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## ***M a i n t e n a n c e   &   S e r v i c e   G u i d e***

### **Compaq Professional Workstation**

First Edition (October 1996)  
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**Compaq Computer Corporation**

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# *preface*

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## ABOUT THIS GUIDE

This *Maintenance and Service Guide* is a troubleshooting guide that can be used for reference when servicing the Compaq Professional Workstation. Only authorized technicians trained by Compaq should attempt to repair this equipment.

Compaq Computer Corporation reserves the right to make changes to Compaq Professional Workstations without notice.

## Symbols

The following text and symbols mark special messages throughout this guide:



**WARNING:** Text set off in this manner indicates that failure to follow directions in the warning could result in bodily harm or loss of life.

---



**CAUTION:** Text set off in this manner indicates that failure to follow directions could result in damage to equipment or loss of data.

---



Text set off in this manner presents commentary, sidelights, or interesting points of information.

Text set off in this manner presents clarifying information or specific instructions.

## Technician Notes



**WARNING:** Only authorized technicians trained by Compaq should attempt to repair this equipment. All troubleshooting and repair procedures are detailed to allow only subassembly/module level repair. Because of the complexity of the individual boards and subassemblies, no one should attempt to make repairs at the component level or to make modifications to any printed wiring board. Improper repairs can create a safety hazard. Any indications of component replacement or printed wiring board modifications may void any warranty.

---



**CAUTION:** To properly ventilate your system, you must provide at least 3 inches (7.62 cm) of clearance at the front and back of the computer.

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**CAUTION:** The computer is designed to be electrically grounded. To ensure proper operation, plug the AC power cord into a properly grounded AC outlet only.

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## Locating Additional Information

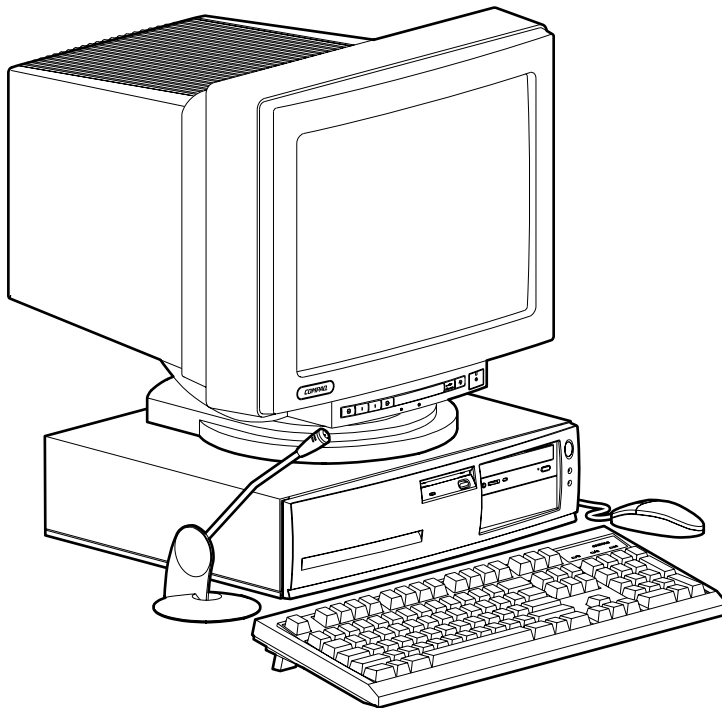
The following documentation is available to support these products:

- User Documentation
- Technical Training Guides
- Compaq Service Advisories and Bulletins
- Compaq QuickFind
- *Technical Reference Guide*
- *Compaq Service Quick Reference Guide*
- *Compaq SmartStart for Workstations CD online documentation*

# *chapter* 1

## PRODUCT DESCRIPTION

This chapter describes the model offerings and features of the Compaq Professional Workstation.



**Figure 1-1.** *Compaq Professional Workstation*

## 1.1 Compaq Professional Workstation Models

The Compaq Professional Workstation is available in the towerable desktop configurations described in the following sections.

**Table 1-1  
Professional Workstation Models**

Configurati on Code	Processor	Hard Drive	Memory	Cache	Graphics	Diskette	CD-ROM	Mouse
BJS2	P6/200	2-GB	32-MB	256K	Millennium*	1.44-MB	8X	2-button
BJS3	P6/200	2-GB	64-MB	256K	Millennium*	1.44-MB	8X	2-button
BJS4	P6/200	4-GB	64-MB	256K	Millennium*	1.44-MB	8X	2-button
BJT3	Dual P6/200	2-GB	64-MB	256K	Millennium*	1.44-MB	8X	2-button
BJS6	P6/200	4-GB	64-MB	256K	Gloria-L **	1.44-MB	8X	3-button
BJT2	Dual P6/200	4-GB	128-MB	256K	Gloria-L **	1.44-MB	8X	3-button

\* Matrox MGA Millennium Graphics Controller

\*\* ELSA Gloria-L 3D Graphics Controller

## 1.2 Feature Summary

Compaq Professional Workstations have the following standard features:

- Pentium Pro 200-MHz processor
- Dual Pentium Pro capable
- 256-Kbyte write-back, four-way, set associative secondary (L2) cache integrated into the processor
- 32-, 64-, or 128-megabyte unbuffered extended data out (EDO) dynamic random access memory (DRAM) standard, with error checking and correcting (ECC) support and a 4-KHz refresh rate; expandable to 512 megabytes, installed in dual inline memory modules (DIMMs)
- One of the following:
  - Gloria-L 3D graphics controller with 8-megabytes VRAM standard for frame buffer memory and 8-megabytes DRAM for the Z-buffer; DRAM upgradable to 16 megabytes
  - Matrox MGA Millennium 64-bit, PCI-based graphics controller with 2 megabytes WRAM standard; upgradable to 4- or 8-megabytes WRAM
- Integrated Wide-Ultra SCSI controller
- One Fast-Wide SCSI-2 hard drive installed; hard drive sizes are 2.1 and 4.3 gigabytes
- Intelligent Manageability and the following security features: removable media lock, surge protector in the power supply, Smart Cover Sensor, power-on and setup (administrator) passwords, device disabling, QuickLock/QuickBlank, and cable lock provision

- Microsoft Windows NT Workstation 4.0 operating system delivered with all models
- ✍ References to Windows NT in this guide refer to Microsoft Windows NT Workstation 4.0.
- Chassis includes expansion slots for up to five expansion boards:
  - Three dedicated PCI slots (graphics controller is installed in one of the PCI slots)
  - One dedicated ISA-bus slot
  - One “combination slot” for either a PCI or an ISA expansion board
- Chassis includes four drive bays:
  - One external 3.5-inch, third-height diskette drive bay (occupied by the diskette drive)
  - Two external 5.25-inch, half-height drive bays (one occupied by the CD-ROM drive)
  - One internal 3.5-inch, third height drive bay
- Integrated 32-bit, PCI-based, Ethernet network interface controller (NIC), 10Base-T standard 100Base-TX autosensing
- Peripheral Components Interconnect (PCI) chipset used for PCI/ISA, memory, and peripheral control
- Integrated audio controller
- Compaq SpaceSaver keyboard, featuring Microsoft Windows-specific keys
- IDE 8X CD-ROM drive installed
- Two RS-232C-compatible, 9-pin serial connectors
- One multimode, 25-pin enhanced parallel connector
- Two PS/2-compatible ports; one for use with the mouse and one for use with the keyboard
- 240-watt continuous power supply; switch-selectable for 115 and 230 VAC operation
- 1.44-megabyte, 3.5-inch high-density diskette drive installed
- Easy serviceability features, including a slide-out drive cage, a removable backplane board cage, and a slide-out system board tray

## 1.3 System Design

This section presents a design overview and functional descriptions of the key components of the Compaq Professional Workstation. All replaceable components are identified in Chapter 3, and removal/replacement instructions are presented in Chapter 5.

### 1.3.1 Design Overview

Compaq Professional Workstations use an innovative chassis design to house the removable backplane cage assembly, slide-out system board, slide-out drive cage, mass storage devices, and power supply. Torx T-15 screws are used throughout the system.

All internal components are immediately accessible when the cover is removed. The front bezel is a separate assembly and is attached to the chassis with release latches.

The removable backplane cage assembly is secured to the chassis without the use of screws and is held in place by the cover. Expansion boards are installed horizontally into the backplane cage assembly and secured with a single screw.

The system board is easily removed by sliding it out from the back of the chassis after removing the cover and backplane cage assembly. The system board tray forms part of the rear panel of the chassis when the system board is installed. No screws are used to secure the system board tray to the chassis; the tray is held in place by the removable backplane cage assembly. The system board spare part includes the attached tray.

The slide-out drive cage is located on the right side of the chassis, directly in front of the power supply. The drive cage can be pulled out from the front, after removing the two screws securing it to the chassis, to provide access to cable connections and to the screws securing the drives to the drive cage. The drive cage accommodates one internal hard drive and provides three drive bays for accessible mass storage devices.

In most cases, the drive cage allows drive installation without the use of brackets. Two screws secure a drive to the drive cage, and a guide screw, installed near the front of a drive, ensures proper alignment of the drive within the cage. Extra guide screws (standard and metric thread) are provided in the front of the chassis, just below the drive cage.

The power supply is mounted in the right rear corner of the chassis. Integrated clips located on the bottom of the power supply engage cutouts in the floor of the chassis. The power supply is held in place by three screws that are installed through the rear panel of the chassis.

## 1.3.2 System Board

The Pentium Pro-based system board is mounted to a tray to provide easier removal and replacement. The Professional Workstation provides an integrated Wide-Ultra SCSI Controller. DIMMs are used for memory expansion.



**CAUTION:** Depending on the physical height of the installed DIMMs, you might have to remove the DIMMs before you can slide the system board tray from the chassis.

---

## 1.3.3 System Memory

The Professional Workstation ships standard with 32-, 64-, or 128-MB 60-ns unbuffered extended data out (EDO) dynamic random access memory (DRAM), with error checking and correcting (ECC) support and a 4-KHz refresh rate. Memory is expandable to 512 megabytes, installed in dual inline memory modules (DIMMs).

## 1.3.4 Cache Memory

A 256-kilobyte write-back, four-way, set-associative secondary (L2) cache is integrated into the processor.

## 1.3.5 Graphics Controllers

The Professional Workstation comes with one of the following graphics controllers:

- Gloria-L 3D graphics controller with 8-megabytes VRAM standard for frame buffer memory and 8-megabytes DRAM for the Z-buffer; DRAM upgradable to 16 megabytes
- Matrox MGA Millennium 64-bit, PCI-based graphics controller with 2 megabytes Windows random access memory (WRAM) standard; upgradable to 4- or 8-megabytes WRAM

Supported screen resolutions for each of the above controllers are listed in Chapter 8, "Specifications."

## 1.3.6 IDE Peripheral Interface

The onboard PCI chipset provides a high-speed, 32-bit PCI/IDE interface, which supports the following:

- Up to two PCI/IDE hard drives on the PCI bus
- Enhanced Mode 3 and Mode 4 support
- Logical block addressing (LBA) of hard drives larger than 528 megabytes
- Extended cylinder head sector (ECHS) translation modes
- ATAPI devices (such as CD-ROMs) on the IDE interface

### 1.3.7 System I/O

The onboard I/O controller integrates the functions for the serial and parallel ports, diskette drives, and the keyboard. This component provides support for the following:

- Multimode bidirectional parallel port
- Standard Parallel Port mode (SPP): Centronics-compatible operation
- High-speed mode with support for an enhanced capabilities port (ECP) and enhanced parallel port (EPP)
- Two RS-232C compatible 9-pin serial ports
- Integrated real-time clock
- A battery-backed CMOS RAM
- Integrated keyboard controller
- Industry-standard diskette drive controller that supports 720-kilobyte and 1.44-megabyte 3.5-inch drives (at 135 tracks per inch)

### 1.3.8 System BIOS

The system BIOS provides ISA and PCI compatibility. Contained in a flash memory device on the system board, the BIOS provides the power-on self-test (POST) and the PCI and IDE auto-configuration utility.

The system BIOS is always “shadowed.” Shadowing allows any BIOS routines to be executed from fast 64-bit onboard EDO DRAM instead of from the slower 8-bit flash device.

#### PCI Auto-Configuration

The PCI auto-configuration utility works in conjunction with the Computer Setup program to support using PCI expansion boards in the system. When you turn on the workstation power after installing a PCI board, the BIOS automatically configures interrupts, I/O space, and so on. Since PCI expansion boards use the same interrupt resources as ISA expansion boards, you must specify the interrupts used by ISA boards in the Computer Setup program. Chapter 7, “Compaq Utilities,” explains how to use the Computer Setup program. The PCI auto-configuration program complies with version 2.1 of the PCI BIOS specification.

#### IDE Auto-Configuration

If you install an IDE drive in the workstation, the IDE auto-configuration utility automatically detects and configures the drive for operation in the workstation. This utility eliminates the need to run the Computer Setup program after you install an IDE drive.

## **ISA Plug and Play Capability**

ISA Plug and Play capability provides auto-configuration of Plug and Play ISA boards and resource management for legacy (non-Plug and Play) ISA boards when used with a Plug and Play-compatible operating system like Microsoft Windows 95 or Windows NT.

## **BIOS Upgrades**

Because the BIOS is stored in a flash memory device, you can easily upgrade the BIOS without having to disassemble the system. The flash upgrade process can be accomplished by running a utility from a diskette, hard drive, or over a network.

See Chapter 7, “Compaq Utilities,” for more information.

### **1.3.9 Expansion Slots**

The Professional Workstation includes expansion slots for up to five expansion boards. Three are dedicated PCI slots (the graphics controller is installed in one of the PCI slots). One is a dedicated ISA-bus slot. One is a “combination slot” for either a PCI or an ISA expansion board.

For more information about expansion slots and installing expansion boards, see Chapter 5, “Removal and Replacement Procedures.”

### **1.3.10 Power Supply**

The workstation has a 240-watt continuous power supply to provide power for onboard resources, expansion boards, and drives. A switch on the workstation back panel sets the power supply to operate at either:

- 115 VAC (in the range of 100-120 VAC; 5.0 A maximum input current)
- 230 VAC (in the range of 200-240 VAC; 3.0 A maximum input current)

For power supply output ratings, see Chapter 8, “Specifications.”

### **1.3.11 System Security**

The system BIOS provides a power-on password option that is enabled through Computer Setup. The workstation includes a Smart Cover Sensor, which indicates when the workstation cover has been removed, and a cable lock provision, which makes it possible to lock the workstation cover in place to prevent unauthorized access to the system jumpers and other internal components (a padlock is not included). For more information on these and additional security features, refer to Chapter 2, “Troubleshooting,” and Chapter 7, “Compaq Utilities.”

### **1.3.12 Keyboard/Mouse Controller**

The onboard I/O controller stores the keyboard and mouse controller code. Connectors for the keyboard and mouse are located on the back panel. The Professional Workstation ships with a 2- or 3-button mouse.



### 1.3.13 Real-Time Clock and CMOS RAM

The onboard I/O controller provides a real-time clock and CMOS RAM. Chapter 5, “Removal and Replacement Procedures,” provides information about replacing the battery.

### 1.3.14 Power Supply Fan

For cooling, a fan is incorporated into the power supply at the rear of the workstation chassis. This fan draws air in through the vents in the front bezel and provides air flow across the processor and other internal components.

### 1.3.15 Speaker

An internal speaker on the system board provides audible error code information (beep codes) during the power-on self-test (POST) and as required by the software. See Chapter 2, “Troubleshooting,” for beep code information.

A 2.5-inch speaker is also mounted on the removable backplane cage assembly.

### 1.3.16 Software

The Professional Workstation comes standard with preloaded and CD-ROM-based software.

#### Preloaded Software

The following Compaq software is preloaded on the workstation:

- Partition-based Computer Setup
- Partition-based Compaq Diagnostics utilities

#### SmartStart for Workstations CD

The Workstation SmartStart CD contains:

- Workstation Optimization Manager
- Workstation Integration Manager
- Workstation License Manager
- Compaq Insight Manager (console)
- Compaq Insight Manager Agents for Windows NT
- Compaq Version Control Database
- Compaq Management ToolKit

■ Support Software

- NT SSD
- Matrox Display Driver for Windows NT 3.51
- Matrox Display Driver for Windows NT 4.0
- Matrox Autodesk Display List Driver
- Matrox Microstation Driver
- ELSA 3D Graphics Drivers for Windows NT 3.51
- ELSA 3D Graphics Drivers for Windows NT 4.0
- ESS Audio Driver for Windows NT 3.51
- ESS Audio Driver for Windows NT 4.0
- Microsoft Service Pack 1 for Windows NT 4.0
- Microsoft Service Pack 5 for Windows NT 3.51

■ Supplemental Software:

- Hummingbird Maestro (evaluation copy)
- Hummingbird Maestro Solo (evaluation copy)
- Hummingbird Maestro
- Hummingbird Maestro Solo
- Hummingbird Exceed 3D
- Hummingbird Soft Docs
- Hummingbird Release Notes

■ Help Files

■ Online *Comfort and Safety Guide*

## **Microsoft Windows NT Workstation 4.0**

The Windows NT Workstation 4.0 operating system software is provided for easy installation.

### 1.3.17 Ordering Additional Operating System Drivers

There are three methods to obtain copies of suitable device drivers and utilities:

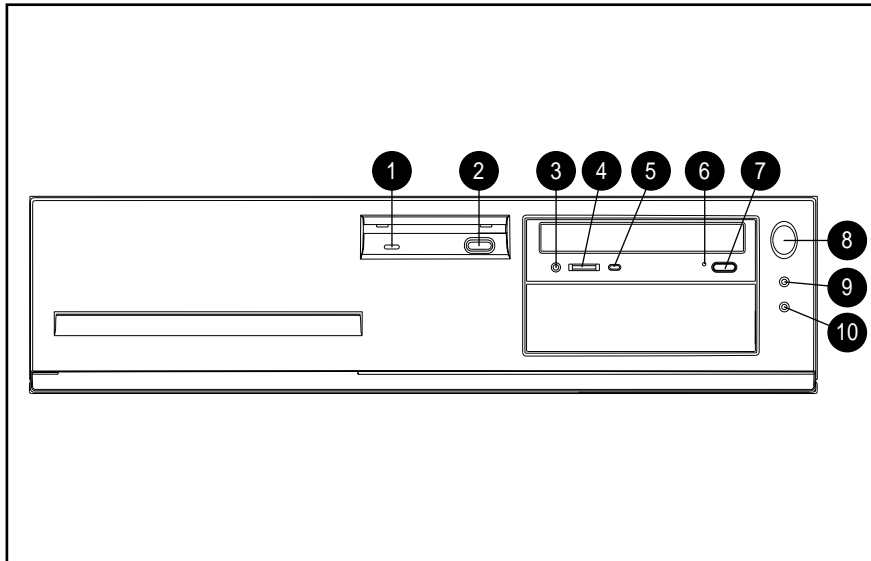
- Order the *Support Software CD for Compaq Desktop, Portable, and Workstation Products*. This compact disc contains the latest device drivers, utilities, and flashable ROM images needed to run Windows 95, Windows NT Workstation 3.51 and 4.0 on the Compaq Professional Workstation. You can purchase the *Support Software CD* in either of two ways:
  - A single CD-ROM that gives one-time access to the latest support software (Compaq part number 272505-001). Available in North America only.
  - A yearly subscription that delivers up to 12 monthly CD-ROMs (Compaq part number 183426-xx1). The annual subscription provides continuous access to the latest developments, while the single CD-ROM offers information as it is needed.
- ✍ When calling the Compaq Order Center (1-800-952-7689; North America only) to place an order, be sure to have the serial number of the workstation available. The serial number is displayed on the right side of the workstation cover (near the front), and on the rear of the workstation. This number is necessary for all purchases.
- Access the Compaq Web site at <http://www.compaq.com>.
- Order the fee-based Compaq Management CD subscription. You can download the subscription order form from the Compaq Web site (<http://www.compaq.com>). With this subscription, you receive:
  - Compaq Insight Management Agents for Windows NT
  - Compaq Insight Manager
  - Compaq Systems Management Toolkit
  - SmartStart and Support Software CD (Servers)
  - Support Software CD (Desktops, Portables, and Workstations)

## 1.4 Front and Rear Panels and Drive Slots

The following sections identify the front panel controls, the workstation drive positions, and the rear panel connectors.

