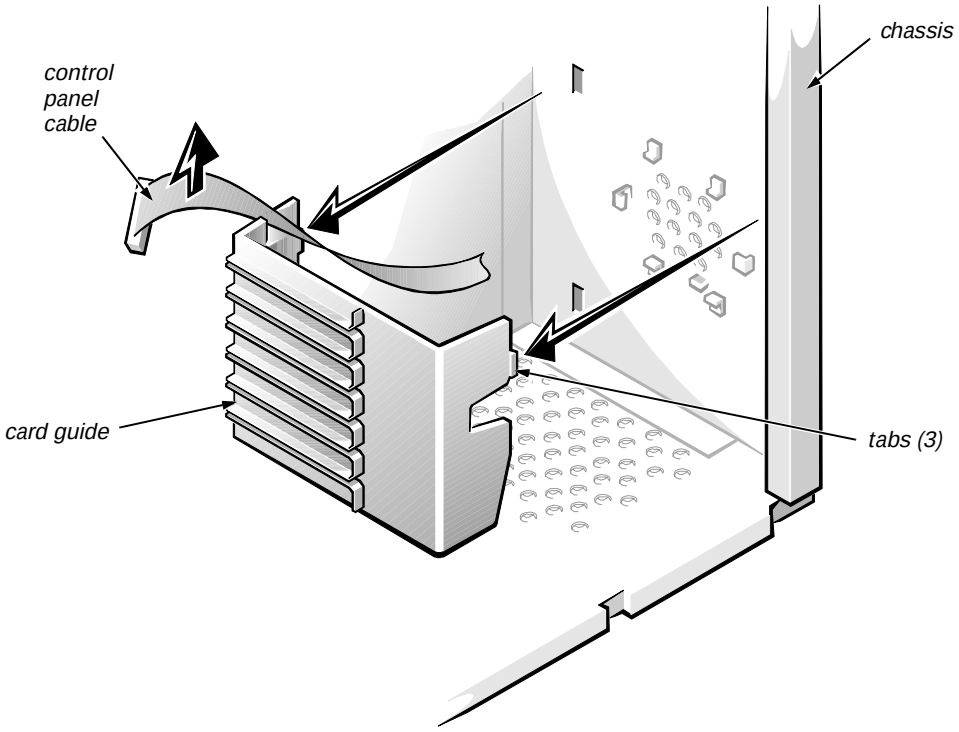


Figure 4-5. Card Guide Removal

To remove the card guide, follow these steps:

1. **Press in with your thumb on the outer side of the card guide (see Figure 4-5). This will release the outer tab from the chassis.**
2. **Pull the released side of the card guide away from the chassis. The outer side of the card guide will swing away from the chassis.**
3. **Slide the control panel cable up out of the slot in the card guide.**
4. **With the outer side of the card guide away from the chassis, you can then pull the card guide back and out of the chassis, which releases the inner two tabs.**

NOTE: Some older PCI and other types of cards may be so long that you cannot remove the card guide until you first remove the cards. Most newer cards are not long enough to interfere with card guide removal.

Control Panel

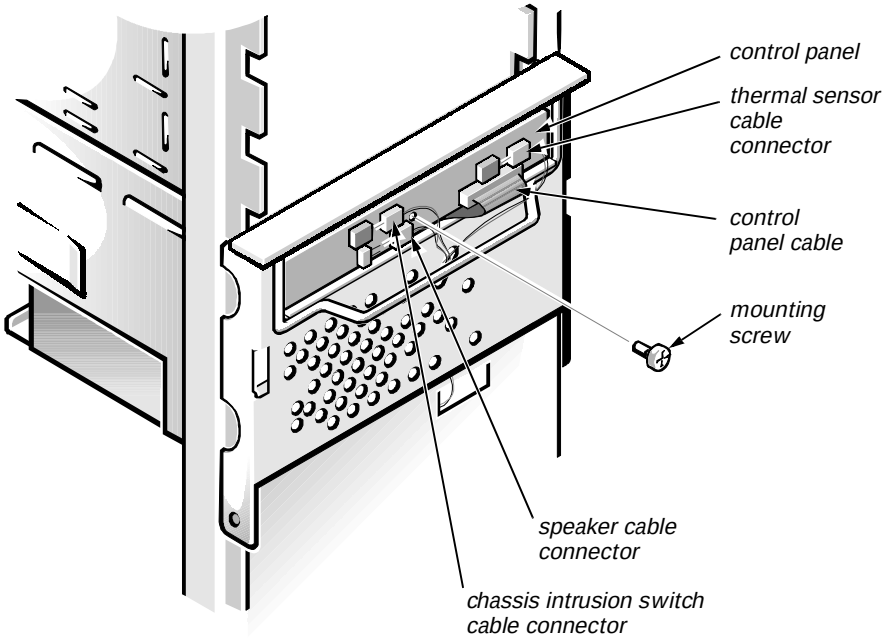


Figure 4-6. Control Panel Removal

To remove the control panel, follow these steps:

1. **Disconnect the control panel cable from the PANEL connector on the system board (see Figure 4-17 for the location of the PANEL connector).**

2. **Remove the card guide. Be sure to remove the control panel cable from the slot on the inner side of the card guide (see Figure 4-5).**

   Note the routing of the control panel cable as you remove it from the chassis. It is important to route the cable properly when you replace it to prevent it from being pinched or crimped.

3. **Disconnect the speaker cable connector, the chassis intrusion switch cable connector, and the thermal sensor cable connector from the control panel (see Figure 4-6).**

4. **Remove the mounting screw that secures the control panel to the chassis.**

5. **Remove the control panel cable.**

   Open the drive cage door, pull the control panel cable through the opening in the front wall, and carefully remove the cable from the routing tab in the drive cage door.

6. **Pull out on the control panel to detach it from the chassis.**

Speaker

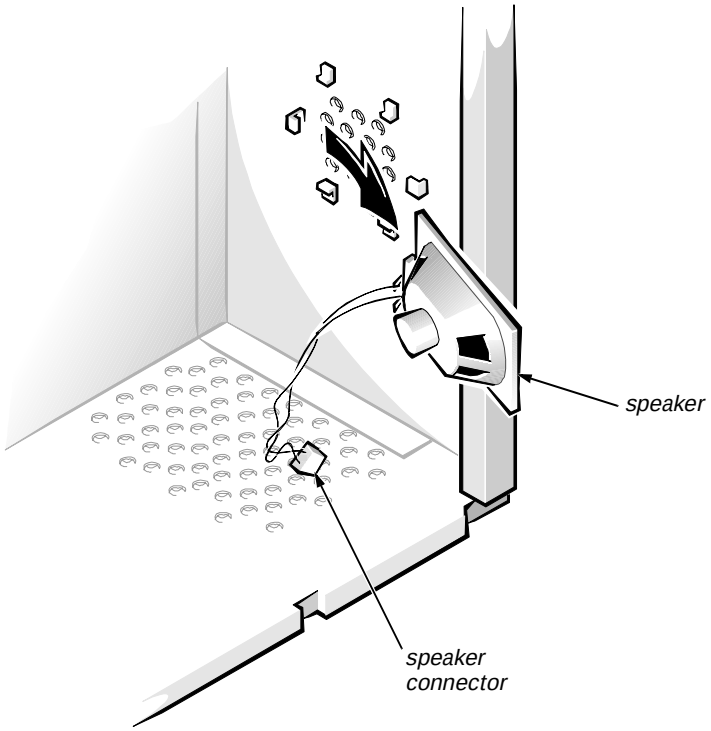


Figure 4-7. Speaker Removal

To remove the speaker, follow these steps:

1. **Remove the card guide (see Figure 4-5).**
2. **Disconnect the speaker cable connector from the control panel (see Figure 4-6).**
3. **Lift the speaker out of the retaining slots on the front of the chassis (see Figure 4-7).**

Drives

Figure 4-8 shows an example of drive hardware that can be installed in the Dell Precision 610 mini tower system. Refer to this figure when you perform any of the procedures in the following subsections.