## 1.4.1 Front Panel Controls and LEDs

The operator controls and LEDs located on the front panel of the workstation are identified and described in the following illustration and table.



**Figure 1-2.** Front Panel Components

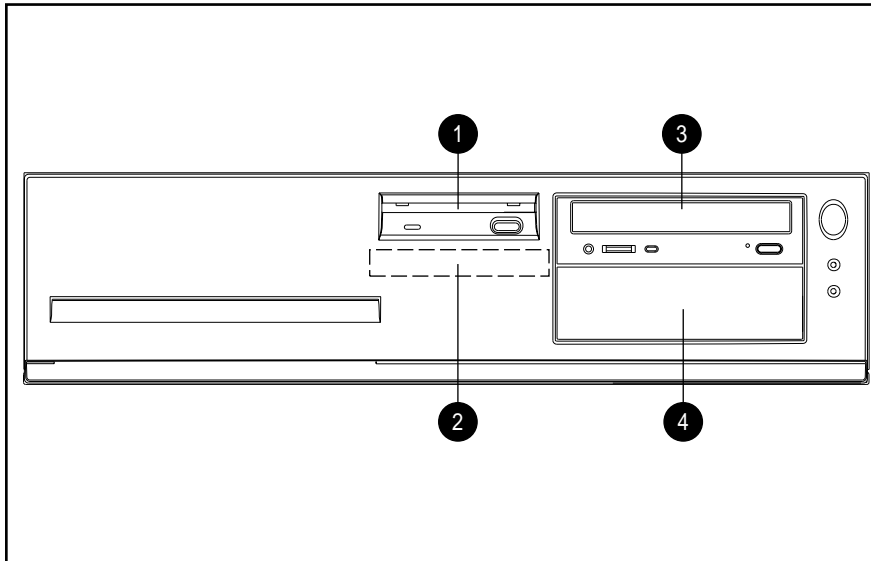
**Table 1-2**  
**Front Panel Components**

Ref. Component	Function
1 Diskette Drive Activity Light	Turns on when the diskette drive is reading or saving data.
2 Diskette Eject Button	Ejects a loaded diskette.
3 Stereo Headphone Jack	Connects headphones to the CD-ROM drive.
4 CD-ROM Volume Control	Adjusts the volume of the CD-ROM drive.
5 CD-ROM Activity Light	Turns green when a CD is present; flashes amber when the drive is reading a CD.
6 CD-ROM Manual Eject Hole	Allows you to manually eject a CD if the load/unload button is inoperable.
7 CD-ROM Load/Unload Button	Opens and closes the disc tray.
8 Power Switch	Turns the workstation on and off.
9 Power-On Light	Turns on when the workstation is turned on.
: Hard Drive Activity Light	Turns on when the hard drive is reading or saving data.

The lights of the workstation provide information about its operation. When the power switch 8 is turned on, the power light 9 is green. When the hard drive activity light : or diskette drive activity light 1 is on, the drive is either reading information from the disk or storing information on the disk.

## 1.4.2 Drive Positions

The Professional Workstation can house up to four mass storage devices. The following illustration and table describe the recommended drive configurations.



**Figure 1-3.** Drive Positions

**Table 1-3**  
**Drive Positions**

Drive Configuration	
1	Standard, 3.5-inch 1.44MB diskette drive
2	Standard 3.5-inch internal hard drive, third height (2.1-GB)
3	Standard 5.25-inch CD-ROM drive, half height
4	Standard 4.3-GB internal hard drive, or optional diskette drive, tape drive, hard drive, PD-CD Drive, or CD-ROM drive (5.25-inch, half height)

To verify the type, size, and capacity of the mass storage devices installed in the workstation, run the View System Information (INSPECT) utility available through Compaq Configuration and Diagnostics. Refer to Chapter 2, “Troubleshooting,” for more information.

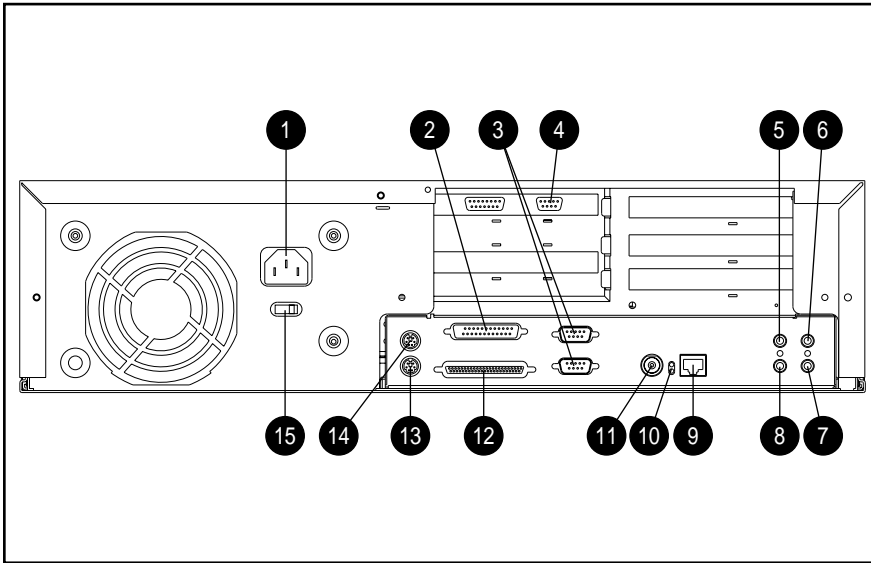
### 1.4.3 Rear Panel Connectors

The following illustration shows the Professional Workstation rear panel. Some connectors include an icon to help you identify their function.



**WARNING:** This equipment is designed for connection to a grounded (earthed) outlet. The grounding type plug is an important safety feature. To avoid the risk of electrical shock or damage to your equipment, do not disable this feature.

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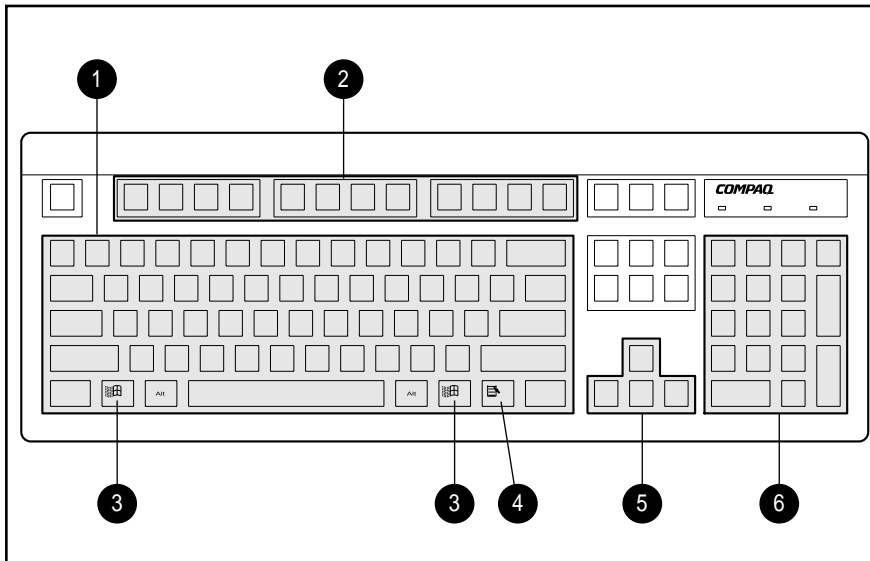
**Figure 1-4. Rear Panel Connectors**

**Table 1-4  
Rear Panel Connectors**

Ref.	Component	Function
1	Power Cord Connector	Connects the workstation to an electrical power outlet.
2	Parallel Connector	Connects a parallel device, such as a parallel printer.
3	Serial Connectors	Connects serial devices, such as a serial printer. COM1 is the bottom connector.
4	Monitor Connector	Connects a monitor.  NOTE: The Millennium graphics controller includes a multimedia port, which can be used with an optional Matrox Media XL module.
5	Microphone Connector	Connects a microphone (blue-colored icon).
6	Line-In Audio Connector	Connects a device that supplies sound, such as a tape deck or CD player.
7	Line-Out Audio Connector	Connects an external amplifier (to power additional speakers) or a tape deck for recording.
8	Headphone Connector	Connects headphones.
9	Ethernet RJ-45 Connector	Connects the Ethernet network, using an RJ-45 cable.
:	LAN Activity Lights	Indicate network connection and activity.
;	Ethernet BNC Connector	Connects the Ethernet network, using a thin-coax cable.
<	Ultra-Wide SCSI Connector	Connects external SCSI devices. To plug in a narrow SCSI option (such as a scanner), a wide-to-narrow converter is required.
=	Keyboard Connector	Connects a keyboard (orange-colored icon).
>	Mouse Connector	Connects a mouse (green-colored icon).
?	Voltage Select Switch	Switches voltage between 115V (U.S.) and 230V to match geographical requirements.

## 1.5 SpaceSaver Keyboard

The SpaceSaver keyboard has four principal typing areas and features Windows-specific keys.



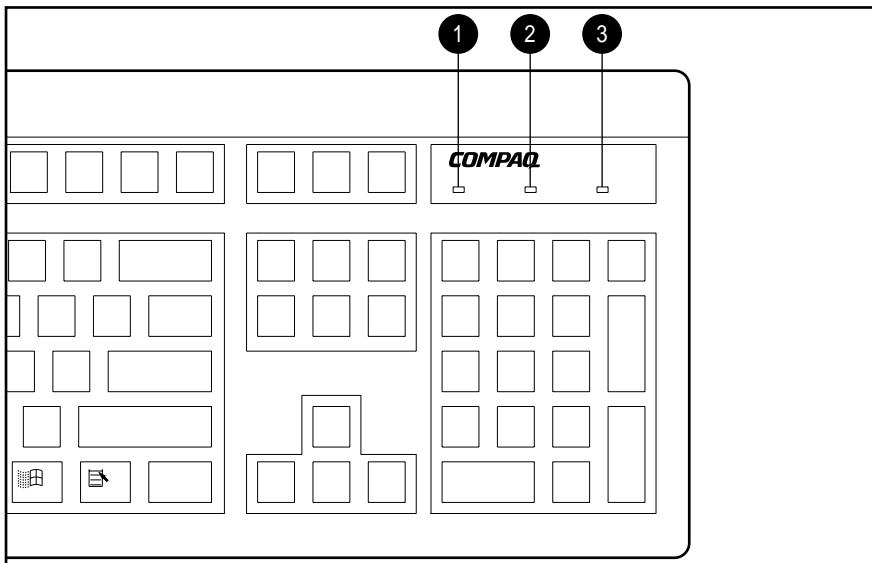
**Figure 1-5.** Keyboard Typing Areas

**Table 1-5**  
**SpaceSaver Keyboard**

Ref.	Function
1	Main (typewriter) keypad.
2	Function keys F1 through F12 at the top of the keyboard. Each key instructs the workstation to carry out a specific task.
3	Windows Logo keys.
4	Windows Application key.
5	Arrow keys for moving the cursor up, down, right, and left.
6	Numeric (calculator style) keypad.



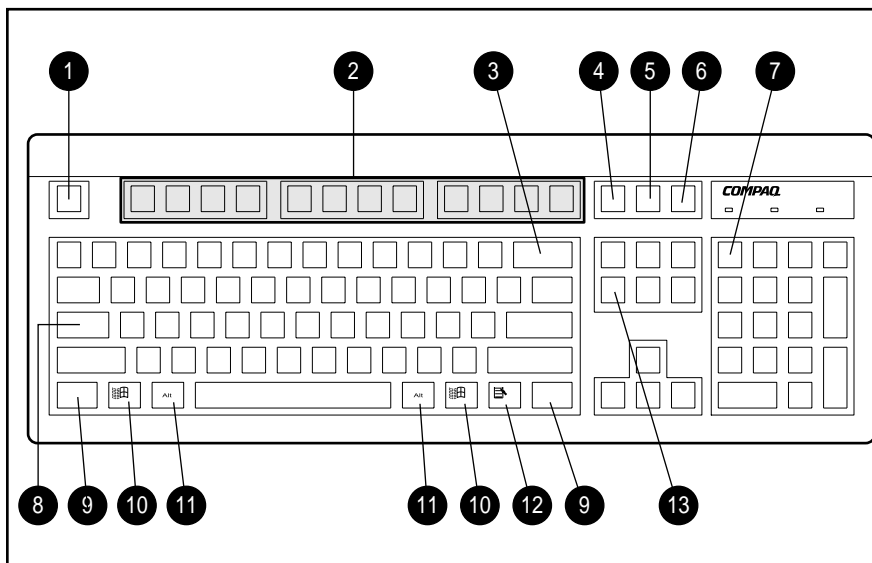
The numeric keypad has two operating modes: numeric and editing. When the Num Lock indicator light is on, the keypad is in the numeric mode and can be used like a calculator. To switch the keypad to the editing mode, press the Num Lock key (the light goes off).



**Figure 1-6.** Keyboard Lights

Three keys perform specific keyboard functions. The corresponding lights at the top of the keyboard indicate whether the keys are on or off (Num Lock 1, Caps Lock 2, and Scroll Lock 3). The keyboard function is operating when the light is on.

Some keys on the keyboard provide special functions, depending on the software application you are using. These keys are illustrated below and described in the following table.



**Figure 1-7.** Special Function Keys

**Table 1-6  
Special Function Keys**

<b>Ref.</b>	<b>Key</b>	<b>Function</b>
1	Esc	Often assigned a specific task by the application. Frequently used as an exit key (for quitting an application), for moving back one screen, or for canceling a command.
2	F1 - F12	Use for specific effects in applications and operating systems. Refer to the application software documentation.
3	Backspace	Moves the cursor left and deletes characters as it moves to the left.
4	Print Scrn	Depending on the software you are using, prints the displayed screen to a printer. Using this key may not print the entire file.
5	Scroll Lock	When the Scroll Lock light is on, the screen is prevented from scrolling.
6	Pause	Temporarily suspends screen scrolling or some operations.
7	Num Lock	When the Num Lock light is on, the numeric keypad is activated and the arrow keys are deactivated. (The arrow keys to the left of the keypad perform the same functions as the arrow keys on the keypad.)
8	Caps Lock	When the Caps Lock light is on, all letters typed are capitalized.
9	Ctrl	Used in combination with another key, its effect depends on the application software you are using.
:	Windows Logo*	Opens the Start menu in Microsoft Windows 95 and Windows NT. Used in combination with other keys to perform other functions. (See next table)
;	Alt	Used in combination with another key, its effect depends on the application software you are using.
<	Windows Application key	Opens a context menu for the software program you are using.
=	Delete	Deletes characters.
9, ;, =	Ctrl+Alt+Delete	Restarts the workstation.

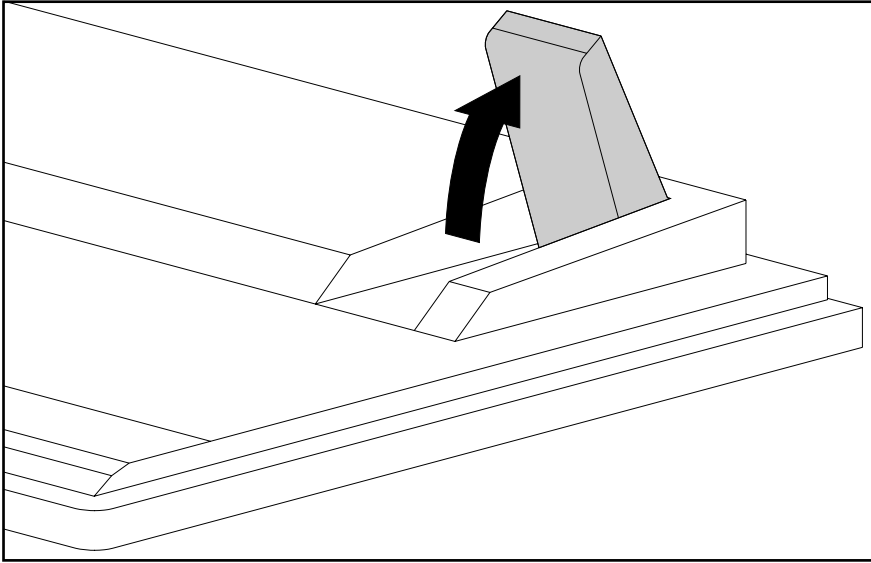
\*Keys available in select geographic regions.

You can use the Windows Logo keys in combination with other keys to perform certain functions in Windows 95 and Windows NT, as shown in the next table:

**Table 1-7  
Windows Logo Key Combinations and Functions**

<b>Windows Logo Key Combination</b>	<b>Functionality in Windows NT and Windows 95</b>
Windows logo key + F1	Starts Help.
Windows logo key + Tab	Activates the next Taskbar button.
Windows logo key + E	Launches Windows Explorer.
Windows logo key + F	Launches Find Document.
Windows logo key + Ctrl + F	Launches Find Computer.
Windows logo key + M	Minimizes all open applications.
Shift+Windows logo key + M	Undoes Minimize All.
Windows logo key + R	Displays Run dialog box.

The keyboard has feet on the bottom to tilt the keyboard to a comfortable typing angle.



**Figure 1-8.** Keyboard Tilt Foot

## 1.6 Options

The options that are available from Compaq for the Professional Workstation are described in the following sections.

### 1.6.1 Monitor Options

The following monitor options are available from Compaq for the Professional Workstation:

- V50 Color Monitor
- P50 Color Monitor
- Compaq 151 FS Color Monitor
- V70 Color Monitor
- P70 Color Monitor
- QVision 172 Color Monitor
- QVision 210 Color Monitor

### 1.6.2 Graphics Controller and Memory Options

The following graphics controller and memory options are available from Compaq for the Professional Workstation:

- Matrox MGA Millennium Graphics Controller
- 2-MB or 6-MB Windows RAM (WRAM) Graphics Memory Module for Matrox MGA Millennium Graphics Controller
- Gloria-L 3D Graphics Controller
- 8-MB Dynamic RAM (DRAM) Graphics Memory Upgrade for Gloria-L Controller

### 1.6.3 Mass Storage Options

The following mass storage options are available from Compaq for the Professional Workstation:

- PD-CD drive: a “2 drives in one” device that is a 650-MB rewritable optical drive and a quad-speed CD-ROM drive. It is a 5.25-inch, half-height, tray-load device that uses phase-change dual technology to simultaneously erase and write on the media at 4X speed. The interface is internal SCSI.
- Tape Drives: 2/8-GB DAT and 4/16-GB TurboDAT

## 1.6.4 System Memory Options

The following system memory options are available from Compaq for the Professional Workstation:

- 16-MB Memory Module (ECC, EDO DIMM, 60ns)
- 32-MB Memory Module (ECC, EDO DIMM, 60ns)
- 64-MB Memory Module (ECC, EDO DIMM, 60ns)
- 128-MB Memory Module (ECC, EDO DIMM, 60ns)

## 1.6.5 Microprocessor Options

- Pentium Pro 200/256K Kit (WSTN-5)

## 1.6.6 Communications Options

The following communications options are available from Compaq for the Professional Workstation:

- Netelligent 10/100 PCI UTP Controller
- Netelligent 10T PCI UTP Controller
- Netelligent 10T ISA UTP Controller
- Netelligent 4/16 TR PCI IBM UTP/STP Controller
- Netelligent 4/16 TR ISA UTP/STP Controller
- Netelligent 4/16 TR PCI UTP/STP Controller
- Compaq Internal 28.8 Data + Fax Modem (North America only)

## 1.6.7 Other Options

- 2-Button Mouse
- 2.0-GB DAT Cartridge
- 4.0-GB DAT Cartridge
- PD Disc (Qty. 2 or 5)

# *chapter* 2

## TROUBLESHOOTING

This chapter provides troubleshooting information for the Compaq Professional Workstation:

- Prefailure Warranty
- Power-On Self-Test (POST)
- Computer Setup
- Compaq Diagnostics
- Troubleshooting without diagnostics

Power-On Self-Test (POST) messages, diagnostic error codes, and memory error codes are included.

The messages and codes appear in tables that include a description of the error, the probable cause, and the recommended action that should be taken to resolve the error condition.

Adherence to the procedures and precautions described in this chapter is essential for proper service.

### 2.1 Prefailure Warranty

The Prefailure Warranty is standard for all Compaq Professional Workstations. It extends the Compaq three-year, limited warranty by applying it to critical system components before they actually fail. The Prefailure Warranty ensures that when you receive notification of a prefailure condition through Compaq Insight Manager or the Windows NT Event Log, the component is replaced under warranty.

The Professional Workstation components covered by the Prefailure Warranty are:

- SCSI hard drives
- Error Correcting Code (ECC) memory
- Pentium Pro processor

For more information about Compaq Insight Manager, see Chapter 7, “Compaq Utilities.”

## 2.2 Power-On Password

The power-on password prevents use of the computer until the password is entered. If the power-on password is set, a key icon (□) appears on the screen when POST completes. If this occurs, enter the password to continue. If you enter the password incorrectly, a broken key icon (□X) is displayed. Try again. After three unsuccessful tries, you must turn off the computer, then on again before you can continue. To delete the password, type the current password immediately followed by a slash (/) and press **Enter**.

To bypass and clear the power-on password, set the SW1-S1 switch on the system board to the ON position. To re-establish the power-on password, set the S1 switch to the OFF position. See Section 6.1.2 for more information.

## 2.3 Power-On Self-Test (POST)

POST is a series of diagnostic tests that run automatically when the system is turned on. After the computer is turned on, POST checks the following assemblies to ensure that the computer system is functioning properly:

- Keyboard
- System board
- Memory modules
- Video
- Diskette drives
- Hard drives
- Power supply
- Controllers

POST also detects the type of mass storage devices installed in the computer.

If POST finds an error in the system, an error condition is indicated by an audible and/or visual message. Table 2-1 gives explanations of the error codes and a recommended course of action.

## 2.4 Power-On Self-Test Messages

An error message results if the Power-On Self-Test encounters a problem. This test runs when the system is turned on, checking assemblies within the computer and reporting any errors found.

**Table 2-1  
Power-On Self-Test Messages**

<b>Message</b>	<b>Beeps*</b>	<b>Probable Cause</b>	<b>Recommended Action</b>
101-ROM Error	1L, 1S	System ROM checksum.	1. Inspect the ROM placement. 2. Verify the correct ROM. 3. Replace the ROM.
101-Option ROM Checksum Error	1L, 1S	Option ROM checksum.	1. Inspect the ROM placement. 2. Verify the correct ROM. 3. Replace the ROM.
102-System Board Failure	None	DMA, timers, etc.	Replace the system board.
162-System Options Error	2S	No diskette drive or mismatch in drive type.	Run Computer Setup or Windows NT or Windows 95 utilities.
162-System Options Not Set	2S	Configuration incorrect.	Run Computer Setup or Windows NT or Windows 95 utilities.
163-Time & Date Not Set	2S	Invalid time or date in configuration memory	Set the date and time under Control Panel.
164-Memory Size Error	2S	Memory configuration incorrect.	Run Computer Setup or Windows NT or Windows 95 utilities.
201-Memory Error	None	RAM failure.	1. Run Computer Setup or Windows NT or Windows 95 utilities. 2. Replace the memory module(s) (if any). 3. Replace system board.
203-Memory Address Error	None	RAM failure.	1. Run Computer Setup or Windows NT or Windows 95 utilities. 2. Replace the memory module(s) (if any). 3. Replace system board.
205-Memory Error	None	Cache memory error (processor cache).	Run the Configuration and Diagnostics utilities.

\* L = Long, S = Short

*Continued*



**Table 2-1** *Continued*

<b>Message</b>	<b>Beeps*</b>	<b>Probable Cause</b>	<b>Recommended Action</b>
206-Secondary cache controller failure	None	Cache memory controller or RAM failure.	Run the Configuration and Diagnostics utilities.
207-ECC Failure	2S	Single Bit ECC error	Replace DIMM if error persists.
212-Failed Processor	1L	Process has failed to initialize.	Replace the process and/or the VRM process or power module (voltage regulator module-VRM)
301-Keyboard Error	None	Keyboard failure.	Reconnect keyboard with computer turned off.
301-Keyboard Error or Test Fixture Installed	None	Keyboard failure.	Replace the keyboard.
303-Keyboard Controller Error	None	I/O board keyboard controller.	1. Reconnect keyboard with computer turned off. 2. Replace the system board.
304-Keyboard or System Unit Error	None	Keyboard failure.	1. Replace the keyboard. 2. Replace the system board.
402-Monochrome Adapter Failure	1L, 2S	Monochrome display controller.	Replace the monochrome display controller.
404-Parallel Port Address Conflict Detected	2S	Both external and internal ports are assigned to parallel port X.	Run Computer Setup or Windows NT or Windows 95 utilities.
501-Display Adapter Failure	1L, 2S	Video display controller.	Replace the graphics board.
601-Diskette Controller Error	None	Diskette controller circuitry or floppy drive circuitry incorrect.	1. Run Setup. 2. Check and/or replace cables. 3. Replace diskette drive. 4. Replace the system board.
602-Record Error	None	Diskette in drive A not bootable.	Replace the diskette.
605-Diskette Drive Type Error	2S	Mismatch in drive type.	Run Computer Setup or Windows NT or Windows 95 utilities.
611-Primary Floppy Port Address Assignment Conflict	2S	Configuration error.	Run Computer Setup or Windows NT or Windows 95 utilities.
612-Secondary Floppy Port Address Assignment Conflict	2S	Configuration error.	Run Computer Setup or Windows NT or Windows 95 utilities.
912-The Computer Cover Has Been Removed Since Last System Start Up	None		
1151-System Board COM Port 1 Address Assignment Conflict	2S	Both external and internal serial ports are assigned to COM1.	Run Computer Setup or Windows NT or Windows 95 utilities.

\* L = Long, S = Short

*Continued*

**Table 2-1** *Continued*

<b>Message</b>	<b>Beeps*</b>	<b>Probable Cause</b>	<b>Recommended Action</b>
1152-System Board COM Port 2 Address Assignment Conflict	2S	Both external and internal serial ports are assigned to COM2.	Run Computer Setup or Windows NT or Windows 95 utilities.
1720-Hard Drive detects imminent failure	None	Hard drive is about to fail.	Backup contents and replace hard drive.
1721-SCSI Hard Drive detects imminent failure	None	Hard drive is about to fail.	Backup contents and replace hard drive.
1771-Primary Disk Port Address Assignment Conflict	2S	Internal and external hard drive controllers are both assigned to the primary address.	Run Computer Setup or Windows NT or Windows 95 utilities.
1772-Secondary Disk Port Address Assignment Conflict	2S	Internal and external hard drive controllers are both assigned to the secondary address.	Run Computer Setup or Windows NT or Windows 95 utilities.
1780-Disk 0 Failure	None	Hard drive/format error.	Run the Configuration and Diagnostics utilities.
1781-Disk 1 Failure	None	Hard drive/format error.	Run the Configuration and Diagnostics utilities.
1782-Disk Controller Failure	None	Hard drive circuitry error.	Run the Configuration and Diagnostics utilities.
1790-Disk 0 Failure	None	Hard drive error or wrong drive type.	Run the Configuration and Diagnostics utilities.
1791-Disk 1 Failure	None	Hard drive error or wrong drive type.	Run the Configuration and Diagnostics utilities.
1792-Secondary Disk Controller Failure	None	Hard drive circuitry error.	Run the Configuration and Diagnostics utilities.
1793-Secondary Controller or Disk Failure	None	Hard drive circuitry error.	Run the Configuration and Diagnostics utilities.
1800-Temperature Alert	None	Internal temperature exceeds specification.	Check that computer air vents are not blocked and cooling fan is running.
XX000Y ZZ Parity Check 2	None	Parity RAM failure.	Run the Configuration and Diagnostics utilities.
Fixed Disk Parameter Table or BIOS Error System Halted	3L	Configuration or hardware failure.	Run the Configuration and Diagnostics utilities.
Invalid Electronic Serial Number	None	Electronic serial number has become corrupted.	Run Computer Setup.
Audible	2S	Power-on successful.	None.
(RESUME = F1 KEY)	None	As indicated to continue.	Press <b>F1</b> .

\* L = Long, S = Short

## 2.5 Compaq Configuration and Diagnostics

This section explains how to use the Configuration and Diagnostics utilities installed on the computer or on diskettes. Compaq Configuration and Diagnostics utilities should be accessed in the following instances:

- When a system configuration error is detected during the Power-On Self-Test (POST).
- To change factory default settings for some of the computer features.
- To change the system configuration, which is sometimes necessary when you add or remove optional hardware.
- To set system configuration features.

To display the Configuration and Diagnostics menu, restart the computer, then press **F10** when the square cursor displays in the upper-right corner of the screen. Full instructions are presented later in this section. Diagnostics are available by selecting the Computer Checkup (TEST) utility on the Configuration and Diagnostics menu.

- ✎ The diagnostics and setup utilities are located on a hard disk partition in the computer, not in the ROM. Information about recreating the diagnostics/setup partition is presented later in this section.
- ✎ Additional utilities are in Windows NT under Administrative Tools and Control Panel.

### 2.5.1 Preparing the Computer

If you encounter an error condition, complete the following steps before starting problem isolation procedures:

1. Ensure proper ventilation. The computer should have a 3-inch (7.6-cm) clearance at the back of the system unit.
2. Turn off the computer and peripheral devices.



**CAUTION:** Always ensure that the power is off before disconnecting or reconnecting the mouse, keyboard, or any other peripheral devices. Disconnecting or connecting any peripheral devices while the unit power is on can damage the system board

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3. Disconnect any peripheral devices other than the monitor and keyboard. Do not disconnect the printer if you want to test it or use it to log error messages.
4. Install loop-back and terminating plugs for complete testing.
5. Run the computer PC Diagnostics diskette.

## 2.5.2 Accessing the Configuration and Diagnostics Menu

You can access the Configuration and Diagnostics utilities at startup from the hard drive or from the diskettes. Procedures for both methods are presented below. Both procedures display the Configuration and Diagnostics menu. Your particular menu may differ slightly from the one shown in Figure 2-1.

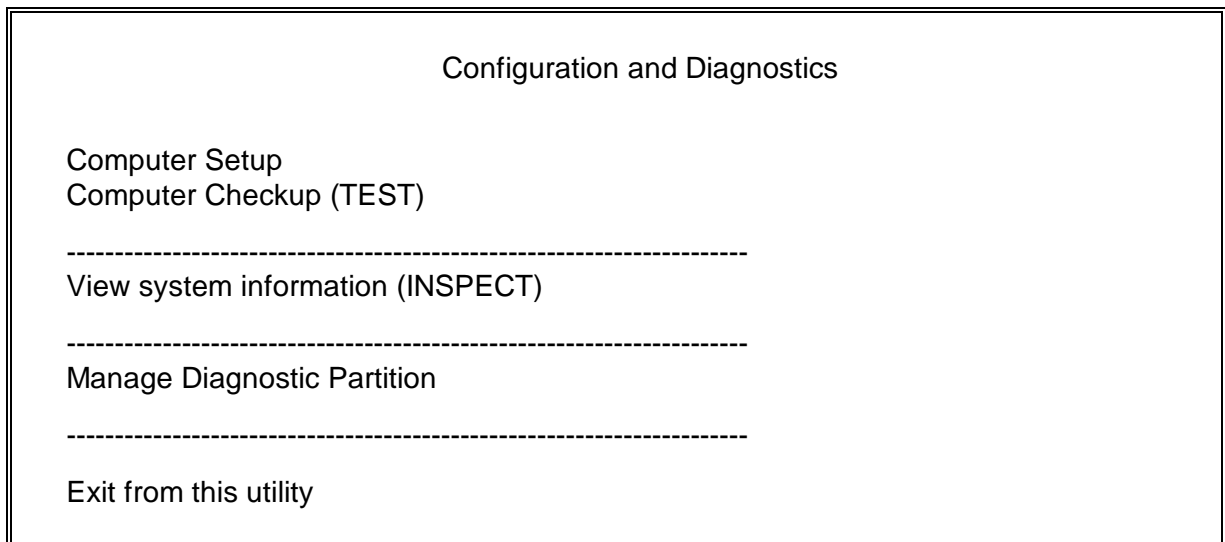
### Accessing the Configuration and Diagnostics Menu at Startup

To display the menu immediately after startup, complete the following steps:

1. Turn on or restart the computer. If Windows NT or Windows 95 is running, select Start, Shut Down, Restart the computer.

Immediately after the computer completes Power-On Self-Test (POST), which is indicated on the screen by the memory check, the computer beeps twice and the cursor moves to the upper-right corner of the screen.

- ✎ The memory check does not occur when performing a warm boot.
2. Press **F10** as soon as the cursor moves to the upper-right corner of the screen.
  3. If prompted, select the desired language.
  4. Press **Enter** at the Welcome to Compaq Utilities Screen.
  5. A menu similar to the one shown in Figure 2-1 is displayed. You are prompted through any procedure that you select.
- ✎ You can also use the SmartStart and Support Software CD to install a system partition containing Diagnostics and Setup.



**Figure 2-1.** Configuration and Diagnostics Menu

## Accessing the Configuration and Diagnostics Menu from Diskette

You can load either the Computer Setup or Diagnostics diskette with this procedure. To load either of the diskettes, complete the following steps:

1. Insert the diskette into drive A.
2. Turn on or restart the computer. If Windows NT or Windows 95 is running, select Start, Shut Down, Restart the computer.
3. If prompted, select the desired language.
4. Press **Enter** at the Welcome to Compaq Utilities Screen.
5. If you load the Diagnostics diskette, a menu similar to the one shown in Figure 2-1 is displayed. If you select Computer Setup from this menu, you are prompted to insert the Setup diskette. You are prompted through any procedure that you select.

 You can also use the SmartStart and Support Software CD-ROM to install a system partition, containing diagnostics and setup.

### 2.5.3 Using Configuration and Diagnostics Menu Options

The Configuration and Diagnostics menu contains the following troubleshooting utilities:

- Computer Setup
- Computer Checkup (TEST)
- View System Information (INSPECT)
- Manage Diagnostics Partition

## Computer Setup

The Computer Setup utility is selected from the Configuration and Diagnostics Menu. It is preinstalled on the hard drive and is also available on diskette. It gives a snapshot of the computer's hardware configuration, aids in troubleshooting, and allows you to set custom features. Computer Setup recognizes a newly installed internal or external device and automatically updates the Computer Setup screen. Among the parameters checked are the following:

- Installed devices
- Memory status
- Password status
- Interface configurations
- Graphics configuration
- Computer serial number
- Controller status
- Power Management

## Computer Checkup (TEST)

Computer Checkup (TEST), the primary diagnostics utility, confirms whether the various computer devices are recognized by the system and are functioning properly. Use the TEST utility to help set up tests, to test the computer, and to install the operating system. The TEST menu offers the following:

- Quick Check Diagnostics runs a quick, general test on each device with a minimal number of prompts. If errors occur, they are displayed when the test is complete.
- Automatic Diagnostics runs unattended and provides maximum testing of each device with minimal prompts. You can choose how many times to run the tests, to stop on errors, or to print or file a log of errors.
- Prompted Diagnostics allows maximum control over the device testing process. You can choose attended or unattended testing, decide to stop on errors, or choose to print or file a log of errors.

The TEST option, which may vary by product, checks the following:

- CPU (main system)
- Keyboard
- Pointing device interface
- Parallel interfaces
- Graphics controllers
- Diskette drives

- Fixed disks
- Serial interfaces
- Installed Compaq devices (tape drive, SCSI device, or network status)

## Running TEST

To run TEST, complete the following steps:


1. From the Configuration and Diagnostics menu, select the Computer Checkup (TEST) option.

A test option menu is displayed.

2. Select the option to view the device list.

After a few minutes, a list of the installed hardware devices is displayed.


3. Verify that the TEST utility correctly detected the devices installed.

 This utility may not detect non-Compaq devices.