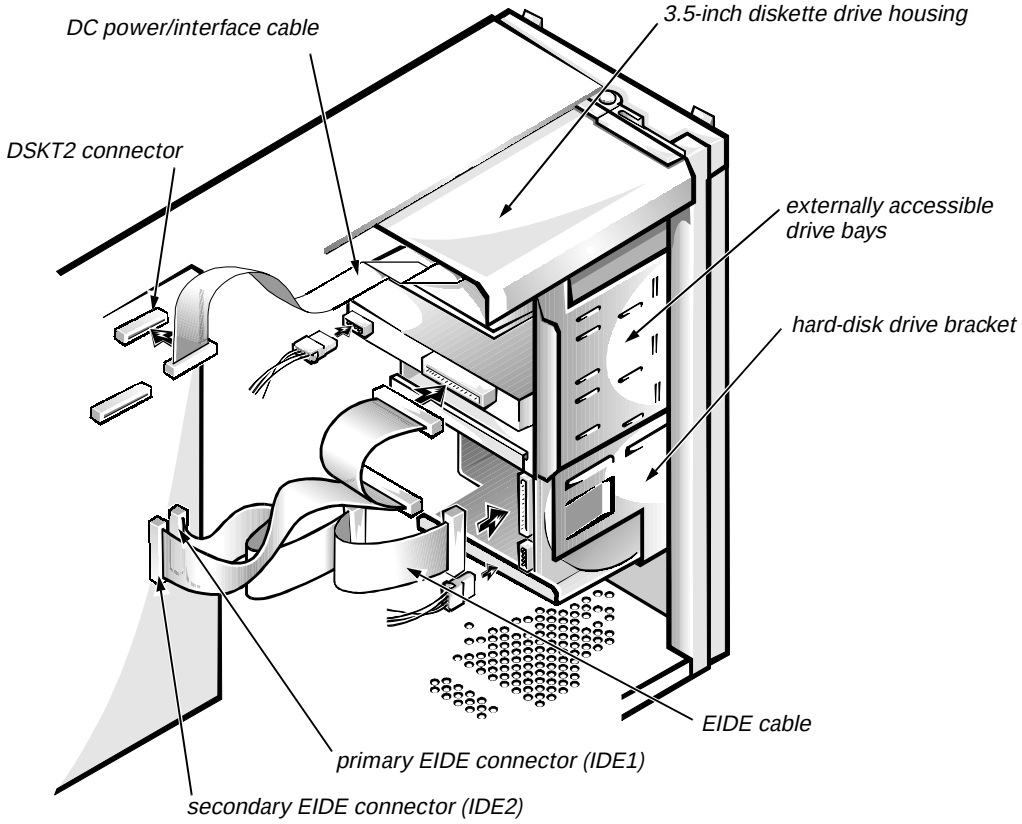


Figure 4-8. Drive Hardware

Externally Accessible Drive Assemblies

The Dell Precision 610 mini tower system can accommodate up to four externally accessible drive assemblies: the 3.5-inch diskette drive and up to three 5.25-inch drives.

3.5-Inch Diskette Drive Assembly

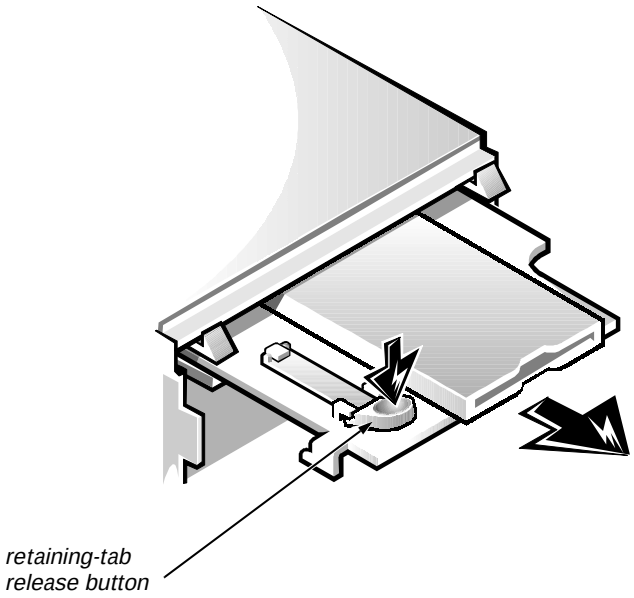


Figure 4-9. 3.5-Inch Diskette Drive Assembly Removal

To remove the 3.5-inch diskette drive assembly, follow these steps:

1. **Disconnect the DC power/interface cable from the system board.**

   Note the routing of the DC power/interface cable through the chassis as you remove it from the system board. It is important to route the cable properly when you replace it to prevent it from being pinched or crimped.

2. **Press the retaining-tab release button (see Figure 4-9) and pull the drive assembly forward to remove it.**

3. **Press down on the drive release lever (see Figure 4-10).**

4. **Holding the drive release lever down, slide the drive to the right, pulling it out from under the hook and away from the retaining tabs.**

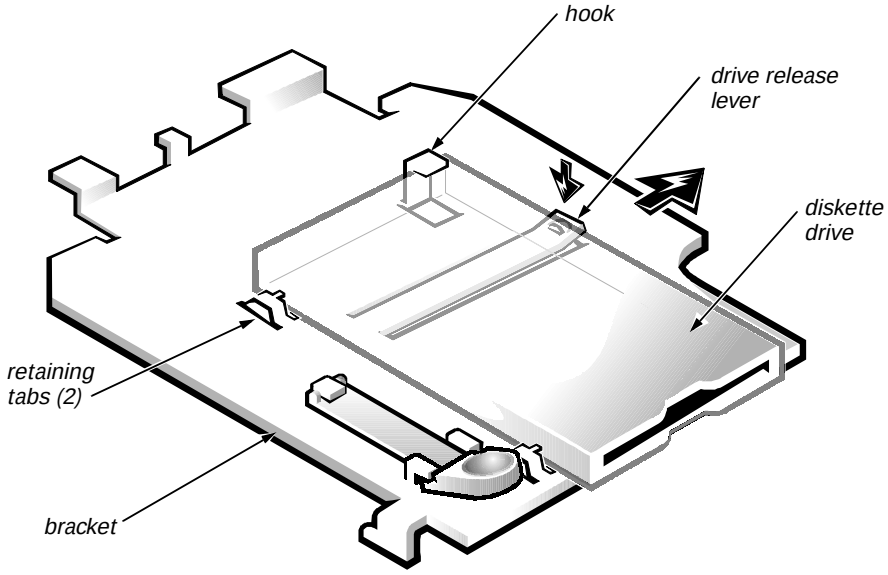


Figure 4-10. 3.5-Inch Diskette Drive Removal

When you replace the 3.5-inch diskette drive on the bracket, be sure that the two retaining tabs on the left side of the bracket engage the mounting holes in the side of the 3.5-inch diskette drive.