- If the list is correct, select **OK**.
- The test option menu is displayed again.
- If the list is incorrect, be sure that any new devices are installed properly.

4. Select one of the following from the test option menu:

- Quick Check Diagnostics** runs a quick, general test on each device with a minimal number of prompts. If errors occur, they are displayed when the testing is complete.
- Automatic Diagnostics** runs unattended, maximum testing of each device with minimal prompts. You can choose how many times to run the tests, to stop on errors, or to print or file a log of errors.
- Prompted Diagnostics** allows maximum control over the device testing process. You can choose attended or unattended testing, decide to stop on errors, or choose to print or file a log of errors.

 When you run the TEST utility, be sure to record any error message numbers.



**CAUTION:** Choosing attended testing allows data-destructive tests.

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5. Follow the instructions on the screen as the diagnostic tests are run on the devices.

When the testing is complete, the test option menu is displayed again.

6. Exit to the Configuration and Diagnostics menu.

## **View System Information (INSPECT)**

The View System Information (INSPECT) utility provides information about the system once it has been configured, including:

- System
- Contents of the operating system startup files
- System ROM
- System storage
- System ports
- Current memory configuration
- ROM version
- Type of processor and coprocessor
- Diskette and hard drives
- Active printer and communications interfaces
- Modem
- Keyboard
- Graphics
- Windows files
- Network status
- Miscellaneous

The options available from this utility are:

- Print the inspect status.
- Save the inspect status to a file.
- Add comments to a parameter status.
- Exit the utility.



## Manage Diagnostics Partition

This option allows you to create, delete, or upgrade the diagnostics software on your computer. This must be performed from a Diagnostics diskette.



**CAUTION:** Creating a Diagnostics Partition involves performing a low-level format on the hard drive. This is normally only done to add diagnostics to a new replacement hard drive. If the diagnostics software is deleted, you will no longer be able to access the Configuration and Diagnostics menu.

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### 2.5.4 Compaq Diagnostics for Windows

Compaq Diagnostics for Windows utility contains the same functionality as the partition-based INSPECT program, but in a Windows environment. To use the Compaq Diagnostics for Windows utility in Windows NT or Windows 95, select the Compaq Diagnostics icon from the Control Panel.

Once the program is running, you can use the tool bar or the menus to browse through the information. Some examples of the information you can view are:

- Product name
- CPU information
- Cache size and type
- Mouse driver versions
- COM ports, LPT ports, modems
- ISA and PCI slot information
- Version of certain software
- ROM version
- Storage information
- Power Management settings
- Multimedia devices information

## 2.6 Diagnostic Error Codes

Diagnostic error codes occur if the system recognizes a problem while running the Compaq Diagnostics program. These error codes help identify possibly defective subassemblies.

Tables 2-2 through 2-18 list possible error codes, descriptions of each error condition, and actions required to resolve the error condition.

- ✎ Retest the system after completing each step. If the problem has been resolved, do not proceed with the remaining steps.

For assistance in the removal and replacement of a particular subassembly, see Chapter 5, "Removal and Replacement Procedures."

**Table 2-2**  
**Microprocessor Test Error Codes**

<b>Error Code</b>	<b>Description</b>	<b>Recommended Action</b>
101-xx	CPU test failed.	Replace the system board and retest.
102-xx	Coprocessor error.	1. Run Computer Checkup or Computer Setup and retest. 2. Replace the processor and retest.
103-xx	DMA controller failed.	Replace the system board and retest.
104-xx	Interrupt controller failed.	Replace the system board and retest.
105-xx	Port error.	Replace the system board and retest.
106-xx	Keyboard controller self-test failed.	Replace the system board and retest.
107-xx	CMOS RAM test failed.	The following steps apply to error codes 107-xx through 109-xx:
108-xx	CMOS interrupt test failed.	1. Replace the battery/clock module and retest.
109-xx	CMOS clock test failed.	2. Replace the system board and retest.
110-xx	Programmable timer test failed.	The following step applies to error codes 110-xx through 113-01:
113-01	Protected mode test failed.	Replace the system board and retest.
114-01	Speaker test failed.	1. Verify the speaker connection. 2. Replace the system board and retest.
199-xx	Installed devices test failed.	1. Check system configuration. 2. Verify cable connections. 3. Check switch settings. 4. Run the Configuration and Diagnostics utility. 5. Replace the system board and retest.

**Table 2-3  
Memory Test Error Codes**

<b>Error Code</b>	<b>Description</b>	<b>Recommended Action</b>
200-xx	Memory machine ID test failed.	Reinsert memory modules in correct location.
202-xx	Memory system ROM checksum failed	The following steps apply to error codes 202-xx through 215-xx:  1. Remove one memory module at a time until the error message stops.  2. Replace other removed modules one at a time, testing each to ensure the error does not return.  3. Replace the system board and retest.
203-xx	Memory write/read test failed	
204-xx	Memory address test failed.	
211-xx	Random pattern test failed.	
214-xx	Noise test failed.	
215-xx	Random address test failed	

**Table 2-4  
Keyboard Test Error Codes**

<b>Error Code</b>	<b>Description</b>	<b>Recommended Action</b>
300-xx	Keyboard ID test failed.	The following steps apply to error codes 300-xx through 304-xx:
301-xx	Keyboard self-test/interface test failed.	1. Check the keyboard connection. If disconnected, turn the computer off and connect the keyboard.
302-xx	Individual key test failed.	2. Replace the keyboard and retest.
304-xx	Keyboard repeat test failed	3. Replace the system board and retest.

**Table 2-5  
Parallel Printer Test Error Codes**

<b>Error Code</b>	<b>Description</b>	<b>Recommended Action</b>
401-xx	Printer failed or not connected.	The following steps apply to 401-xx through 403-xx: 1. Connect the printer.
402-xx	Printer port test failed.	2. Check power to the printer.
403-xx	Printer pattern test failed.	3. Install the loop-back connector and retest. 4. Replace system board and retest.

**Table 2-6  
Diskette Drive Test Error Codes**

<b>Error Code</b>	<b>Description</b>	<b>Recommended Action</b>
600-xx	Diskette ID drive types test failed.	The following steps apply to error codes 600-xx through 698-xx:
601-xx	Diskette format failed	1. Replace the diskette media and retest.
602-xx	Diskette read test failed.	2. Check and/or replace the diskette power and signal cables and retest.
603-xx	Diskette write, read, compare test failed.	3. Replace the diskette drive and retest.
604-xx	Diskette random seek test failed.	4. Replace the system board and retest.
605-xx	Diskette ID media test failed.	
606-xx	Diskette speed test failed.	
609-xx	Diskette reset controller failed.	
610-xx	Diskette change line test failed.	
697-xx	Diskette type error.	
698-xx	Diskette drive speed not within limits.	
699-xx	Diskette drive/media error.	1. Replace media. 2. Run Computer Setup and Computer Checkup.

**Table 2-7  
Serial Test Error Codes**

<b>Error Code</b>	<b>Description</b>	<b>Recommended Action</b>
1101-xx	Serial port test failed.	1. Run Computer Setup or Windows NT or Windows 95 utilities. 2. Replace the system board and retest.

**Table 2-8  
Modem Communications Test Error Codes**

<b>Error Code</b>	<b>Description</b>	<b>Recommended Action</b>
1201-xx	Modem internal test failed.	The following steps apply to error codes 1201-xx through 1210-xx:
1202-xx	Modem time-out test failed.	1. Disconnect from the phone line and retest.
1203-xx	Modem external termination test failed.	2. Check the phone number.
1204-xx	Modem auto originate test failed.	3. Check the modem line.
1205-xx	Modem auto answer test failed.	4. Replace the modem and retest.
1210-xx	Modem direct connect test failed.	

**Table 2-9  
Hard Drive Test Error Codes**

<b>Error Code</b>	<b>Description</b>	<b>Recommended Action</b>
1701-xx	Hard drive format test failed.	The following steps apply to error codes 1701-xx through 1736-xx:  1. Run Computer Setup and verify drive type. 2. Replace the hard drive signal and power cables and retest. 3. Replace the hard drive and retest. 4. Replace the system board and retest.
1702-xx	Hard drive read test failed.	
1703-xx	Hard drive write/read/compare test failed.	
1704-xx	Hard drive random seek test failed.	
1705-xx	Hard drive controller test failed.	
1706-xx	Hard drive ready test failed.	
1707-xx	Hard drive recalibration test failed.	
1708-xx	Hard drive format bad track test failed.	
1709-xx	Hard drive reset controller test failed.	
1710-xx	Hard drive park head test failed.	
1715-xx	Hard drive head select test failed.	
1716-xx	Hard drive conditional format test failed.	
1717-xx	Hard drive ECC* test failed.	
1719-xx	Hard drive power mode test failed.	
1724-xx	Hard drive network preparation test failed.	
1736-xx	Hard drive monitoring test failed.	

\*Error Correction Code

**Table 2-10  
Tape Drive Test Error Codes**

<b>Error Code</b>	<b>Description</b>	<b>Recommended Action</b>
1900-xx	Tape drive ID test failed.	The following steps apply to error codes 1900-xx through 1906-xx:  1. Replace the tape cartridge and retest. 2. Check the switch settings on the adapter board. 3. Check and/or replace the signal cable and retest. 4. Replace the tape adapter board (if applicable) and retest. 5. Replace the tape drive and retest. 6. Replace the system board and retest.
1901-xx	Tape drive servo test failed.	
1902-xx	Tape drive format or format verification test failed.	
1903-xx	Tape drive sensor test failed.	
1904-xx	Tape drive BOT/EOT test failed.	
1905-xx	Tape drive read test failed.	
1906-xx	Tape drive write/read/compare failed.	

**Table 2-11  
Video Test Error Codes**

<b>Error Code</b>	<b>Description</b>	<b>Recommended Action</b>
501-xx	Video controller test failed.	The following error codes apply to error codes 501-xx through 516-xx:  1. Replace the monitor and retest. 2. Replace the system board.
502-xx	Video memory test failed.	
503-xx	Video attribute test failed.	
504-xx	Video character set test failed.	
505-xx	Video 80 × 25 mode 9 × 14 character cell test failed.	
506-xx	Video 80 × 25 mode 8 × 8 character cell test failed.	
507-xx	Video 40 × 25 mode test failed.	
508-xx	Video 320 × 200 mode color set 0 test failed.	
509-xx	Video 320 × 200 mode color set 1 test failed.	
510-xx	Video 640 × 200 mode test failed.	
511-xx	Video screen memory page test failed.	
512-xx	Video gray scale test failed.	
514-xx	Video white screen test failed.	
516-xx	Video noise pattern test failed.	
2402-xx	Video memory test failed.	
2403-xx	Video attribute test failed.	
2404-xx	Video character set test failed.	
2405-xx	Video 80 × 25 mode 9 × 14 character cell test failed.	
2406-xx	Video 80 × 25 mode 8 × 8 character cell test failed.	
2408-xx	Video 320 × 200 mode color set 0 test failed.	
2409-xx	Video 320 × 200 mode color set 1 test failed.	
2410-xx	Video 640 × 200 mode test failed.	
2411-xx	Video screen memory page test failed.	
2412-xx	Video gray scale test failed.	
2414-xx	Video white screen test failed.	
2416-xx	Video noise pattern test failed.	
2418-xx	ECG/VGC memory test failed.	

*Continued*

**Table 2-11** *Continued*

<b>Error Code</b>	<b>Description</b>	<b>Recommended Action</b>
2419-xx	ECG/VGC ROM checksum test failed.	The following steps apply to error codes 2402-xx through 2456-xx:
2421-xx	ECG/VGC 640 × 200 graphics mode test failed.	1. Run the Configuration and Diagnostics utilities.
2422-xx	ECG/VGC 640 × 350 16 color set test failed.	2. Replace the monitor and retest.
2423-xx	ECG/VGC 640 × 350 64 color set test failed.	3. Replace the video board and retest.
2424-xx	ECG/VGC monochrome text mode test failed.	
2425-xx	ECG/VGC monochrome graphics mode test failed.	
2431-xx	640 × 480 graphics test failure.	
2432-xx	320 × 200 graphics (256 color mode) test failure.	
2448-xx	Advanced VGA Controller test failed.	
2451-xx	132-column Advanced VGA test failed.	
2456-xx	Advanced VGA 256 Color test failed.	
2458-xx	Advanced VGA BitBLT test.	The following steps apply to error codes 2458-xx through 2480-xx:
2468-xx	Advanced VGA DAC test.	1. Replace the video board and retest.
2477-xx	Advanced VGA data path test.	2. Replace the system board and retest.
2478-xx	Advanced VGA BitBLT test.	
2480-xx	Advanced VGA Linedraw test.	

**Table 2-12**  
**Audio Test Error Codes**

<b>Error Code</b>	<b>Description</b>	<b>Recommended Action</b>
3206-xx	Audio System Internal Error.	Replace the system board and retest.

When Windows 95 is installed, changes to ESS sound device configuration do not take effect until the computer is restarted (turned off and on).

**Table 2-13  
Network Interface Test Error Codes**

<b>Error Code</b>	<b>Description</b>	<b>Recommended Action</b>
6000-xx	Network ID test failed.	The following steps apply to error codes 6000-xx through 6089-xx:
6014-xx	Network configuration test failed.	1. Turn computer off then on (cold boot) and run Computer Setup or Windows NT or Windows 95 utilities.
6016-xx	Network reset test failed.	2. Verify test procedures.
6028-xx	Network internal test failed.	3. Replace the network board, if installed.
6029-xx	Network external test failed.	4. Replace the system board.
6054-xx	Network configuration test failed.	
6056-xx	Network reset test failed.	
6068-xx	Network internal test failed.	
6069-xx	Network external test failed.	
6089-xx	Network open test failed.	

**Table 2-14  
CD-ROM Test Error Codes**

<b>Error Code</b>	<b>Description</b>	<b>Recommended Action</b>
3301-xx	CD-ROM drive read test failed.	The following steps apply to error codes error codes 3301-xx through 3305-xx and 6600-xx through 6623-xx:
3305-xx	CD-ROM drive seek test failed.	1. Replace the CD media and retest.
6600-xx	ID test failed.	2. Check the jumper settings on the adapter board.
6600-xx	ID test failed.	3. Verify that the speakers are connected.
6605-xx	Read test failed.	4. Check and/or replace the power and signal cables and retest.
6608-xx	Controller test failed.	5. Replace the CD-ROM drive and retest.
6623-xx	Random read test failed.	

**Table 2-15  
Pointing Device Test Error Codes**

<b>Error Code</b>	<b>Description</b>	<b>Recommended Action</b>
8601-xx	Mouse test failed.	The following steps apply to error codes 8601-xx through 8602-xx:
		1. Replace with a working mouse and retest.
8602-xx	Interface test failed.	2. Replace the system board and retest.



## SCSI Error Codes

This section includes the error codes for the following SCSI devices:

- Hard drives
- CD-ROM drives
- Tape drives
- PD-CD drives

The SCSI error codes are written in the format AABB-CC and can be determined by looking up the respective parts of the code in the three corresponding tables numbered 2-16, 2-17, and 2-18. AA (Table 2-16) identifies the drive type being tested. BB (Table 2-17) identifies the type of test. CC (Table 2-18) identifies the exact error received.

For example, if you received a diagnostic error code of 6523-05, you would look at Table 2-16 to identify the meaning of the first two numbers, 65. This indicates a hard drive problem. The second set of two numbers, 23, refers to a random read, as shown in Table 2-17. The last two numbers, 05, indicate a seek failure, as listed in Table 2-18. When you combine this information, you know that the diagnostics program was testing the random-read functioning of the hard drive and received a seek failure. The device is faulty and must be replaced.

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**Table 2-16**  
**SCSI Device Names**

65XX-XX	Hard Drive
66XX-XX	CD-ROM Drive and PD-CD Drive
67XX-XX	Tape Drive

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**Table 2-17**  
**SCSI Test Names**

XX00-XX	ID
XX05-XX	Read
XX06-XX	SA/Media
XX23-XX	Random Read
XX28-XX	Media load/unload

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**Table 2-18  
SCSI Test Error Codes**

<b>Error Code</b>	<b>Description</b>	<b>Recommended Action</b>
XXXX-02	Drive not installed.	Check cable connections.
XXXX-03	Media not in drive.	Check for and install DATA CD or write-enabled tape in drive.
XXXX-05	Seek failure.	Replace the indicated device.
XXXX-06	Drive timed out.	Replace the indicated device.
XXXX-07	Drive busy.	Replace the indicated device.
XXXX-08	Drive already reserved.	Replace the indicated device.
XXXX-09	Unknown.	
XXXX-10	Unknown.	
XXXX-11	Media soft error.	Replace the indicated device.
XXXX-12	Drive not ready.	Replace the indicated device.
XXXX-13	Media error.	Replace the indicated device.
XXXX-14	Drive hardware error.	Replace the indicated device.
XXXX-15	Illegal drive command.	Replace the indicated device.
XXXX-16	Media was changed.	Replace the indicated device.
XXXX-17	Tape write-protected.	1. Disable write-protect on tape cartridge. 2. Replace tape drive.
XXXX-18	No data detected.	Replace the indicated device.
XXXX-21	Drive command aborted.	Replace the indicated device.
65XX-24	Media hard error.	1. Back up data and perform Surface Analysis to reallocate defect. 2. Replace drive.
66XX-24	Media hard error.	1. Replace current DATA CD with different DATA CD. 2. Replace drive.
67XX-24	Media hard error.	1. Ensure correct media type for this tape drive. 2. Replace current tape with new tape. 3. Replace tape drive.
XXXX-25	Unknown.	
XXXX-30	Controller timed out.	Replace the indicated device.
XXXX-31	Unrecoverable error.	Replace the indicated device.
XXXX-32	Controller/drive disconnected.	Replace the indicated device.
XXXX-33	Illegal controller command.	Replace the indicated device.
XXXX-34	Invalid SCSI bus phase.	Replace the indicated device.
XXXX-35	Invalid SCSI bus phase.	Replace the indicated device.
XXXX-36	Invalid SCSI bus phase.	Replace the indicated device.
XXXX-39	Error status from drive.	Replace the indicated device.
XXXX-40	Target timed out.	Replace the indicated device.

*Continued*

**Table 2-18** *Continued*

<b>Error Code</b>	<b>Description</b>	<b>Recommended Action</b>
XXXX-41	SCSI bus stayed busy.	Replace the indicated device.
XXXX-42	ACK/REQ lines bad.	Replace the indicated device.
XXXX-43	ACK did not deassert.	Replace the indicated device.
XXXX-44	Parity error.	Replace the indicated device.
XXXX-50	Data pins bad.	Replace the indicated device.
XXXX-51	Data line 7 bad.	Replace the indicated device.
XXXX-52	MSG, C/D, and/or I/O lines bad.	Replace the indicated device.
XXXX-53	BSY never went busy.	Replace the indicated device.
XXXX-54	BSY stayed busy.	Replace the indicated device.
XXXX-60	Controller CONFIG-1 register bad.	Replace the indicated device.
XXXX-61	Controller CONFIG-2 register bad.	Replace the indicated device.
XXXX-65	Media not unloaded.	Replace the indicated device.
XXXX-90	Fan failure.	1. Ensure fan(s) connected. 2. Replace nonfunctional fan(s).
XXXX-91	Over Temperature.	1. Ensure proper air flow. 2. Perform required maintenance and cleaning.
XXXX-99	Autoloader reported tapes not loaded properly.	1. Install tape(s) in autoloader tape drive according to test instructions. 2. Change autoloader magazine.

## 2.7 Troubleshooting Without Diagnostics

This section describes some simple, preliminary tests and guidelines for troubleshooting the computer without using the diagnostics.

### 2.7.1 Checklist for Solving Minor Problems

If you encounter some minor problem with the computer or a software application, go through the following checklist for possible solutions before running any of the diagnostic utilities:

- Is the computer connected to a working power outlet?
- Is the computer turned on and the power light illuminated?
- Are all cables connected properly and seated?
- Is the monitor turned on and the power light illuminated?
- If the monitor is dim, turn up the brightness and contrast controls of the monitor.
- Press and hold any key. If the system beeps, then the keyboard should be operating correctly.
- Are all of the necessary device drivers installed?
- Have all printer drivers been installed for each application?
- Was a nonbootable diskette loaded in the diskette drive at powerup?
- Was a bootable compact disc in the CD-ROM drive at powerup?
- Are all switch settings correct?
- Have all jumper settings been set as instructed by the configuration utility?
- Was Computer Setup run after installing options (memory, disk drives, expansion boards, etc.) and before installing industry standard architecture (ISA) boards?

## 2.7.2 Power Problems

This section identifies some quick checks for power-related problems.

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**Table 2-19**  
**Solutions for Power Problems**

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<b>Problem</b>	<b>Possible Solution</b>
Computer will not turn on.	Ensure that the computer is connected to a power source. Cables to the external power source are unplugged. Ensure that cables connecting the computer and the external source are plugged in properly. A PCI or ISA card that has been installed is defective. Remove any adapter card that was just installed.
Computer does not automatically display the date and time.	The real-time clock (RTC) battery may need to be replaced. See Chapter 5 for replacement procedures.
Computer powered off automatically.	The unit temperature may have been exceeded. Check the fan for function and blockage.

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## 2.7.3 Diskette Drive Problems

This section identifies some quick checks for diskette drive-related problems.

**Table 2-20**  
**Solutions for Diskette Drive Problems**

<b>Problem</b>	<b>Possible Solution</b>
Diskette drive light stays on.	<ol style="list-style-type: none"><li>1. Diskette might be damaged. In Windows NT, run Disk Administrator. At the Start menu, highlight Programs and select Administrator Tools. In Windows 95, run ScanDisk. At the Start menu, highlight Programs, select Accessories, then select System Tools.</li><li>2. Diskette could be installed incorrectly. Remove the diskette and reinsert.</li><li>3. Software program may be damaged. Check the program diskettes.</li><li>4. Drive button is not pushed in. Push in drive button.</li><li>5. Drive cable is not properly connected. Reconnect drive cable.</li></ol>
Diskette drive cannot write to a diskette.	<ol style="list-style-type: none"><li>1. Diskette is not formatted. Format the diskette.</li><li>2. Diskette is write-protected. Either use another diskette that is not write-protected or disable the write protection on the diskette.</li><li>3. Writing to the wrong drive. Check the drive letter in the path statement.</li><li>4. Not enough space is left on the diskette. Use another diskette to write the information.</li><li>5. Diskette write control is disabled. Check the security feature settings.</li></ol>
Diskette drive cannot read a diskette.	<ol style="list-style-type: none"><li>1. Diskette is not formatted. Format the diskette.</li><li>2. Using the wrong diskette type for the drive type. Use a diskette that is compatible with the drive.</li><li>3. Reading the wrong drive. Check the drive letter in the path statement.</li><li>4. Diskette drive has been disabled by Computer Setup, Windows NT, or Windows 95 utilities. Run Computer Setup and enable the diskette drive.</li></ol>
A problem has occurred with a disk transaction.	The directory structure is bad, or there is a problem with a file. In Windows NT, run Disk Administrator. At the Start menu, highlight Programs and select Administrator Tools. In Windows 95, run Scan Disk. At the Start menu, highlight Programs, select Accessories, then select System Tools.
Non-system disk message.	Remove the diskette from the drive.
Drive not found.	Check the cables for loose connections.

## 2.7.4 Display Problems

This section identifies some quick checks for display-related problems.

**Table 2-21**  
**Solutions for Display Problems**

<b>Problem</b>	<b>Possible Solution</b>
Screen is blank.	<ol style="list-style-type: none"><li>1. Monitor is not turned on and the monitor light is not on. Turn on the monitor and check that the monitor light is on.</li><li>2. Screen save has been initiated. Press any key or move the mouse to light the screen.</li><li>3. Check the cable connection from the monitor to the computer and check the electrical outlet.</li><li>4. The brightness need adjusting. Adjust the brightness control.</li><li>5. The QuickBlank feature has been enabled through Security Management. Run Computer Setup and disable the QuickBlank feature.</li><li>6. The energy saver feature has been enabled. Hit any key or type the password.</li><li>7. The RGB (Red, Green, Blue) input switch on the back of the monitor is incorrectly set. Set the monitor's input switch to 75 ohms and, if there is a sync switch, set it to External.</li><li>8. If a fixed-sync monitor is used, be sure that the monitor can accept the same sweep rate as the resolution chosen.</li></ol>
Graphics colors are wrong.	<ol style="list-style-type: none"><li>1. Ensure that the Red, Green, and Blue BNC cables are connected to the corresponding monitor connectors.</li><li>2. Be sure the monitor's RGB inputs are set to 75 ohms.</li></ol>
Characters are dim.	<ol style="list-style-type: none"><li>1. Adjust the monitor's brightness and contrast controls.</li><li>2. Check that the video cable is securely connected to the graphics card and monitor.</li><li>3. Set the RGB switch (and sync options, if available) to 75 ohms, with the sync set to External. Refer to the documentation included with the monitor.</li></ol>
Monitor does not function properly when used with the energy saver features.	Monitor without the energy saver feature is being used with energy saver features enabled. Disable the monitor energy saver feature.
Blurry display or requested resolution cannot be set.	If the graphics controller was upgraded, the correct display drivers may not be loaded. Install the correct display drivers on the diskette included in the upgrade kit.
The picture is broken up; it rolls, jitters, or blinks.	<ol style="list-style-type: none"><li>1. Be sure the monitor cable is securely connected to the computer.</li><li>2. In a 2-monitor system or if another monitor is in close proximity, be sure the monitors are not interfering with each other's magnetic field by moving them apart.</li></ol>
Screen goes blank.	A screen blanking utility may be installed or energy saver features are enabled. Press any key or type password.
Monitor overheats.	There is not enough ventilation space for proper airflow. Leave at least 3 inches (7.6 cm) of ventilation space. Also, be sure there is nothing on top of the monitor to obstruct air flow.
Cursor will not move using the arrow keys on the numeric keypad.	The Num Lock key is on. Press the Num Lock key. The Num Lock light should not be on when you want to use the arrow keys.

## 2.7.5 Printer Problems

This section identifies some quick checks for printer-related problems.

**Table 2-22**  
**Solutions for Printer Problems**

<b>Problem</b>	<b>Possible Solution</b>
Printer will not print.	<ol style="list-style-type: none"><li>1. Printer is not turned on and online. Turn the printer on and make sure it is online.</li><li>2. The correct printer drivers for the application are not installed. Install the correct printer drivers for the application.</li><li>3. If the computer is on a network, you may not have made the connection to the printer. Make the proper network connections to the printer.</li></ol>
Printer will not turn on.	The cables may not be connected properly. Reconnect all cables and check the power cord and electrical outlet.
Prints garbled information.	<ol style="list-style-type: none"><li>1. The correct printer drivers for the application are not installed. Install the correct printer driver for the application.</li><li>2. The cables may not be connected properly. Reconnect all cables.</li></ol>
Printer is off line.	The printer may be out of paper. Check the paper tray and refill it if it is empty. Select online.

## 2.7.6 Hard Drive Problems

This section identifies some quick checks for hard drive-related problems.

The information provided by the diagnostics test includes: error code, system serial number, drive serial number, drive model, and drive firmware revision. Specific details of the drive failure are not included.

When you run the diagnostics, the test results are stored in a log. After completing the test, you can print this log to a local printer or save it to a file. Alternatively, before running the test, you can configure the test options to send the results to a local printer or file.



Solutions for some typical hard drive problems are presented in Table 2-23.

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**Table 2-23**  
**Solutions for Hard Drive Problems**

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<b>Problem</b>	<b>Possible Solution</b>
Hard drive error occurs.	Hard disk has bad sectors or has failed. Use a utility to locate and block usage of bad sectors. If necessary, reformat the hard disk.
Disk transaction problem.	Either the directory structure is bad or there is a problem with a file. In Windows NT, run Disk Administrator. At the Start menu, highlight Programs and select Administrator Tools. In Windows 95, run ScanDisk. At the Start menu, highlight Programs, select Accessories, then select System Tools.
Drive not found.	<ol style="list-style-type: none"><li>1. Cable could be loose. Check cable connections.</li><li>2. The system may not have automatically recognized a newly installed device. If Windows NT is installed, run Computer Setup and identify the new device. If Windows 95 is installed, run Device Manager and identify the device.</li><li>3. If the drive is a secondary drive that has just been installed on the same controller as the primary drive, verify that the jumpers for both drives are set correctly.</li></ol>
Nonsystem disk message.	<ol style="list-style-type: none"><li>1. The system is trying to start from a diskette that is not bootable. Remove the diskette from the diskette drive.</li><li>2. The system is trying to start from the hard drive but the hard disk has been damaged. Insert a bootable diskette into the diskette drive and restart the computer.</li><li>3. Diskette boot has been disabled in Computer Setup. Run Computer Setup and enable diskette boot.</li></ol>

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## 2.7.7 Hardware Installation Problems

This section identifies some quick checks for hardware problems.

**Table 2-24**  
**Solutions for Hardware Installation Problems**

<b>Problem</b>	<b>Possible Solutions</b>
A new device is not recognized as part of the computer system.	<ol style="list-style-type: none"><li>1. The Computer Setup utility has not been run to configure the new device. Run the Computer Setup utility.</li><li>2. When the system advised you of changes to the configuration, you did not accept them. Reboot the computer and follow the instructions for accepting the changes.</li><li>3. The system may not have automatically recognized the new device. If Windows NT is installed, run Computer Setup and identify the new device. If Windows 95 is installed, run Device Manager and identify the device.</li><li>4. A Plug and Play board may not automatically configure when added if the default configuration conflicts with other devices. Use Computer Setup (Windows NT installed) or Device Manager (Windows 95 installed) to deselect the automatic settings for the board and choose a basic configuration that doesn't cause a resource conflict.</li><li>5. The cables for the new external device are loose or the power cables are unplugged. Check all cables.</li><li>6. The power switch for the new external device is not turned on. Turn off the computer, turn on the external device, and then turn the computer on to integrate the new device with the computer.</li><li>7. If the drive is a secondary drive that has just been installed on the same controller as the primary drive, verify that the jumpers for both drives are set correctly.</li></ol>
The computer supports plug and play, but the hardware configuration settings in Computer Setup do not match the settings in Windows 95 Device Manager.	<p>In Windows 95, when onboard serial devices are assigned to ports other than COM1 or COM2, the configuration is saved statically in CMOS. When the system is rebooted, the ROM configures the device to the static setting; when Windows 95 loads, it configures the device to the configuration set via Device Manager. In such cases, the configuration shown when F10 Setup is run does not match what was set up via Device Manager.</p> <p>If these devices must be configured a certain way before Windows 95 loads, then the serial port devices on the system should only be configured to COM1 or COM2 resources. If the system has two serial devices plus a modem, then the first serial device can be COM1 or COM2 or disabled, the modem can be COM1 or COM2 or disabled, and the second serial device can be COM4 or disabled.</p>

## 2.7.8 CD-ROM Drive Problems

This section identifies some quick checks for CD-ROM drive-related problems.

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**Table 2-25**  
**CD-ROM Drive Problems**

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<b>Problem</b>	<b>Possible Solution</b>
Cannot read compact disc.	<ol style="list-style-type: none"><li>1. CD is not properly seated in the drive. Eject the CD, correctly seat it in the drive, then reload.</li><li>2. CD has been loaded upside down. Eject the CD, turn it over, then reload.</li></ol>
System will not boot from CD-ROM drive.	<ol style="list-style-type: none"><li>1. The CD-ROM boot is not enabled through the Computer Setup utility. Run the Computer Setup utility and set the drive priorities.</li><li>2. Ensure that drive cabling and jumpers are set correctly. To boot a SCSI drive, the drive ID number must be set to 0.</li></ol>
Cannot eject compact disc.	CD is not properly seated in the drive. Turn off the computer and insert a thin metal rod into the emergency eject hole and push firmly (a straightened paper clip can be used). Slowly pull the tray out from the drive until the tray is fully extended, then remove the CD.
CD-ROM device is not detected; driver is not loaded.	CD-ROM drive is not connected properly. Open the computer and check to see that the drive cable is connected properly.

---

## 2.7.9 Memory Problems

This section identifies some quick checks for memory-related problems.

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**Table 2-26**  
**Memory Problems**

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<b>Problem</b>	<b>Possible Solution</b>
Out of Memory error.	<ol style="list-style-type: none"><li>1. In Windows NT, run Performance Monitor. At the Start menu, highlight Programs and select Administrator Tools. In Windows 95, run Resource Meter. At the Start menu, highlight Programs, select Accessories, then select System Tools.</li><li>2. The computer has run out of memory to run the application. Check the application documentation to determine the memory requirements.</li></ol>
Memory count during POST is wrong.	The memory modules may not be installed correctly. Check that the memory modules have been installed correctly, then run the Configuration utility.
Insufficient memory error during operation.	<ol style="list-style-type: none"><li>1. Too many Terminate and Stay Resident programs (TSRs) are installed. Delete any unnecessary TSRs.</li><li>2. The computer has run out of memory for the application. Check the memory requirements for the application or add more memory to the computer.</li></ol>

---

## 2.7.10 SCSI Problems

Some common causes and solutions for SCSI device problems are listed in the following table.

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**Table 2-27**  
**SCSI Problems**

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<b>Problem</b>	<b>Cause</b>	<b>Solution</b>
System will not boot from a SCSI drive.	The SCSI drive is not configured correctly.	Ensure that drive cabling and jumpers are set correctly. To boot a SCSI drive, the drive ID number must be set to 0.

---

## 2.7.11 Network Problems

Some common causes and solutions for network problems are listed in the following table. These guidelines do not discuss the process of debugging network cabling.

**Table 2-28**  
**Network Problems**

<b>Problem</b>	<b>Cause</b>	<b>Solution</b>
System does not detect a network controller.	Possible I/O address conflict with another expansion board.	Factory default is 300h to 30Fh for Ethernet. Either remove and reconfigure the conflicting expansion board, or reconfigure the network controller. If the address is changed, ensure that the drive parameters match the new I/O address for the network controller.
System Setup utility reports unprogrammed EPROM.	<ol style="list-style-type: none"> <li>1. Possible I/O address conflict with another expansion board.</li> <li>2. The network controller is defective.</li> <li>3. Network drivers are not loaded.</li> </ol>	<ol style="list-style-type: none"> <li>1. Factory default is 300h to 30Fh for Ethernet. Either remove and reconfigure the conflicting expansion board, or reconfigure the network controller. If the address is changed, ensure that the drive parameters match the new I/O address for the network controller.</li> <li>2. Replace the controller or the system board.</li> <li>3. Boot the computer without the network drivers, using a system boot diskette, and reconfigure the network controller.</li> </ol>
Diagnostics reports a failure.	<ol style="list-style-type: none"> <li>1. Possible I/O address conflict with another expansion board.</li> <li>2. The cable is not securely connected.</li> <li>3. The cable is attached to the incorrect connector.</li> <li>4. There is a problem with the cable or a device at the other end of the cable.</li> <li>5. The network controller is defective.</li> <li>6. Network controller interrupt or memory overlaps the interrupt or memory of an expansion board.</li> </ol>	<ol style="list-style-type: none"> <li>1. Factory default is 300h to 30Fh for Ethernet. Either remove and reconfigure the conflicting expansion board, or reconfigure the network controller. If the address is changed, ensure that the drive parameters match the new I/O address for the network controller.</li> <li>2. Ensure that the cable is securely attached to the network connector and that the other end of the cable is securely attached to the correct device.</li> <li>3. Ensure that the cable is attached to the correct connector.</li> <li>4. Ensure that the cable and device at the other end are operating correctly.</li> <li>5. Replace the controller or the system board.</li> <li>6. Run Computer Setup and modify the network controller memory value.</li> </ol>
Diagnostics passes, but the computer does not communicate with the network.	<ol style="list-style-type: none"> <li>1. Network drivers are not loaded, or driver parameters do not match current configuration.</li> <li>2. The network controller is not configured for this computer.</li> <li>3. The network controller interrupt or memory overlaps the interrupt or memory of an expansion board.</li> </ol>	<ol style="list-style-type: none"> <li>1. Make sure the network drivers are loaded and that the driver parameters match the configuration of the network controller.</li> <li>2. In Windows 95 or Windows NT, select the Network icon at the Control Panel. Reconfigure the driver if necessary, using the Network Setup found in the Control Center.</li> <li>3. Run Computer Setup and modify the network controller memory value.</li> </ol>

*Continued*

**Table 2-28** *Continued*

<b>Problem</b>	<b>Cause</b>	<b>Solution</b>
Network controller stopped working when an expansion board was added to the computer.	<ol style="list-style-type: none"> <li>1. Network drivers are not loaded or driver parameters do not match the current configuration.</li> <li>2. The cable is not securely connected.</li> <li>3. The network controller interrupt or memory overlaps the interrupt or memory of another expansion board.</li> <li>4. The network controller require drivers.</li> <li>5. The files containing the network drivers are corrupted.</li> </ol>	<ol style="list-style-type: none"> <li>1. Make sure that the network drivers are loaded and that the driver parameters match the configuration of the network controller using Network Setup found in the Control Center.</li> <li>2. Ensure that the cable is securely attached to the network connector and that the other end of the cable is securely attached to the correct device.</li> <li>3. Run Computer Setup and modify the network controller memory value.</li> <li>4. Verify that the drivers were not accidentally deleted when the drivers for a new expansion board were installed.</li> <li>5. Reinstall the network drivers, using the backup diskettes and then run Computer Setup.</li> </ol>
Network controller stopped working without apparent cause.	<ol style="list-style-type: none"> <li>1. The files containing the network drivers are corrupted.</li> <li>2. The cable is not securely connected.</li> <li>3. The network controller is defective.</li> </ol>	<ol style="list-style-type: none"> <li>1. Reinstall the network drivers using the backup diskettes and then run Computer Setup.</li> <li>2. Ensure that the cable is securely attached to the network connector and that the other end of the cable is securely attached to the correct device.</li> <li>3. Replace the network controller or system board.</li> </ol>

## 2.7.12 Resolving Audio Hardware Conflicts

Hardware conflicts occur when two or more peripheral devices contend for the same signal lines or channels. Conflicts between the audio interface and another peripheral device may be due to the settings of the base I/O addresses, interrupts, or DMA channels. The audio interface typically has the following settings:

Base I/O address	220H
OPL III I/O address	388-38Bh
Interrupt	IRQ 5
8-bit DMA	Channel 1

To resolve hardware conflicts:

1. Change the hardware settings of your audio card or the peripheral card in your system if the peripheral card is using the audio interface setting. You can change settings for integrated audio using Computer Setup.
2. If you are unsure of the settings of the peripheral cards, you can isolate the source of the problem by temporarily removing all cards and other essential cards such as the disk controller. After that, add the cards back one at a time until the card that is causing the conflict is found.