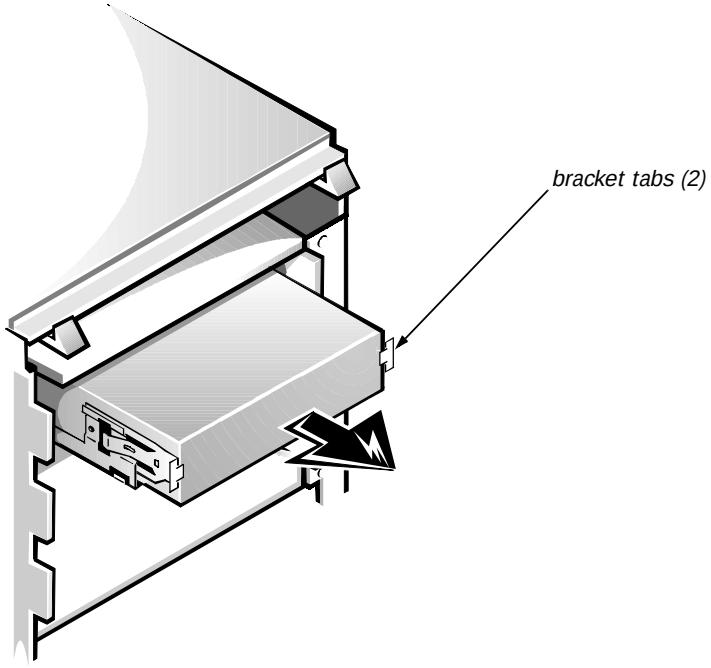


Figure 4-11. 5.25-Inch Drive Assembly Removal

To remove a 5.25-inch drive assembly from one of the drive bays, follow these steps:

1. **Disconnect the DC power cable and the interface cable the from the back of the drive.**
2. **Press the two bracket tabs (one on each side of the drive), and slide the drive assembly forward to remove it (see Figure 4-11).**

3. **To remove the drive from the bracket, turn the drive/bracket assembly upside down and unscrew the four screws that secure the drive to the bracket (see Figure 4-12).**

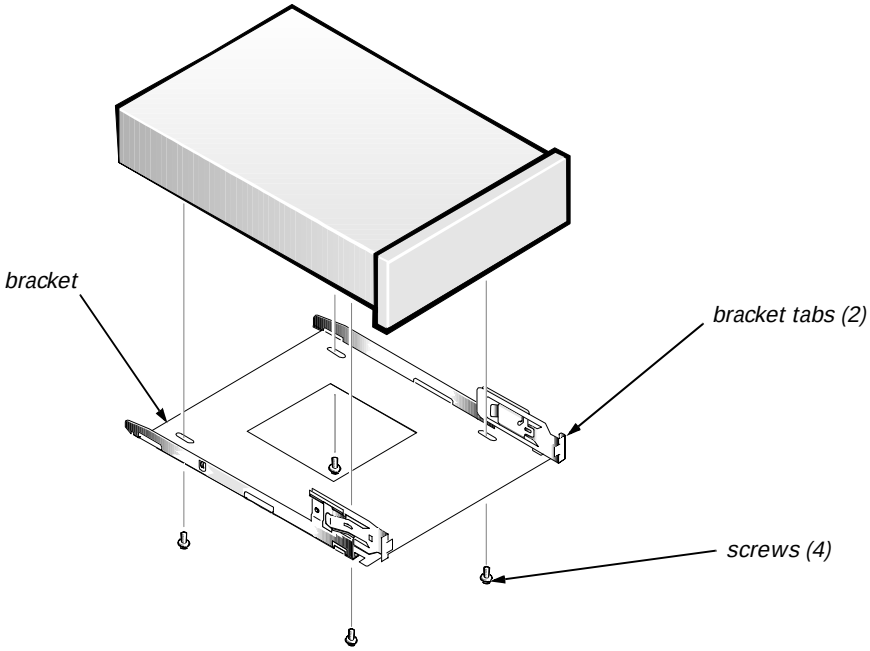


Figure 4-12. 5.25-Inch Drive Removal

When you replace the 5.25-inch drive, align the front of the drive flush with the bracket tabs at the front of the bracket. Insert the four screws, and tighten them in the order stamped on the bottom of the 5.25-inch drive bracket.

Internal Drive Assemblies in the Hard-Disk Drive Bracket

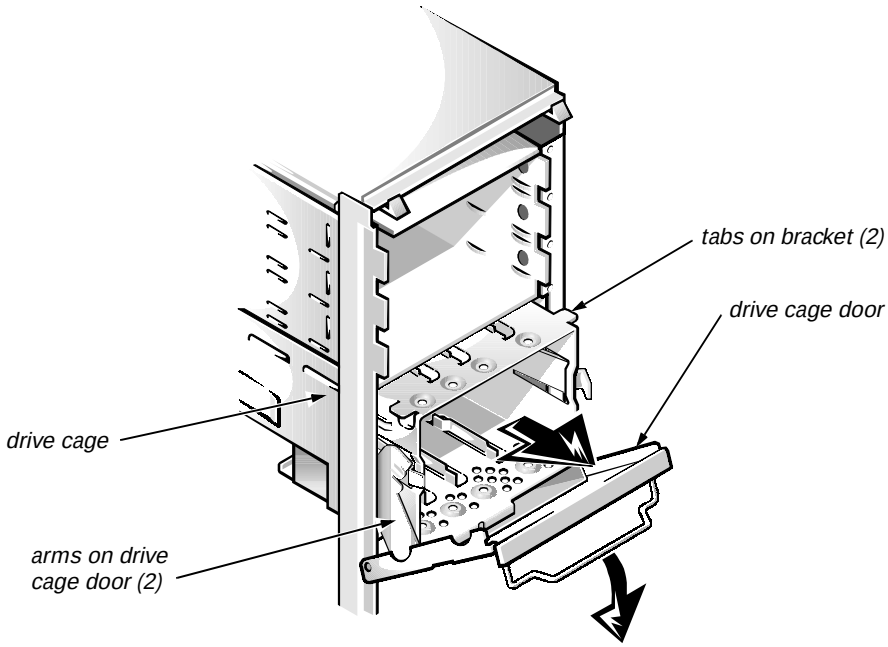


Figure 4-13. Removing the Hard-Disk Drive Bracket

To remove the hard-disk drive bracket, follow these steps:

1. **Open the drive cage door.**

   If any hard-disk drives are already installed in the bracket, disconnect the DC power cable and interface cable from each drive.

   Grasp the handle of the drive cage door on the front of the chassis, and pull out and down until the arms on the drive cage door (see Figure 4-13) disengage from the tabs on the bracket. This action pulls the bracket out of the drive cage about 1 to 3 inches.

2. **Remove the bracket from the drive cage.**

   When removing the bracket from the drive cage, you should remove it slowly and cautiously, using two hands to support the weight of the bracket. The bracket can be quite heavy, especially if it is populated with drives.