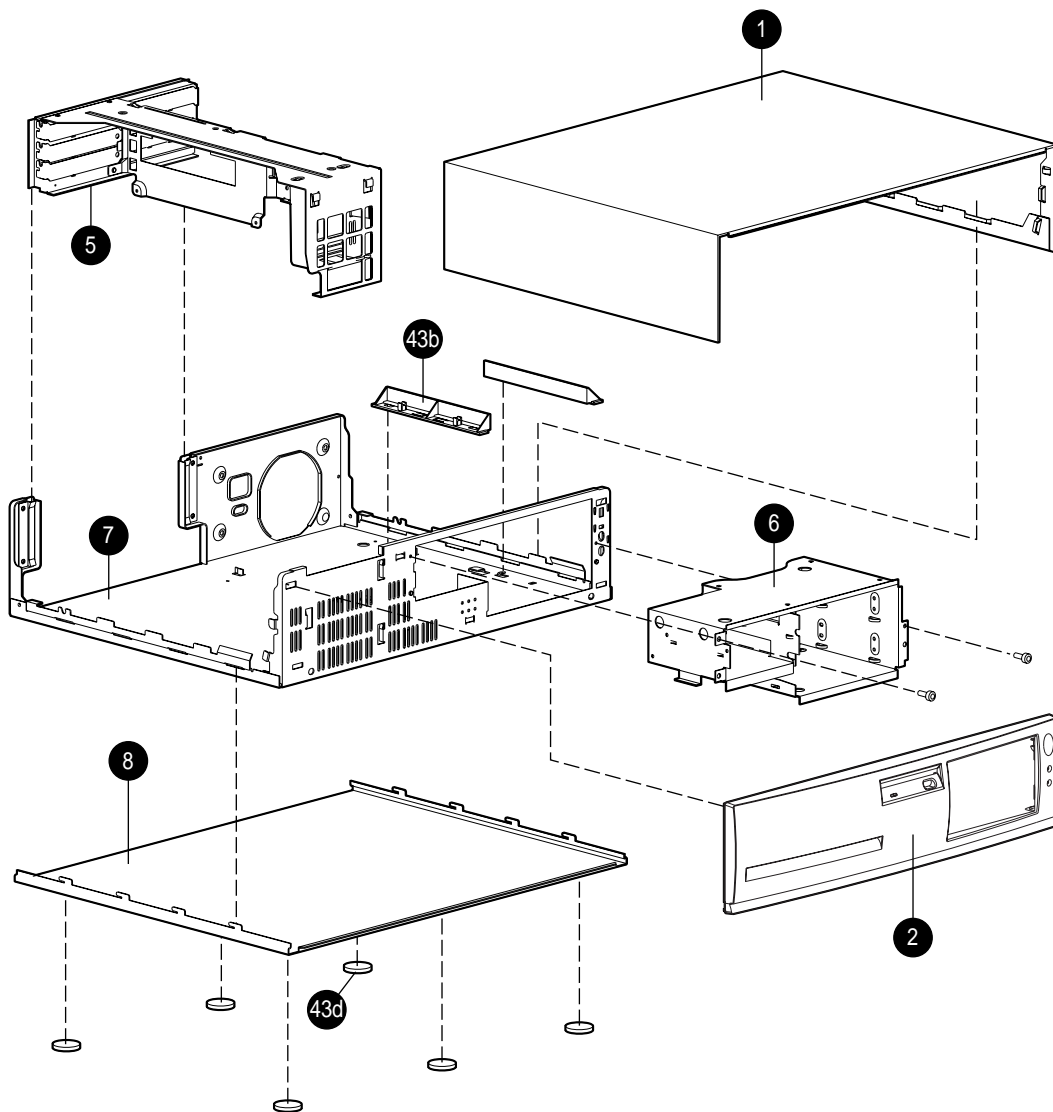


# *chapter 3*

## ILLUSTRATED PARTS CATALOG

This chapter provides an illustrated parts breakdown and a reference for spare parts for the Compaq Professional Workstation.

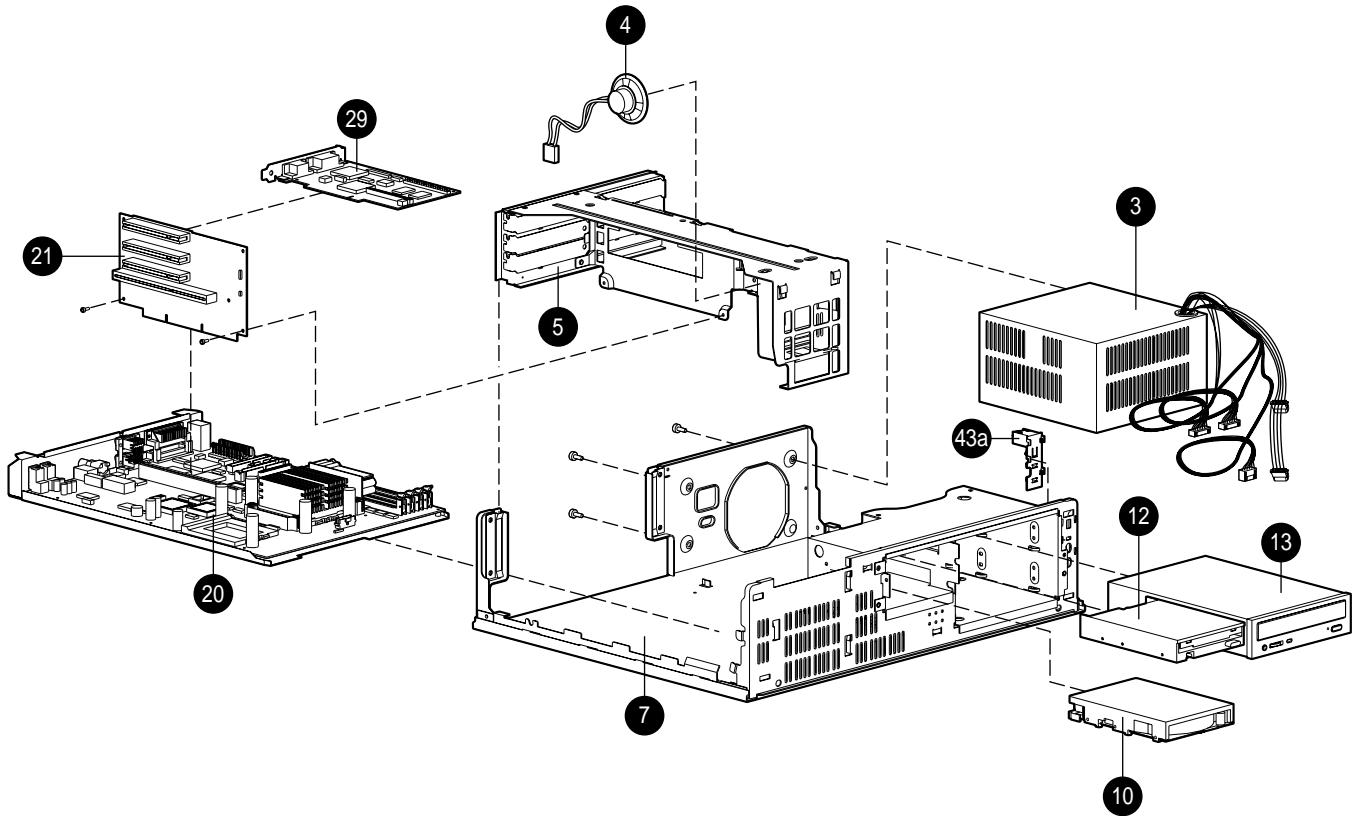
### 3.1 Mechanical Parts





*Figure 3-1. Exploded View of the Compaq Professional Workstation Mechanical Parts*

## 3.2 System Components



*Figure 3-2. Exploded View of the Compaq Professional Workstation System Components*

### 3.3 Spares Parts List

**Table 3-1  
System Unit**

Ref	Description	Spare Part Number	Warranty Tier
1	Workstation cover	269247-001	D
2	Front bezel with logo	269256-001	D
3	Power supply, 240W (includes power switch, power switch holder, and LED assembly)	269249-001	A
4	Speaker, 2.5-inch, 0.5W	247508-001	A
5	Backplane Cage Assembly	269258-001	D
6	Drive Cage	269273-001	D
7	Base Pan Assembly	269261-001	D
8	Base Pan Cover with Feet	269275-001	D

**Table 3-2  
Mass Storage Devices**

Ref	Description	Spare Part Number	Warranty Tier
9	4.3-GB Fast-Wide SCSI-2 hard drive*	269387-001	A
10	2.1-GB Fast-Wide SCSI-2 hard drive	269415-001	A
11	Mounting bracket (3.5-inch to 5.25-inch)*	269416-001	D
12	Diskette drive (3.5-inch, 1.44-MB, 3-mode)	172465-001	A
13	CD-ROM Drive, 8X IDE	185916-201	A
14	PD-CD Drive (5.25-inch, 650-MB, SCSI)*	184691-201	A
15	Tape drive (2/8-GB DAT) *	142074-201	A
16	Tape drive (4/16-GB DAT)*	199464-201	A
17	Tape cartridge, DDS1, 2-GB (90 m)*	131148-001	D
18	Tape cartridge, DDS2, 4-GB (120 m)*	199496-001	D
19	PD-CD cartridge, 650-MB*	186075-001	D

\* Not shown

**Table 3-3  
Standard and Optional Boards**

<b>Ref</b>	<b>Description</b>	<b>Spare Part Number</b>	<b>Warranty Tier</b>
20	System board with tray (no microprocessor)	269259-001	A
21	Backplane board	269257-001	A
22	Memory module (16-MB, 60ns DIMM)*	269414-001	A
23	Memory module (32-MB, 60ns DIMM)*	269263-001	A
24	Memory module (64-MB, 60ns DIMM)*	269264-001	A
25	Memory module (128-MB, 60ns DIMM)*	269266-001	A
26	Processor (P6/200MHz, 256K)*	273759-001	A
27	Heatsink (with clip and thermal pad)*	269262-001	A
28	Processor Power Module (Voltage Regulator Module) *	271935-001	A
29	Controller, PCI, Matrox MGA Millennium Graphics	243136-001	A
30	Controller, Gloria-L Graphics*	269277-001	A
31	DRAM, 2-MB EDO, 50 ns*	269411-001	A
32	WRAM, 2-MB for Matrox MGA Millennium Graphics*	223339-001	A
33	WRAM, 6-MB for Matrox MGA Millennium Graphics*	223340-001	A
34	Controller, 10/100TX PCI UTP*	169849-001	A
35	Controller, 10 BaseT, PCI, UTP*	242501-001	A
36	Controller, 10 BaseT, ISA*	265617-001	A
37	Controller, 16/4 PCI Token Ring, IBM *	199764-001	A
38	Controller, Token Ring, ISA *	172194-001	A
39	Network Interface Controller, ISA *	265434-001	A
40	Network Interface Controller, PCI *	265452-001	A
41	Modem, 28.8 DataFax (US)*	259214-002	A

\*Not shown

**Table 3-4  
Miscellaneous Hardware Kit**

<b>Ref</b>	<b>Description</b>	<b>Spare Part Number</b>	<b>Warranty Tier</b>
42	Miscellaneous Hardware Kit includes:	247380-001	D
a	Power switch spring *		
b	1/4-inch, 6-32 High top screw *		
c	3/16-inch, 6-32 High top screw (for standard thread drives) *		
d	5-mm, M3, High top screw, black (for metric thread drives) *		
e	Thumbscrews *		

\*Not shown.

This kit contains parts not listed here.

**Table 3-5  
Miscellaneous Plastics Kit**

<b>Ref</b>	<b>Description</b>	<b>Spare Part Number</b>	<b>Warranty Tier</b>
43	Miscellaneous plastics kit includes:	247379-001	D
a	Holder, power switch		
b	Guides, drive cage		
c	Bezel, blank drive, half-height*		
d	Feet		

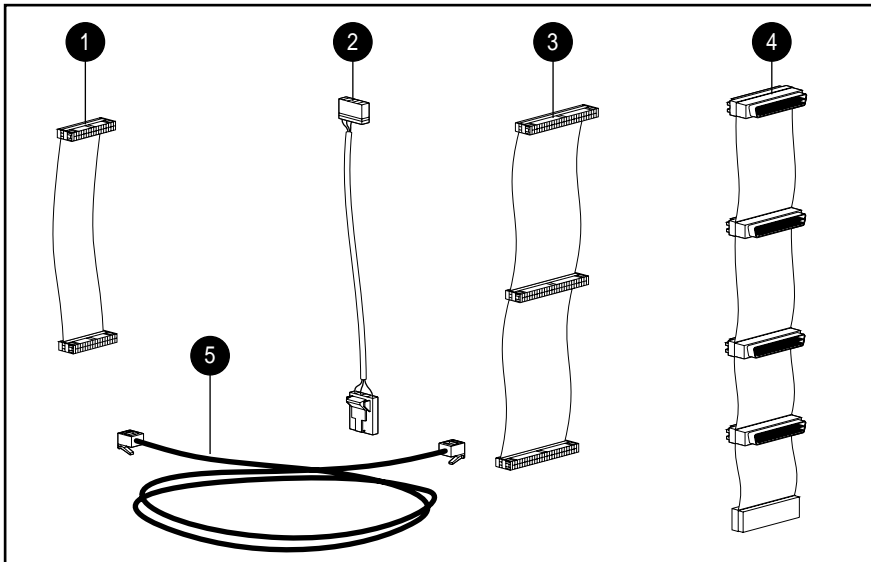
\*Not shown.

This kit contains parts not listed here.

**Table 3-6  
Miscellaneous Parts**

<b>Ref</b>	<b>Description</b>	<b>Spare Part Number</b>	<b>Warranty Tier</b>
44	Assembly, Lock Bracket *	173066-001	D
45	Compaq 2-button mouse *	141189-401	A
46	Compaq 3-button mouse *	269278-001	A
47	Battery, Real-Time Clock (External) *	160274-001	A
48	Slot cover *	141081-001	D
49	Microphone assembly w/ base *	194376-001	D
50	Country Kit *	269413-001	D

\* Not shown



**Figure 3-3. Cables**

**Table 3-7  
Cables**

Ref	Description	Spare Part Number	Warranty Tier
1	Cable, CD-ROM drive	269269-001	A
2	Cable, CD audio	171139-001	A
3	Cable, diskette drive	269412-001	A
4	Cable, SCSI, Wide, 3-device with terminator (68-pin)	269268-001	A
5	Cable, modem (U.S. only)	127949-001	D
6	Adapter, SCSI, 50- to 68-pin (female) *	189638-001	A
7	Cable, Wide to narrow SCSI *	189636-002	A
8	Cable, Assembly (PCI voltage adapter) *	269419-001	A
9	Cable, dual, HD/PWR (for 2/8-GB DAT drive) *	120588-001	A
10	Cable, Adapter, connector (for 2/8-GB DAT drive) *	147237-001	A
11	Cable, Signal Video (15P-15P, D-SHE, 21-inch monitor data cable) *	210430-001	A

\*Not shown

**Table 3-8  
Keyboards**

<b>Description</b>	<b>Spare Part Number</b>	<b>Warranty Tier</b>
Keyboard, Windows	235496-101	A
Keyboard, Windows (International)	235496-102	A
Keyboard, Windows (Great Britain)	235496-103	A
Keyboard, Windows (German)	235496-104	A
Keyboard, Windows (French)	235496-105	A
Keyboard, Windows (Italian)	235496-106	A
Keyboard, Windows (Spanish)	235496-107	A
Keyboard, Windows (Danish)	235496-108	A
Keyboard, Windows (Norwegian)	235496-109	A
Keyboard, Windows (Swedish)	235496-110	A
Keyboard, Windows (Swiss)	235496-111	A
Keyboard, Windows (French Canadian)	235496-112	A
Keyboard, Windows (Japanese)	235496-119	A
Keyboard, Windows (Finnish)	235496-137	A

**Table 3-9  
Monitors**

<b>Description</b>	<b>Spare Part Number</b>	<b>Warranty Tier</b>
P50 Color Monitor (MPR, UPS, NH)	264202-001	A
P50 Color Monitor (MPR, UPS, GSA)	264202-004	A
P50 Color Monitor (TCO95, UPS, EUR)	264202-021	A
P50 Color Monitor (MPR, UPS, SH)	264202-B21	A
V50 Color Monitor (MPR, UPS, NH)	264152-001	A
V50 Color Monitor (MPR, UPS, GSA)	264152-004	A
V50 Color Monitor (TCO95, UPS, NH)	264152-021	A
V50 Color Monitor (MPR, UPS, SH)	264152-B21	A
151 FS Color Monitor, Low Emissions/AssetControl (NA, 444)	147265-601	A
151 FS Color Monitor, Low Emissions/AssetControl (TCO, NH, 444)	147265-602	A
151 FS Color Monitor, Low Emissions/AssetControl (SH, 444)	147265-603	A
151 FS Color Monitor, Low Emissions/AssetControl (GSA, 444)	147265-604	A
151 FS Color Monitor, Low Emissions/AssetControl (NH, MPR)	147265-002	A
151 FS Color Monitor, Low Emissions/AssetControl (SH, MPR)	147265-004	A
151 FS Color Monitor, Low Emissions/AssetControl (NH)	147265-005	A

*Continued*



**Table 3-9** *Continued*

<b>Description</b>	<b>Spare Part Number</b>	<b>Warranty Tier</b>
151 FS Color Monitor, Low Emissions/AssetControl (SH)	147265-006	A
151 FS Color Monitor, Low Emissions/AssetControl (GSA)	147265-007	A
151 FS Color Monitor, Low Emissions/AssetControl (GSA, MPR)	147265-008	A
151 FS Color Monitor, Low Emissions/AssetControl (LP, NH, MPR)	147265-502	A
151 FS Color Monitor, Low Emissions/AssetControl (LP, SH, MPR)	147265-504	A
151 FS Color Monitor, Low Emissions/AssetControl (LP, NH)	147265-505	A
151 FS Color Monitor, Low Emissions/AssetControl (LP, SH)	147265-506	A
151 FS Color Monitor, Low Emissions/AssetControl (LP, GSA)	147265-507	A
151 FS Color Monitor, Low Emissions/AssetControl (LP, GSA, MPR)	147265-508	A
Compaq V70-A Color Monitor (17", MPR, NA)	255609-001	A
Compaq V70-A Color Monitor (17", MPR, GSA)*	255609-004	A
Compaq V70-S Color Monitor (17", MPR, UPS, INTNL, SH)	255638-B21	A
Compaq V70-S Color Monitor (17", MPR, UPS, INTNL, NH)	255638-B22	A
Compaq V70-S Color Monitor (17", TCO95, UPS, INTNL, SH)	255638-B23	A
Compaq V70-S Color Monitor (17", TCO95, UPS, EUR)	255638-021	A
QVision 172 Color Monitor (1280x1024, NA)	143547-002	A
QVision 172 Color Monitor (1280x1024, SH)	143547-003	A
QVision 172 Color Monitor (1280x1024, TCO)	143547-004	A
QVision 172 Color Monitor (NA)	143547-602	A
QVision 172 Color Monitor (SH)	143547-603	A
QVision 172 Color Monitor (NH, TCO)	143547-604	A
QVision 172 Color Monitor (TCO95, AM, NH)	143547-605	A
Compaq P70 Color Monitor (17", TCO95, UPS, NH)	255652-001	A
Compaq P70 Color Monitor (17", TCO95, UPS, SH)	255652-B23	A
QVision 210 Color Monitor (AM, NH, TCO95)	210407-021	A
QVision 210 Color Monitor (NA)	210407-601	A
QVision 210 Color Monitor (NH, TCO)	210407-602	A
QVision 210 Color Monitor (SH)	210407-603	A



**Table 3-10  
Documentation**

<b>Description</b>	<b>Spare Part Number</b>	<b>Warranty Tier</b>
<i>Maintenance &amp; Service Guide</i>	269409-001	D
<i>Illustrated Parts Map</i>	269410-001	D
<i>Compaq Service Quick Reference Guide</i>	162212-001	D

**Table 3-11  
Software**

<b>Description</b>	<b>Spare Part Number</b>	<b>Warranty Tier</b>
Diagnostics and Setup 3.5-inch Diskette Kit (British English)	275575-031	D
Diagnostics and Setup 3.5-inch Diskette Kit (Dutch)	275575-331	D
Diagnostics and Setup 3.5-inch Diskette Kit (French)	275575-051	D
Diagnostics and Setup 3.5-inch Diskette Kit (French Canadian)	275575-121	D
Diagnostics and Setup 3.5-inch Diskette Kit (German)	275575-041	D
Diagnostics and Setup 3.5-inch Diskette Kit (Italian)	275575-061	D
Diagnostics and Setup 3.5-inch Diskette Kit (Japanese)	275575-391	D
Diagnostics and Setup 3.5-inch Diskette Kit (Asia Pacific)	275575-371	D
Diagnostics and Setup 3.5-inch Diskette Kit (US)	275575-001	D
Windows NT 4.0 Workstation CD (British English)	275573-031	D
Windows NT 4.0 Workstation CD (Dutch)	275573-331	D
Windows NT 4.0 Workstation CD (French)	275573-051	D
Windows NT 4.0 Workstation CD (French Canadian)	275573-121	D
Windows NT 4.0 Workstation CD (German)	275573-041	D
Windows NT 4.0 Workstation CD (Italian)	275573-061	D
Windows NT 4.0 Workstation CD (Japanese)	275573-391	D
Windows NT 4.0 Workstation CD (Asia Pacific)	275573-371	D
Windows NT 4.0 Workstation CD (US)	275573-001	D
Compaq SmartStart CD for the Professional Workstation (British English)	275574-031	D
Compaq SmartStart CD for the Professional Workstation (Dutch)	275574-331	D
Compaq SmartStart CD for the Professional Workstation (French)	275574-051	D
Compaq SmartStart CD for the Professional Workstation (French Canadian)	275574-121	D

*Continued*

**Table 3-11** *Continued*

<b>Description</b>	<b>Spare Part Number</b>	<b>Warranty Tier</b>
Compaq SmartStart CD for the Professional Workstation (German)	275574-041	D
Compaq SmartStart CD for the Professional Workstation (Italian)	275574-061	D
Compaq SmartStart CD for the Professional Workstation (Japanese)	275574-391	D
Compaq SmartStart CD for the Professional Workstation (Asia Pacific)	275574-371	D
Compaq SmartStart CD for the Professional Workstation (US)	275573-001	D
ROMPaq	275595-001	D

# *chapter* 4

## REMOVAL AND REPLACEMENT PRELIMINARIES

This chapter provides general service information. Adherence to the procedures and precautions described in this chapter is essential for proper service.

### 4.1 Electrostatic Discharge Information

A sudden discharge of static electricity from your finger or other conductor can destroy static-sensitive devices or microcircuitry. Often the spark is neither felt nor heard, but damage occurs. An electronic device exposed to electrostatic discharge (ESD) may not be affected at all and can work perfectly throughout a normal cycle. Or it may function normally for a while, then degrade in the internal layers, reducing its life expectancy.

Networks built into many integrated circuits provide some protection, but in many cases, the discharge contains enough power to alter device parameters or melt silicon junctions.

#### 4.1.1 Generating Static

Table 4-1 shows how different activities generate static electricity at different electrostatic voltage levels.

<b>Event</b>	<b>Relative Humidity</b>		
	<b>10%</b>	<b>40%</b>	<b>55%</b>
Walking across carpet	35,000 V	15,000 V	7,500 V
Walking across vinyl floor	12,000 V	5,000 V	3,000 V
Motions of bench worker	6,000 V	800 V	400 V
Removing DIPs* from plastic tube	2,000 V	700 V	400 V
Removing DIPs* from vinyl tray	11,500 V	4,000 V	2,000 V
Removing DIPs* from Styrofoam	14,500 V	5,000 V	3,500 V
Removing bubble pack from PCB	26,500 V	20,000 V	7,000 V
Packing PCBs in foam-lined box	21,000 V	11,000 V	5,000 V

---

\*Dual Inline Packaging (DIP) is the packaging around individual microcircuitry. These are then multi-packaged inside plastic tubes, trays, or Styrofoam.

---

✍ 700 volts can degrade a product.

## 4.1.2 Preventing Electrostatic Damage to Equipment

Many electronic components are sensitive to ESD. Circuitry design and structure determine the degree of sensitivity. The following proper packaging and ground precautions are necessary to prevent damage to electric components and accessories.

- To avoid hand contact, transport products in static-safe containers such as tubes, bags, or boxes.
- Protect all electrostatic parts and assemblies with conductive or approved containers or packaging.
- Keep electrostatic sensitive parts in their containers until they arrive at static-free stations.
- Place items on a grounded surface before removing them from their container.
- Always be properly grounded when touching a sensitive component or assembly.
- Avoid contact with pins, leads, or circuitry.
- Place reusable electrostatic-sensitive parts from assemblies in protective packaging or conductive foam.

## 4.1.3 Personal Grounding Methods

The method for grounding must include either a wrist strap or a foot strap at a grounded workstation. When seated, wear a wrist strap connected to a grounded system. When standing, use footstraps and a grounded floor mat.

---

**Table 4-2**  
**Static Shielding Protection Levels**

---

<b>Method</b>	<b>Voltage</b>
Antistatic plastic	1,500
Carbon-loaded plastic	7,500
Metallized laminate	15,000

---

#### 4.1.4 Grounding Workstations

To prevent static damage at the workstation, use the following precautions:

- Cover the workstation with approved static-dissipative material. Provide a wrist strap connected to the work surface and properly grounded tools and equipment.
- Use static-dissipative mats, foot straps, or air ionizers to give added protection.
- Handle electrostatic sensitive components, parts, and assemblies by the case or PCB laminate. Handle them only at static-free workstations.
- Turn off power and input signals before inserting and removing connectors or test equipment.
- Use fixtures made of static-safe materials when fixtures must directly contact dissipative surfaces.
- Keep work area free of nonconductive materials such as ordinary plastic assembly aids and Styrofoam.
- Use field service tools, such as cutters, screwdrivers, and vacuums, that are conductive.
- Use a portable field service kit with a static-dissipative vinyl pouch that folds out on a work mat. Also, use a wrist strap and a ground cord for the work surface. Ground the cord to the chassis of the equipment undergoing test or repair.

#### 4.1.5 Personal Grounding Equipment

Use the following equipment to prevent static electricity damage to equipment:

**Wrist Straps** are flexible straps with a minimum of one-megohm  $\pm$  10% resistance in the ground cords. To provide proper ground, a strap must be worn snug against bare skin. The ground cord must be connected and fit snugly into the banana plug connector on the grounding mat or workstation.

**Heelstraps/Toestraps/Bootstraps** can be used at standing workstations and are compatible with most types of shoes or boots. On conductive floors or dissipative floor mats, use them on both feet with a minimum of one-megohm resistance between the operator and ground. To be effective, the conductive strips must be worn in contact with the skin.

### **4.1.6 Recommended Materials and Equipment**

Other materials and equipment that are recommended for use in preventing static electricity include:

- Antistatic tape
- Antistatic smocks, aprons, or sleeve protectors
- Conductive bins and other assembly or soldering aids
- Conductive foam
- Conductive tabletop workstations with ground cord of one-megohm resistance
- Static-dissipative table or floor mats with hard tie to ground
- Field service kits
- Static awareness labels
- Wrist straps and footwear straps providing one-megohm +/- 10% resistance
- Material handling packages
- Conductive plastic bags
- Conductive plastic tubes
- Conductive tote boxes
- Opaque shielding bags
- Transparent metallized shielding bags
- Transparent shielding tubes

## **4.2 Service Considerations**

Listed below are some of the considerations that you should keep in mind during the disassembly and assembly of the computer.

### **4.2.1 Tools and Software Requirements**

To service the computer, you need the following:

- Torx T-15 screwdriver
- Flat-bladed screwdriver
- Diagnostics software

## 4.2.2 Screws

The screws used in the computer are not interchangeable. They may have standard or metric threads and may be of different lengths. If an incorrect screw is used during the reassembly process, it can damage the unit. Compaq strongly recommends that all screws removed during disassembly be kept with the part that was removed, then returned to their proper locations.

Spare guide screws are mounted on the front of the chassis.

**IMPORTANT:** As each subassembly is removed from the computer, it should be placed away from the work area to prevent damage.

## 4.2.3 Cables and Connectors

Most cables used throughout the unit are flat, flexible cables. These cables must be handled with extreme care to avoid damage. Apply only the tension required to seat or unseat the cables during insertion or removal from the connector. Handle cables by the connector whenever possible. In all cases, avoid bending, twisting, or tearing the cables, and ensure that the cables are routed in such a way that they cannot be caught or snagged by parts being removed or replaced.



**CAUTION:** When servicing this computer, ensure that cables are placed in their proper location during the reassembly process. Improper cable placement can damage the computer.

---

## 4.2.4 Hard Drives

Handle hard drives as delicate precision components, avoiding all physical shock and vibration. This applies to failed drives as well as spares.

- Use only the packaging provided by Compaq for shipping.
- Do not remove hard drives from the shipping package for storage.  
Keep hard drives in their protective packaging until they are actually mounted in the CPU or external storage unit.
- Avoid dropping drives from any height onto any surface.
- Use only 3/16-inch or 5-mm mounting screws.

## 4.2.5 Plastic Parts

Plastic parts can be damaged by the use of excessive force during disassembly and reassembly. When handling the plastic parts, use care. Do not use a screwdriver or similar tool to pry apart the plastic components.



## 4.2.6 Lithium Battery

The battery that came with the computer is nonreplaceable and is permanently soldered onto the system board. Do not attempt to remove the lithium battery when installing a replacement battery. The lithium battery can explode if mishandled.



**WARNING:** Never attempt to remove a lithium battery. You can damage the system board in such an attempt, thereby making it unusable. Do not abuse or disassemble the lithium battery, as it may explode if mistreated.

---

See Chapter 5, “Removal and Replacement Procedures,” for information on installing a replacement battery.

# *chapter* 5

## REMOVAL AND REPLACEMENT PROCEDURES

This chapter provides subassembly/module level removal and replacement procedures for the Compaq Professional Workstation.

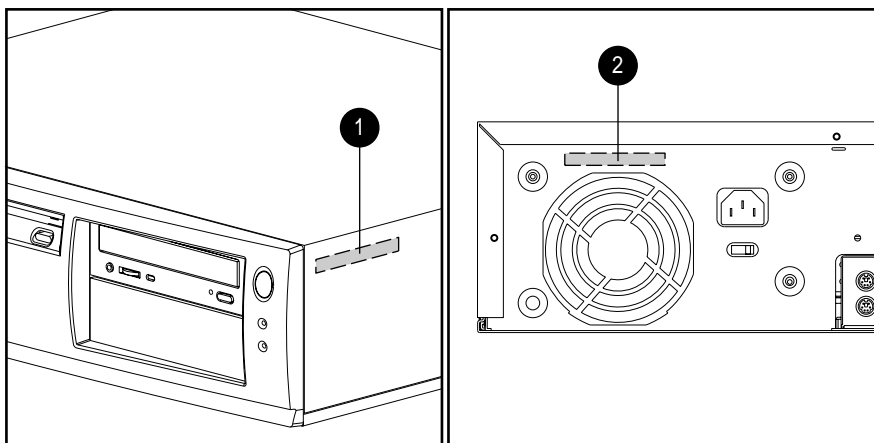
After completing all necessary removal and replacement procedures, run the Diagnostics program to verify that all components operate properly.

### 5.1 Serial Number

Provide the computer serial number to Compaq whenever you request information or order spare parts. The serial number is located on the right side of the workstation cover, toward the front 1 and also on the rear of the chassis above the fan 2.

For asset control, the computer serial number is also imbedded in the EEPROM on the system board. If the system board is replaced with a spare part from Compaq, the invalid serial number condition will be recognized during POST. You will need to reenter the original serial number through Computer Setup.

✍ A system board borrowed from another computer is recognized as a valid serial number.



**Figure 5-1.** Serial Number Locations



## 5.3 Preparation for Disassembly

See Chapter 4, “Removal and Replacement Preliminaries,” for initial procedures. To prepare the computer for the removal and replacement procedures, complete the following steps:

1. Remove any diskette, compact disc, or tape from the computer.
2. Turn off the computer and any peripheral devices that are connected to it.



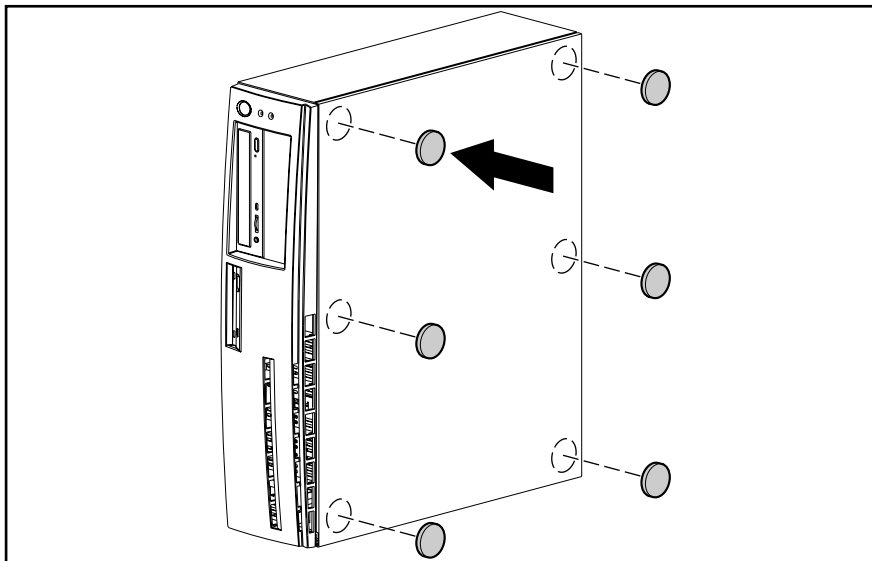
**CAUTION:** Turn OFF the computer power switch before you disconnect any cables.

---

3. Disconnect the power cord from the electrical outlet and then from the computer.
  4. Disconnect all peripheral device cables from the computer.
- ✍ During disassembly, label each cable as you remove it, noting its position and routing.

## 5.4 Feet

Six rubber feet are mounted to the underside of the base pan. No parts have to be removed to access the feet. The replacement feet have an adhesive surface and are shipped with a protective strip in place. Remove the protective strip from the replacement feet before installation. If necessary, use a small flat-bladed screwdriver to remove the old feet from the workstation.