Hard-Disk Drive

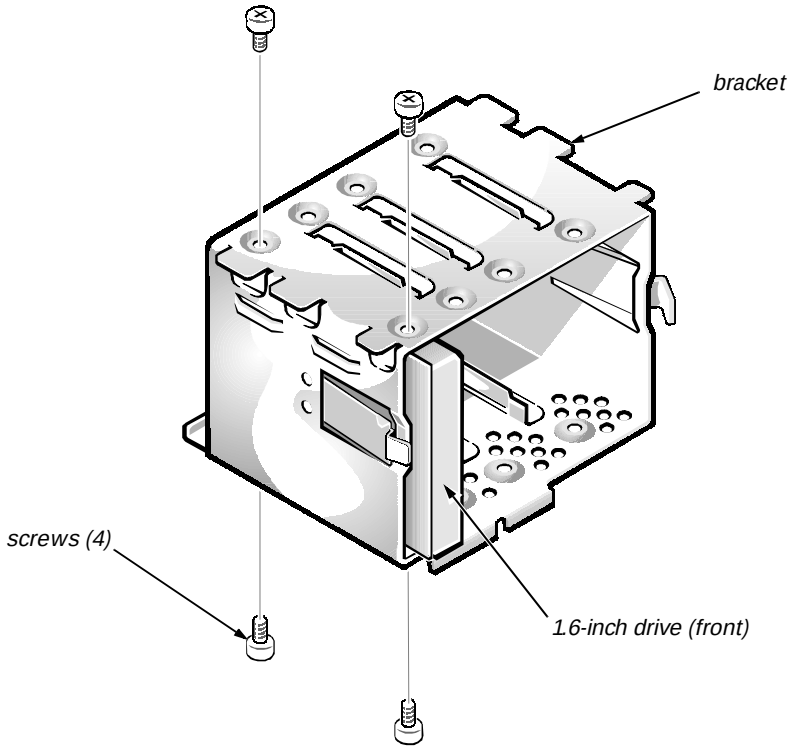


Figure 4-14. Hard-Disk Drive Removal

To remove a hard-disk drive, follow these steps:

1. **Remove the hard-disk drive bracket (see Figure 4-13).**
2. **Remove the four screws that attach the hard-disk drive to the hard-disk drive bracket (see Figure 4-14).**
3. **Slide the drive out of the hard-disk drive bracket.**

If you are replacing more than one hard-disk drive in the bracket, do not fully tighten any of the screws that hold the drives in the bracket until all of the drives have been placed into the bracket. This prevents the bracket from compressing, which could make it difficult to insert additional drives.

When you replace the hard-disk drive bracket, be sure that it is pushed fully into the system and snapped into position before you close the drive cage door (See Figure 4-13).

When you are ready to replace the front bezel, be sure to fold the drive cage door handle down to avoid interference with the front bezel.

System Power Supply

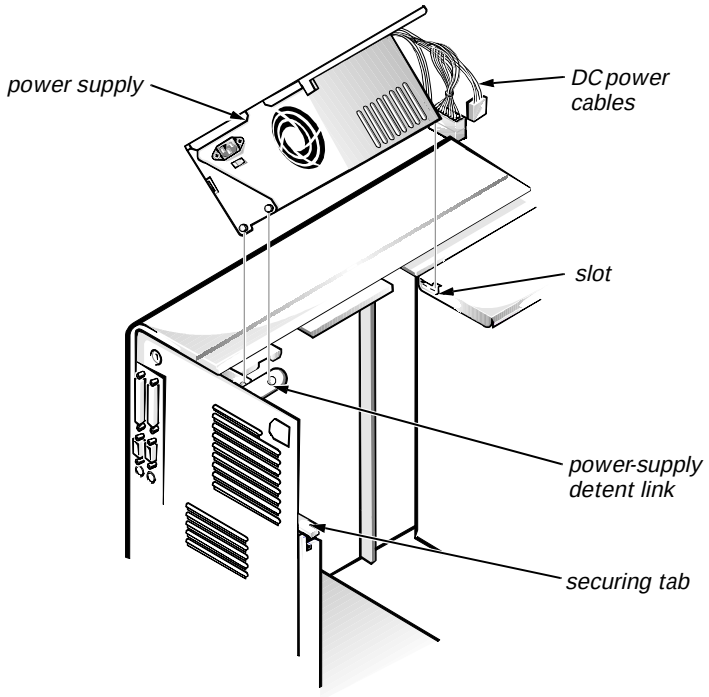


Figure 4-15. System Power-Supply Removal

To remove the system power supply, follow these steps:

1. **Disconnect the AC power cable from the back of the power supply.**
2. **Free the system power supply from the securing tab labeled "RELEASE —>," and rotate it upward until it locks (see Figure 4-15).**

   Press the securing tab to release the power supply.
3. **Disconnect the DC power cables from the system board and the drives.**

   Note the routing of the DC power cables underneath the tabs in the chassis as you remove them from the system board and drives. It is important to route these cables properly when you replace them to prevent them from being pinched or crimped.
4. **Facing the left side of the computer, move the front end of the system power supply toward you, and lift it to disengage the power supply from the slot in the chassis.**
5. **Lift the system power supply from the computer.**

When you reinstall the power supply, place the power-supply detent link over the pin on the power supply as you position the power supply in the chassis opening.

Microprocessor Fan

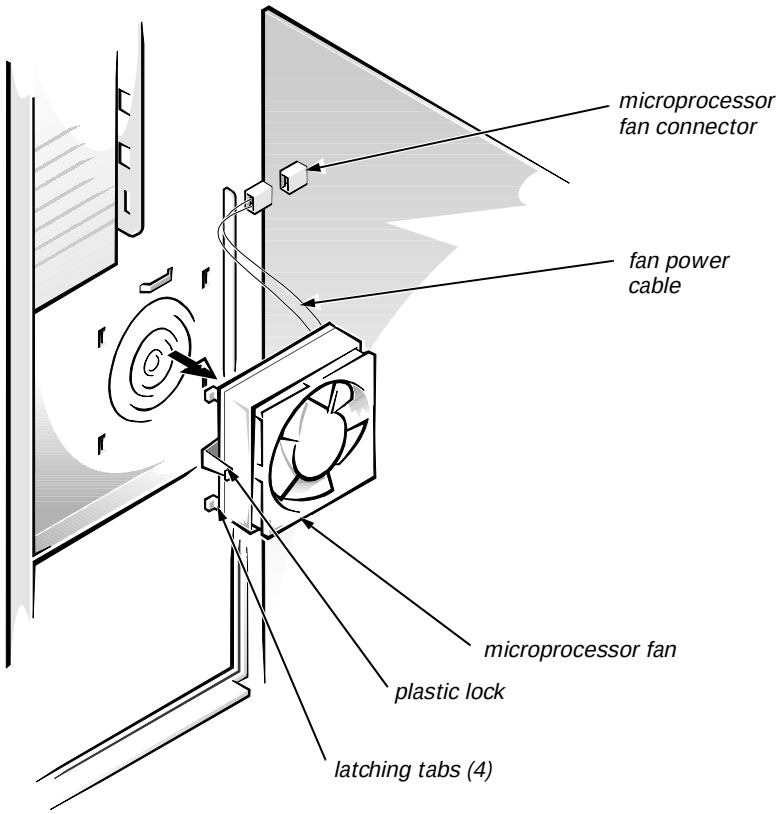


Figure 4-16. Microprocessor Fan Removal

To remove the microprocessor fan, follow these steps:

1. **Rotate the power supply up until it locks (see Figure 4-15).**
2. **Disconnect the fan power cable from the microprocessor fan connector (see Figure 4-16).**
3. **Gently pull the plastic lock, and push down on the fan to disengage the four latching tabs holding the fan to the back of the chassis.**
4. **Pull the fan forward to remove it.**

System Board Components

The subsections that follow contain procedures for removing system board components, which are shown in Figure 4-17.

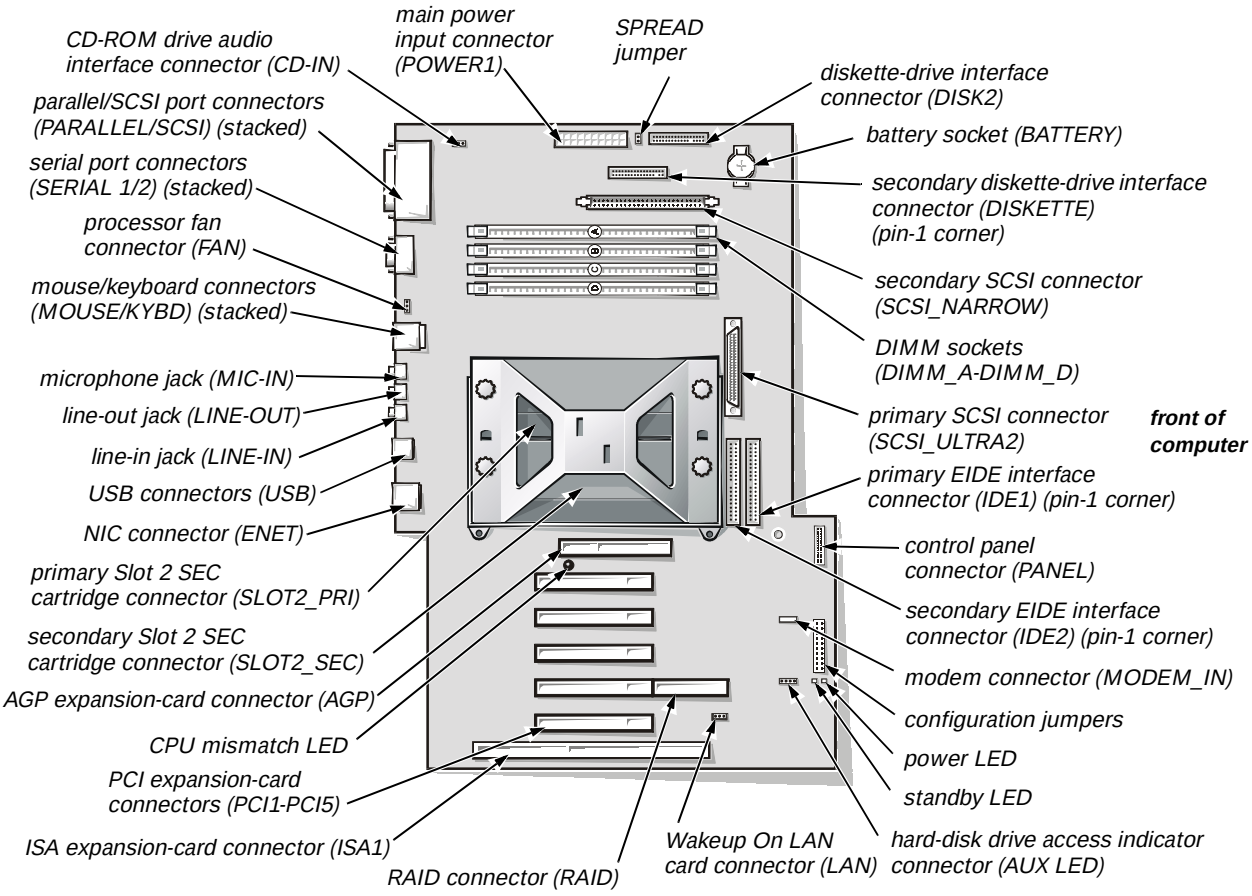


Figure 4-17. System Board Components

Expansion Cards

There are seven expansion-card connectors on the system board (see Figure 4-18). Expansion-card connectors PCI1 through PCI5 support 32-bit PCI expansion cards; expansion-card connector AGP supports a 32-bit AGP expansion card; and expansion-card connector ISA1 can accommodate an 8- or 16-bit ISA expansion card.

NOTES: Connector ISA1 shares expansion-card slot space with connector PCI5. Therefore, only one card of either type can be installed in this slot.

PCI4 has a connector extension to support a PCI RAID controller (see Figure 4-17 for the location of the PCI connectors).

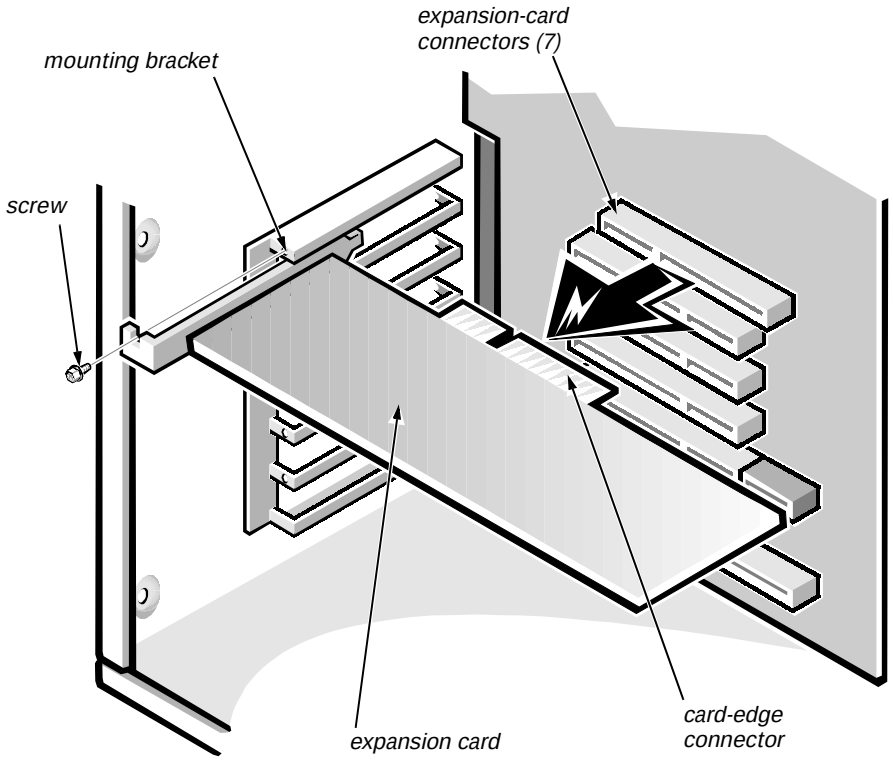


Figure 4-18. Removing an Expansion Card

Follow this general procedure to remove an expansion card:

1. **If necessary, disconnect any cables connected to the card.**
2. **Unscrew the mounting bracket (see Figure 4-18) of the card you want to remove.**
3. **Grasp the card by its outside corners, and ease it out of its connector.**

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

NOTE: Installing filler brackets over empty card-slot openings is necessary to maintain Federal Communications Commission (FCC) certification of the system. The brackets also keep dust and dirt out of your computer.

5. **Replace the computer cover, and reconnect your computer and peripherals to their power sources and turn them on.**

NOTE: After you remove and replace the cover, the chassis intrusion detector will cause the following message to be displayed at the next system start-up:

```
ALERT! Cover was previously removed.
```

6. **To reset the chassis intrusion detector, enter the System Setup program and reset Chassis Intrusion to Not Detected.**

See Chapter 3, "Using the System Setup Program," in the *User's Guide* for instructions.

NOTE: If a setup password has been assigned by someone else, contact that person for information on resetting the chassis intrusion detector.

DIMMs

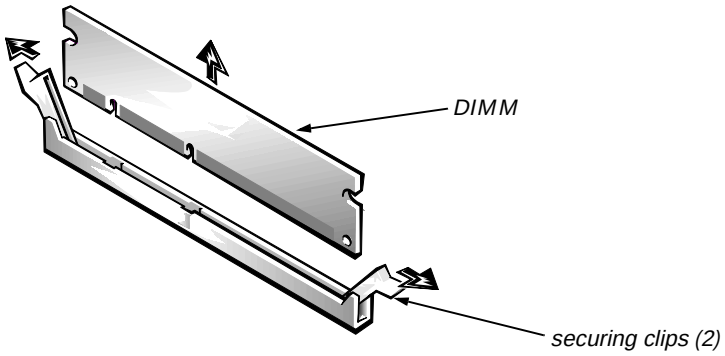


Figure 4-19. DIMM Removal

To remove a DIMM, follow these steps:

1. **Unlatch and rotate the power supply up until it locks (see Figure 4-15).**
2. **Push outward on the DIMM socket securing clips (see Figure 4-19) until the DIMM is released from its socket.**
3. **Lift the DIMM away from the socket.**

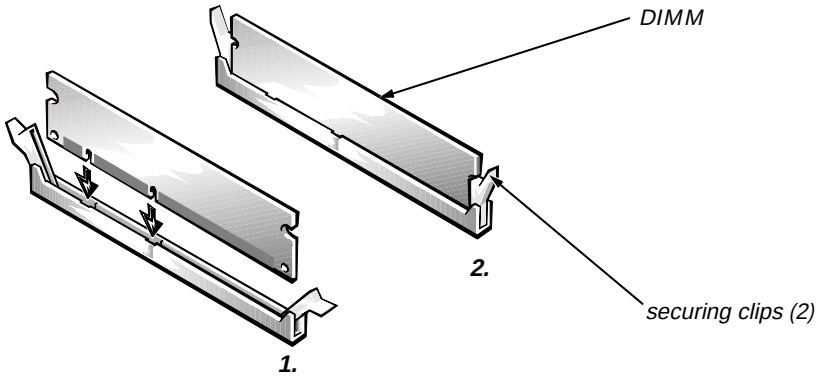


Figure 4-20. DIMM Installation

To replace a DIMM, press the DIMM fully into the socket (see step 1 of Figure 4-20) while closing the securing clips to lock the DIMM into the socket (see step 2 of Figure 4-20).

Microprocessor Slot 2 SEC Cartridge/Heat Sink Assembly

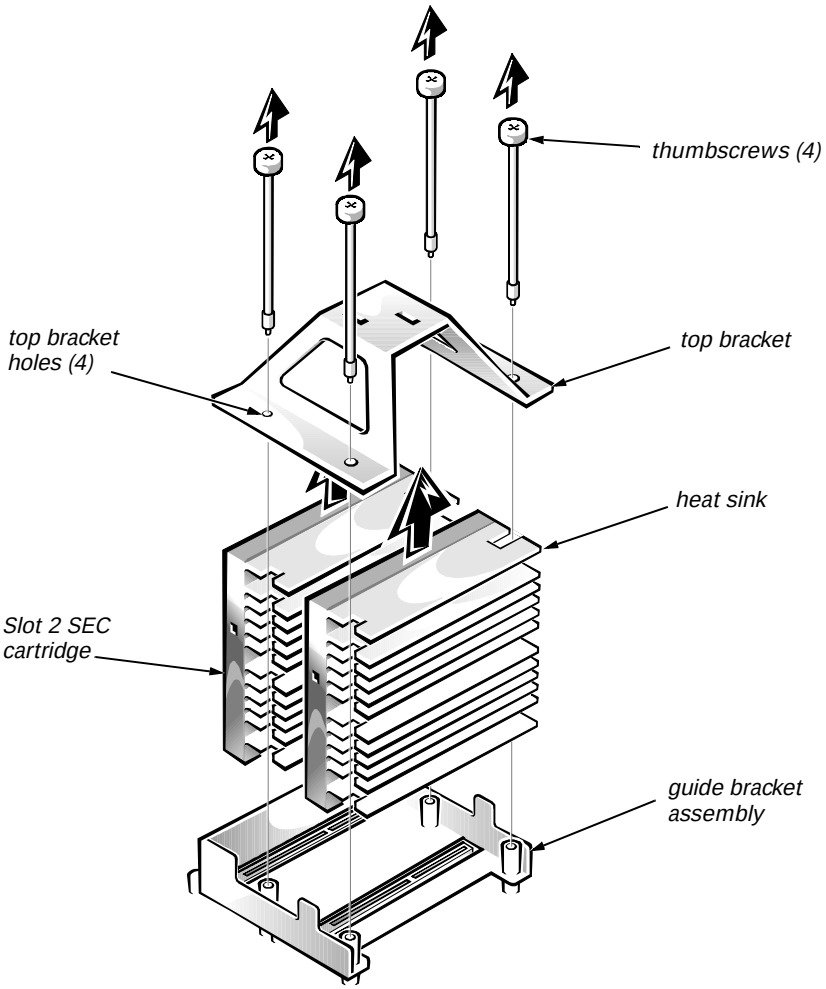


Figure 4-21. Microprocessor Slot 2 SEC Cartridge/Heat Sink Removal

To remove a microprocessor Slot 2 SEC cartridge/heat sink assembly, follow these steps:

WARNING: The microprocessor Slot 2 SEC cartridge/heat sink assembly can get extremely hot. Be sure that the assembly has had sufficient time to cool before you touch it.

1. **Unscrew and remove the four large thumbscrews and top bracket that secure the heat sink to the system board.**

2. **Grasp the Slot 2 SEC cartridge assembly firmly, and pull it away from the guide bracket assembly (see Figure 4-21).**

   You must use up to 15 pounds of force to disengage the Slot 2 SEC cartridge from its connector.

To install a Slot 2 SEC cartridge/heat sink assembly, press the cartridge firmly into its connector until it is firmly seated. You must use up to 25 pounds of force to fully seat the cartridge in its connector. Place the top bracket on top of the cartridge. Install the four large thumbscrews through the top bracket holes and through the holes in the guide bracket assembly to secure the heat sink to the system board.

NOTE: Both processor slots must be populated with either a Pentium II Xeon processor or a Dell terminator card. If a slot is not occupied, or if a non-Dell terminator card is installed, the system will not power on.

If necessary, change the processor speed jumper setting (see Figure 4-17 to locate system board jumpers).

The processor speed jumper should be set for the installed processor's rated internal speed. For example, for a 400-MHz Intel Pentium II Xeon processor, a jumper plug should be installed on the pins labeled "400MHZ." (See Chapter 1, "System Board Jumpers," for more information on the jumpers.) The processor speed jumper setting must not exceed the slowest internal speed of either processor.

Terminator Card

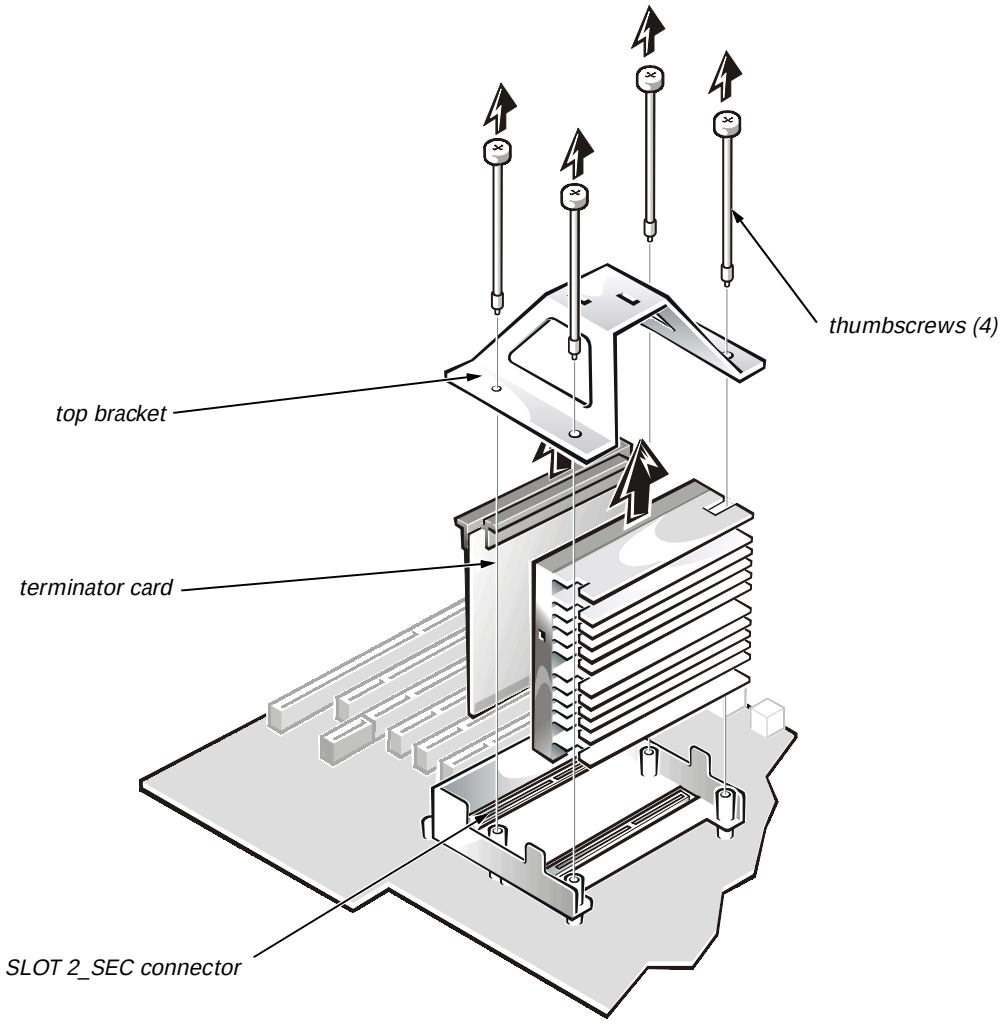


Figure 4-22. Terminator Card Removal

If you are adding a second Pentium II Xeon processor to a single-Pentium II Xeon processor system, remove the terminator card from the secondary Slot 2 SEC cartridge connector (labeled "SLOT2_SEC").

1. **Unscrew and remove the four large thumbscrews and top bracket that secure the heat sink and the Dell terminator card to the system board.**

2. **Pull the terminator card straight out to remove it from the connector.**

NOTE: Be sure that the power requirements for both processors match. Otherwise, the CPU mismatch LED will light up and the system will not power on.

System Battery

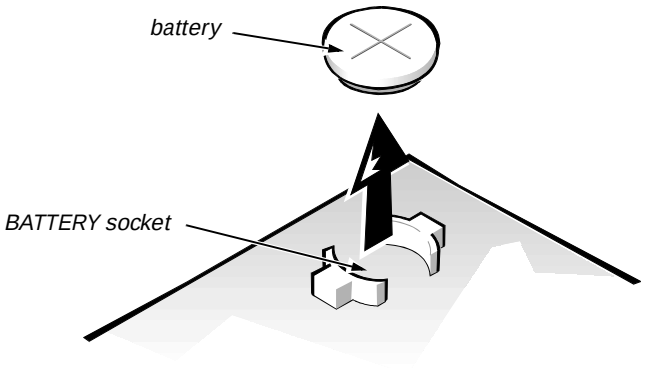


Figure 4-23. System Battery Removal

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

To remove the system battery, follow these steps:

1. **If possible, enter the System Setup program and print the System Setup screens.**
2. **Rotate the power supply up until it locks (see Figure 4-15).**
3. **Remove the system battery (see Figure 4-23).**

   Carefully pry the system battery out of its socket with your fingers or with a blunt, nonconducting object, such as a plastic screwdriver.

When you replace the system battery, orient the new battery with the "+" facing up. Insert the battery into its socket and snap it into place.

System Board

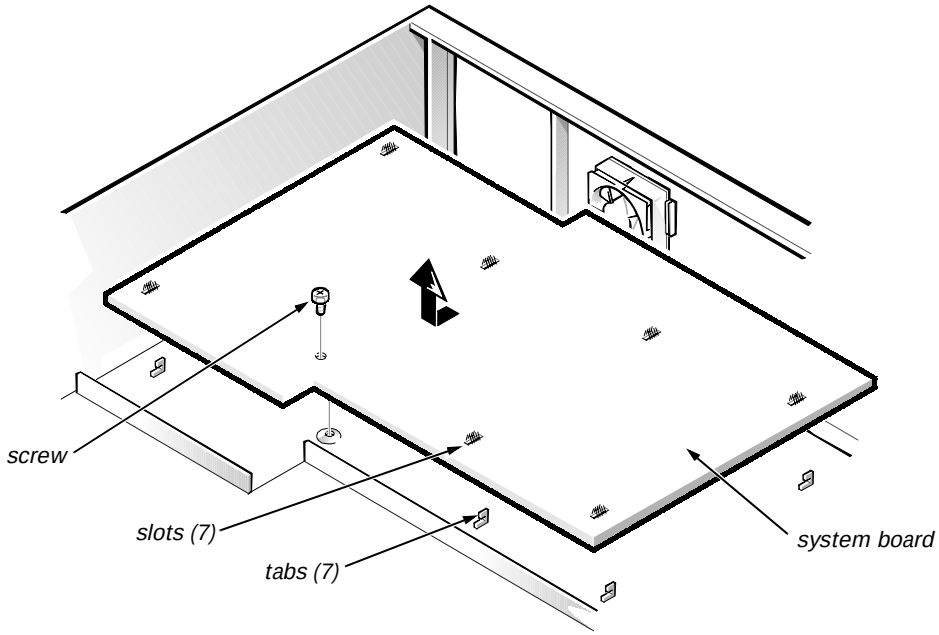


Figure 4-24. System Board Removal

1. **Place the computer on its side on a flat surface.**
2. **Disconnect all cables from their connectors at the back of the computer.**
3. **Unlatch and rotate the power supply until it locks (see Figure 4-15).**
4. **Disconnect all cables from the system board.**
5. **Remove the microprocessor fan (see Figure 4-16).**
6. **Remove the screw that secures the system board to the bottom of the chassis (see Figure 4-24).**
7. **Slide the system board toward the front of the chassis until it stops.**
8. **Carefully lift the system board out of the chassis (be sure to lift evenly and not twist the system board).**

If you are replacing a system board, remove the DIMMs, the primary microprocessor SEC cartridge/heat sink assembly, and the terminator card or secondary microprocessor assembly, and install them on the replacement board.

When you reinstall the system board, before you slide the system board back to lock it in position, push down near each slot to engage the grounding clip onto its corresponding tab. Push evenly on both sides of the system board as you slide it into position (do not twist the system board).

APPENDIX A
System Setup Program

This appendix describes the System Setup program for the Dell Precision 610, which is used to change the system configuration information stored in NVRAM on the system board.

To enter the System Setup program, follow these steps:

1. **Turn on (or reboot) the system.**
2. **Press <F2> when the prompt appears in the upper-right corner of the Dell logo screen.**

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

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

System Setup Screen

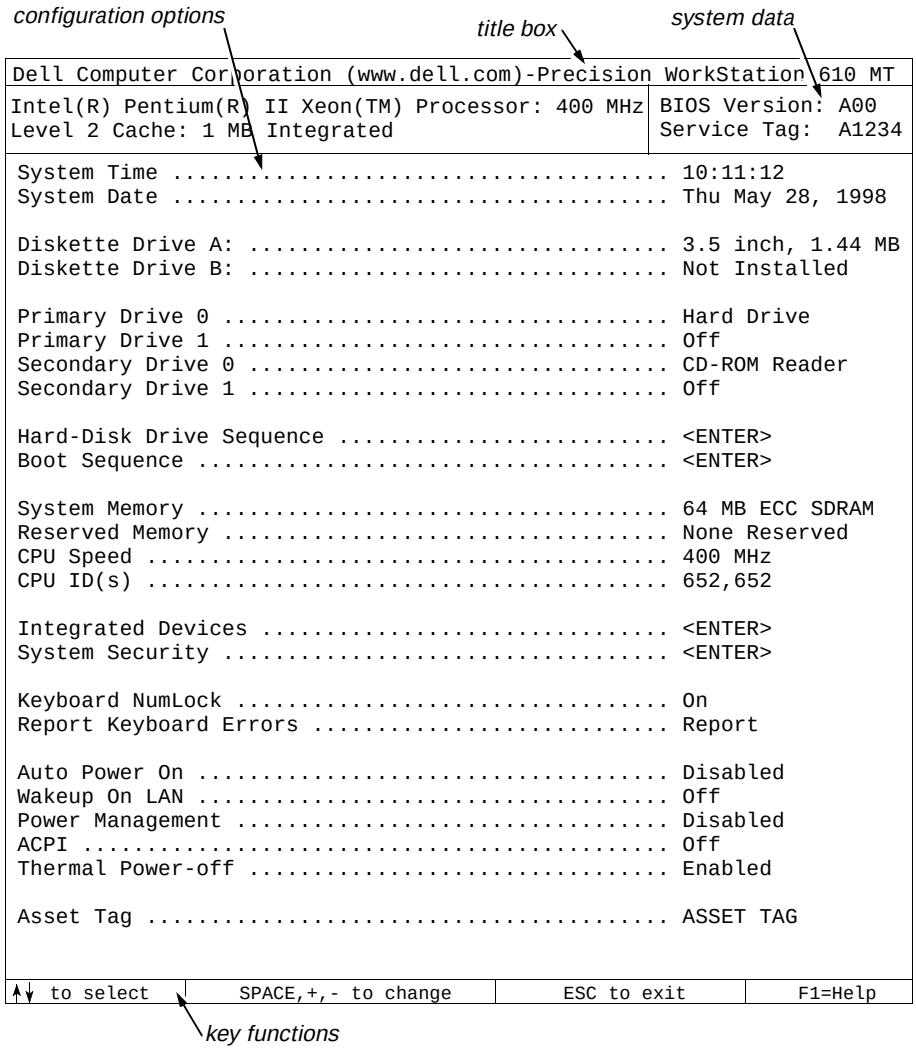


Figure A-1. System Setup Screen

Table A-1. System Setup Options

Option	Function
Time	Resets time on computer's internal clock.
Date	Resets date on computer's internal calendar.
Diskette Drive A Diskette Drive B	Identifies type of diskette drives installed. Option settings always match physical locations of drives in computer. Tape drives are *not* reflected in these options.
Primary Drive *n* Secondary Drive *n*	Identifies drives attached to the IDE1 and IDE2 connectors on system board. Each EIDE connector supports two EIDE drives (Drive 0 and Drive 1). For EIDE hard-disk drives, the system provides an automatic drive-type detect feature. To use this feature, highlight the appropriate Drive option, press <Enter>, and then type a (for *automatic*). If none of the supported drive types matches the parameters of the new drive, enter parameters directly. To do so, highlight the appropriate Drive option (Drive 0 or Drive 1), press <Enter>, and then type u to display `User1`. Press <Tab> to highlight each of the parameter fields in succession, and enter the appropriate number for each field. *NOTE: For EIDE devices such as EIDE CD-ROM drives and EIDE tape drives that are using the built-in EIDE controller, set the appropriate Drive option to Auto.*
Drive Sequence	Lists installed adapter cards and devices in the order they will be initialized.
Boot Sequence	Lists the order of the devices from which the system attempts to boot.
System Memory	Indicates the entire amount of installed memory detected in your system.
Reserved Memory	Designates a region of system board memory that can be supplied by an expansion card. This feature should not be enabled unless an expansion card that requires special addressing is installed.
CPU Speed	Indicates processor speed at which system boots—the processor's rated speed or a slower compatibility speed, which disables cache.

Table A-1. System Setup Options *(continued)*

Option	Function
CPU ID(s)	CPU ID(s) provides the manufacturer's identification code for the installed processor(s).
Integrated Devices	Configures the devices integrated into the system board.
System Security	Displays the current status of your system's password security feature and allows you to assign and verify a new password.
Keyboard NumLock	Determines whether the system boots with the keyboard's Num Lock mode activated.
Report Keyboard Errors	Enables or disables reporting of keyboard errors during POST.
Auto Power On	Allows you to set the day and time you want the system to power on automatically. The time uses the 24-hour format.
Wakeup On LAN	Wakeup On LAN determines whether the Wakeup On LAN feature is set to Off, On, or On (Integrated NIC). You must reboot your system before a change takes effect.
Power Management	With the Power Management option enabled, DPMS monitors and most EIDE drives automatically switch into low-power mode during periods of system inactivity. **CAUTION: Before enabling this feature, check the monitor documentation to make sure that the system has a DPMS-compliant monitor. Otherwise, there is a risk of damaging the monitor.** *NOTE: Not all EIDE hard-disk drives support this feature. Enabling this feature for a drive that does not support it may cause the EIDE drive to become inoperable until the system is restarted and the Power Management option is disabled.*
ACPI	ACPI controls the Advanced Configuration and Power Interface. When ACPI is toggled Off, pressing the power button turns the system completely off. When ACPI is not activated (Off), IRQ 9 is available for use by expansion cards.

Table A-1. System Setup Options *(continued)*

Option	Function
Thermal Power-off	This feature provides a safeguard in the event that another shutdown utility, such as the Dell AutoShutdown service, is not installed or fails to shut the system down after an overtemperature condition.
Asset Tag	Displays the customer-programmable asset tag number for the system if an asset tag number has been assigned.

Index

Numbers

A

B

C

D

E

F

H

I

J

K

L

M

N

P

R

S

T

U

V

W

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DELL®

P/N 9156C

Dell Information Development

Postscript Imaging Specs

JOB TITLE:	Dell Precision WorkStation 610 Mini Tower Systems Service Manual (Volcano)
LANGUAGES:	English
PART NUMBER:	9156C
PREPARED BY:	Gloria Salinas
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VENDOR:	Hart Graphics
DATE:	6/05/98

COMPUTER SOURCE:	Dell PC
APPLICATION SOFTWARE:	FrameMaker Version 5.5.2
POSTSCRIPT FILES:	Yes
POSTCRIPT DRIVER USED:	Linotronic 330
COLOR SEPARATED FILES:	No
COMPRESSED & TESTED:	Yes
PAGE SIZE:	8.5 x 11 inches
PAGE ORIENTATION:	Portrait
LINE SCREEN:	133 lpi
TRANSPORT MEDIA:	ZIP Diskette
HALFTONES/SCREENS/	No
DUOTONES:	No
COLOR(S):	Text - Black
COLOR MARKUP PROVIDED:	No

Continued on Back

For questions or problems with files contact:
Donna Moore - Graphic Development
Dell Computer Corporation (512) 728-3439

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FILE NAME(S) & PAGE COUNT:	Section	Filename	Page Count
	Frontcover:	9156Cfc0.ps	2(Incl. Blank Back)
	Title page:	9156Ctp0.ps	2
	Toc:	9156Ctc0.ps	6
	Ch1:	9156Cc10.ps	24
	Ch2:	9156Cc20.ps	8
	Ch3:	9156Cc30.ps	12
	Ch4:	9156Cc40.ps	28
	AppA:	9156Caa0.ps	6
	Index:	9156Cix0.ps	4
	Backcover:	9156Cbc0.ps	2(Incl. Blank Back)
TOTAL PAGE COUNT:			94

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