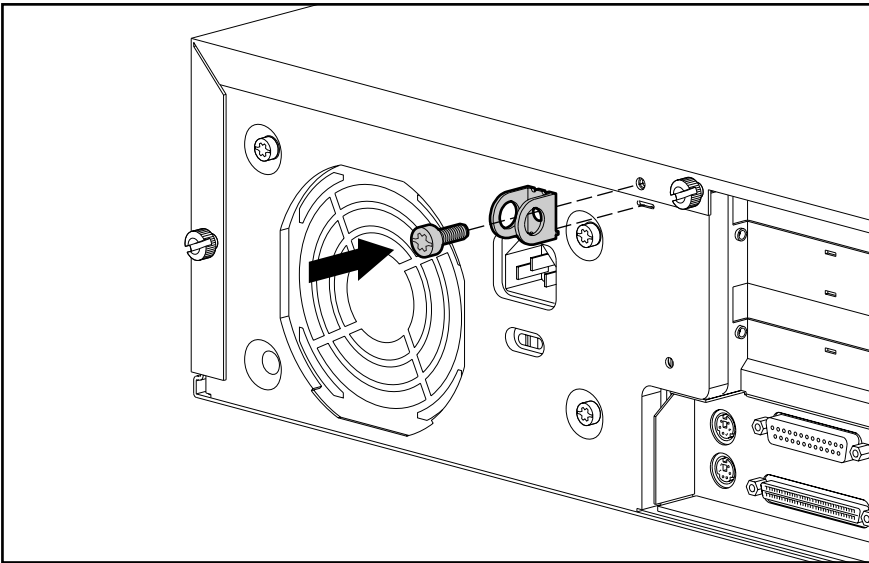


**Figure 5-2.** Installing the Feet

## 5.5 Cable Lock

To install the cable lock provision, complete the following steps:

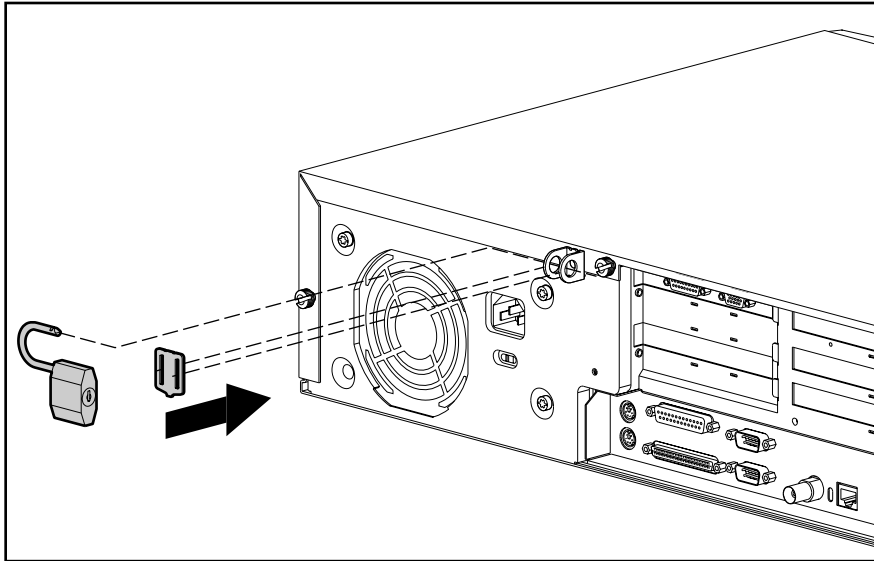
1. Separate the pieces of the security bracket by bending the metal where the two pieces join.
2. Slide the tab on the bottom part of the bracket into the notch on the back of the computer, then position the bracket over the screw hole.



**Figure 5-3.** *Installing the Cable Lock Bracket*

3. Secure the bracket with the screw provided.

4. Cover the screw with the top part of the security bracket.
5. Install a padlock (not provided) to secure the top part of the security bracket to control access to the interior of the computer. Install a cable lock (not provided) to control access to the interior of the computer and to secure the computer to a fixed object.



**Figure 5-4.** Attaching a Security Bracket with Padlock

To remove the cable lock provision, reverse the above procedure.

## 5.6 Workstation Cover

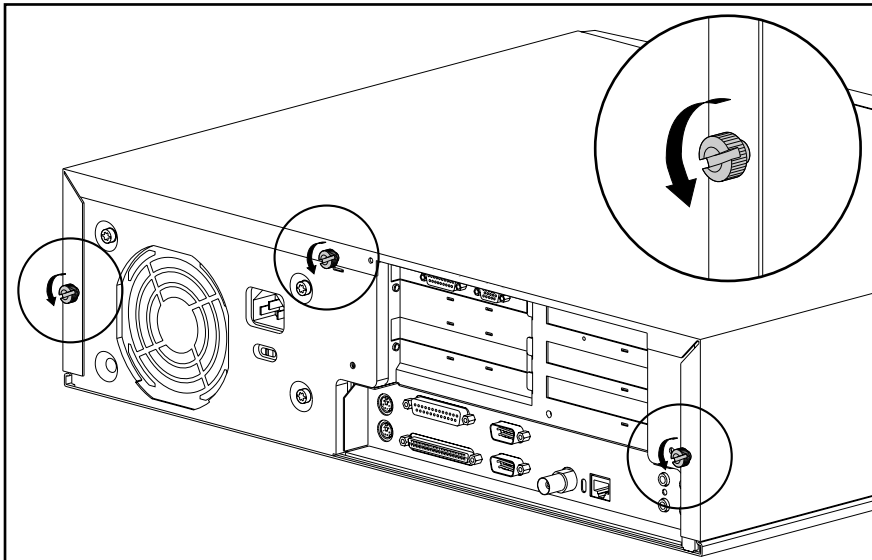


**CAUTION:** Before removing the computer cover, ensure that the computer is turned off and that the power cord is disconnected from the electrical outlet.

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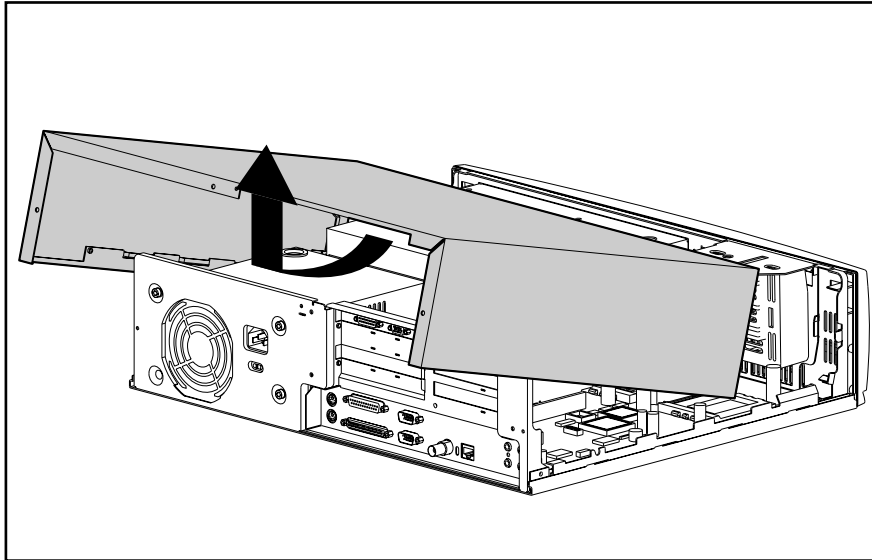
To remove the computer cover, complete the following steps:

1. Perform the preparation procedures (Section 5.3).
  - ✎ If the computer has a cable lock mechanism installed, refer to Section 5.5.
2. Loosen the three thumbscrews on the back of the workstation.
  - ✎ If the thumbscrews are tight, you can use a coin in the thumbscrew slot to loosen the thumbscrews.



**Figure 5-5.** Loosening the Thumbscrews on the Workstation Cover

3. Rotate the workstation cover up, remove the front lip of the cover from under the front bezel, and lift off the cover.



**Figure 5-6.** Removing the Workstation Cover



**WARNING:** To reduce the risk of personal injury from hot surfaces, allow the internal system components to cool before touching.

---

To replace the computer cover, complete the following steps:

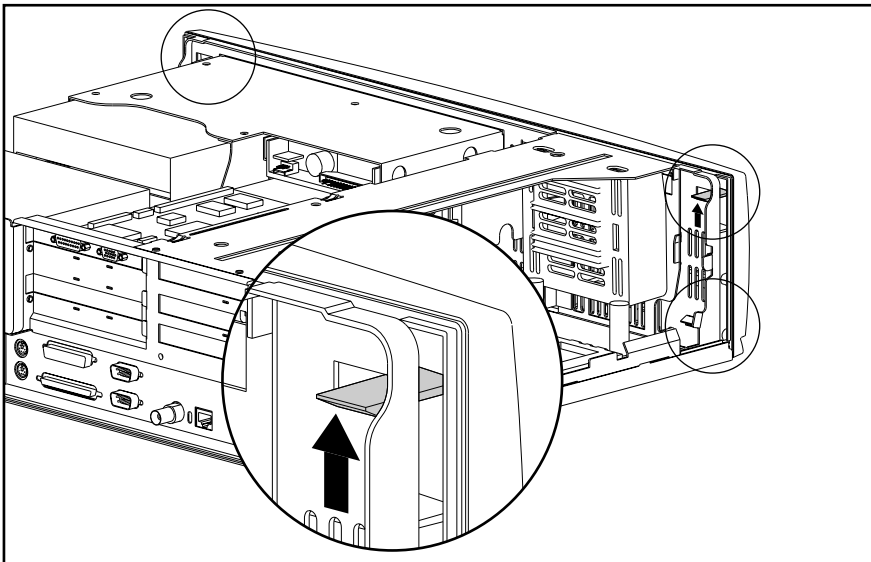
1. Hold the cover in an almost vertical position, and hook the front lip of the cover behind the front bezel. Then rotate the cover down onto the unit.
2. Tighten the thumbscrews on the back of the workstation.



## 5.7 Front Bezel

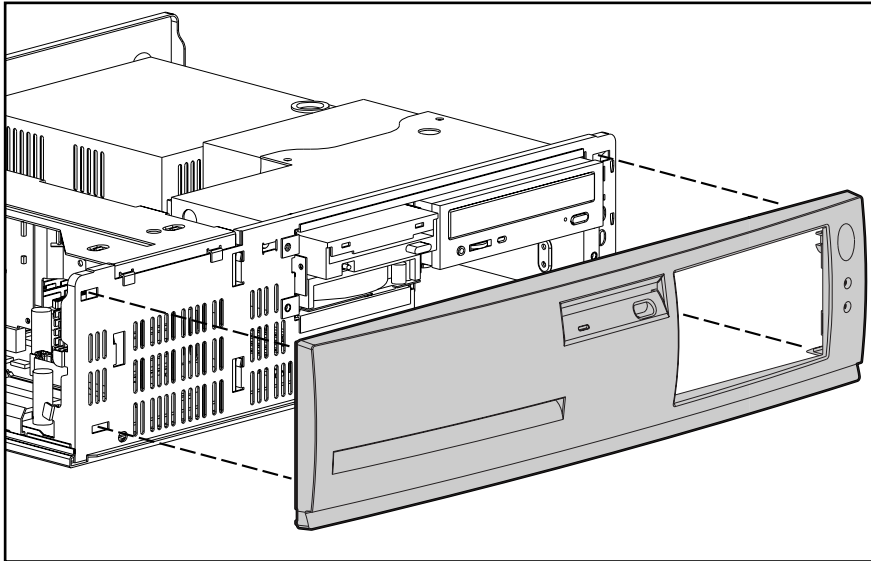
The front bezel is mounted to the chassis with release latches that are integrated into the bezel. To remove the front bezel, complete the following steps:

1. Perform the preparation procedures (Section 5.3).
2. Remove the workstation cover (Section 5.6).
3. From inside the chassis, push up the top release latches and push down the bottom release latches.



**Figure 5-7.** Locating the Release Latches

- ✎ Do not allow the bezel to pull off the push button on the diskette drive when separating the bezel from the chassis.
4. Pull the bezel straight out and away from the chassis.



**Figure 5-8.** Removing the Front Bezel

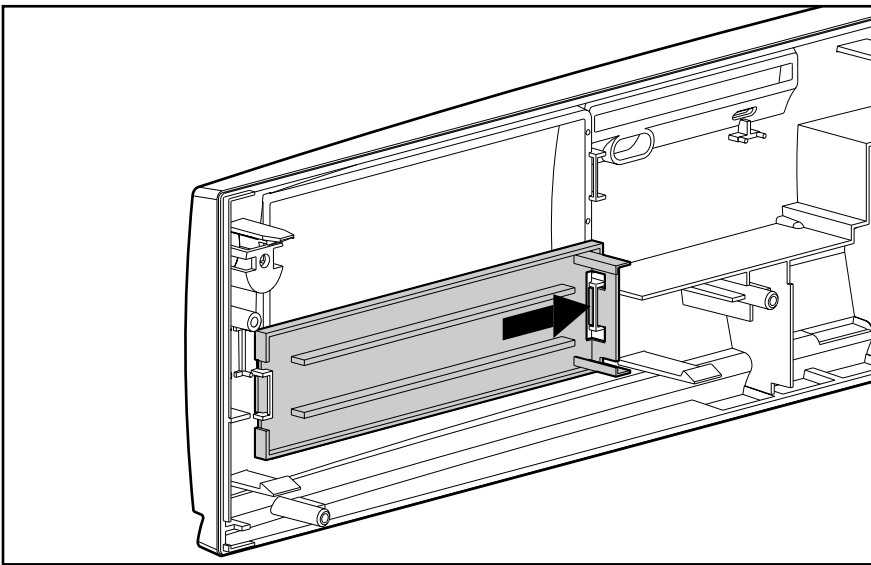
To replace the front bezel, complete the following steps:

1. Line up the release latches at the top of the bezel with the appropriate slots in the front of the chassis.
2. Press the bezel in to secure the release latches.

## 5.8 Blank Bezel

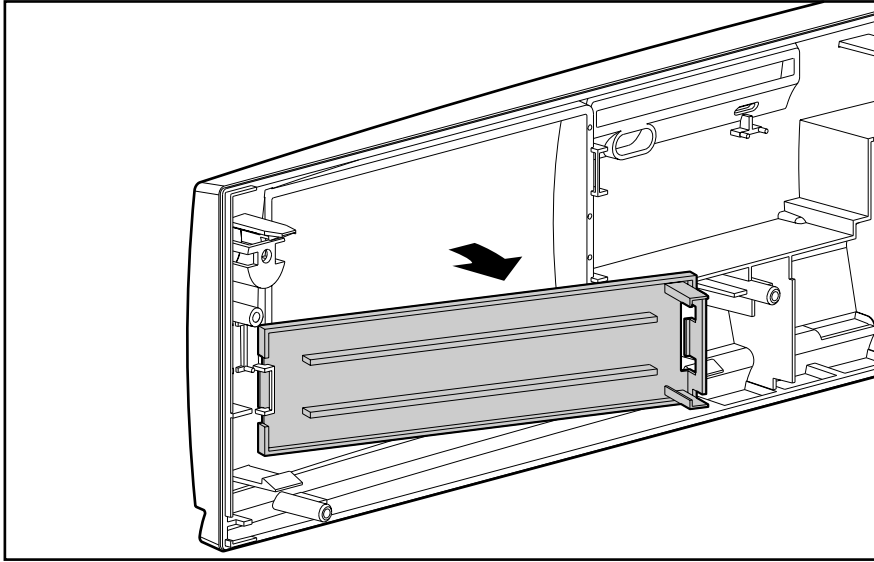
To remove the blank bezel from the front bezel, complete the following steps:

1. Perform the preparation procedures (Section 5.3).
2. Remove the workstation cover (Section 5.6).
3. Remove the front bezel (Section 5.7).
4. Lay the front bezel face down onto a protected work surface. Push the tab on the right of the blank bezel to the right.



**Figure 5-9.** Blank Bezel Tab

5. Pull the blank bezel out of the rear of the front bezel.



**Figure 5-10.** Removing the Blank Bezel

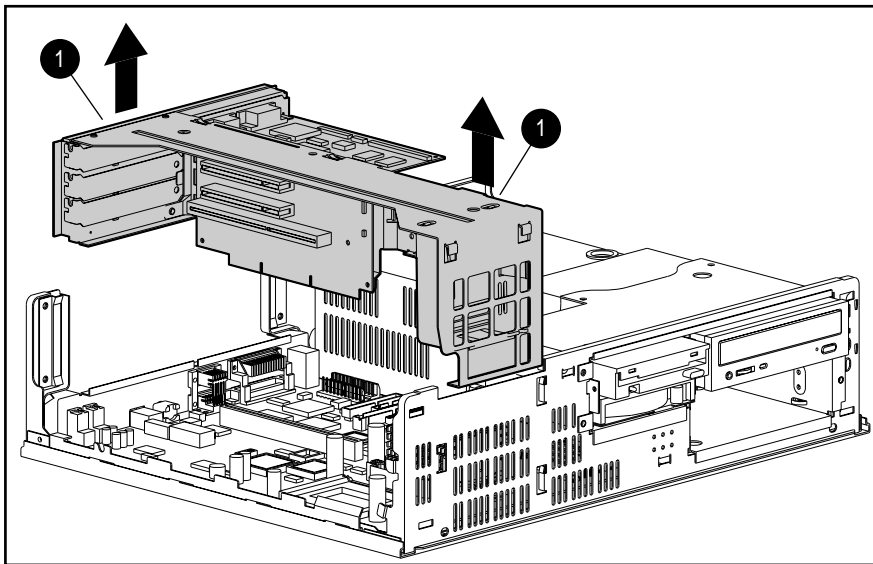
To replace the blank bezel, reverse the above steps.

## 5.9 Backplane Cage Assembly

The backplane cage assembly contains the audio speaker, backplane board, graphics controller, and any expansion boards.

To remove the backplane cage assembly from the chassis, complete the following steps:

1. Perform the preparation procedures (Section 5.3).
2. Remove the workstation cover (Section 5.6).
3. Disconnect any cabling to installed boards that would prevent the removal of the backplane cage assembly.
4. Grasp the backplane cage assembly at the indicated points 1 and pull it up and out of the workstation chassis. Use care when guiding the assembly out of the unit to prevent damaging the boards.



**Figure 5-11.** Removing the Backplane Cage Assembly

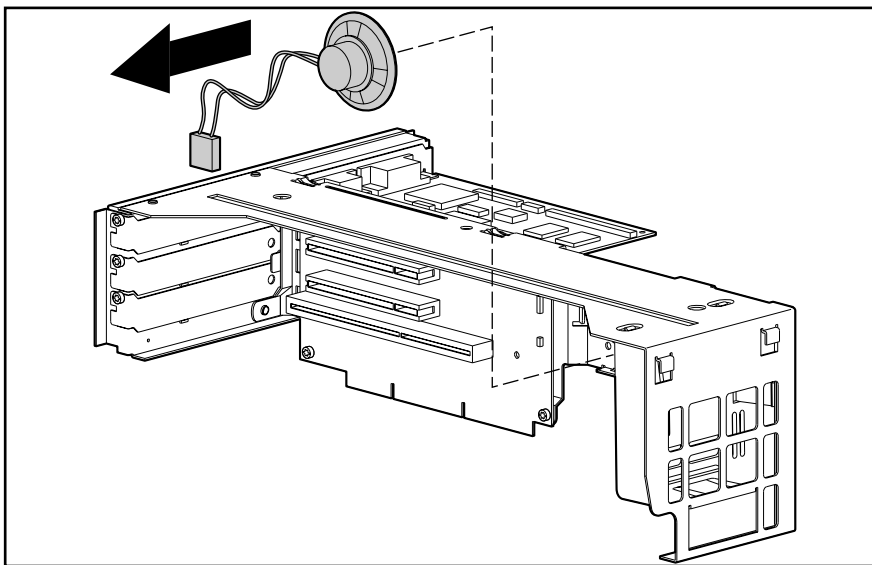
5. After removing the cage, lay it upside down on a protected work surface before doing any additional work to it.

To replace the backplane cage assembly, reverse the above procedure. Ensure that the backplane board is properly seated in the system board.

## 5.9.1 Speaker

To remove the speaker from the backplane cage assembly, complete the following steps:

1. Perform the preparation procedures (Section 5.3).
2. Remove the workstation cover (Section 5.6).
3. Remove the backplane cage assembly (Section 5.9).
4. Remove the speaker retaining screw.
5. Unplug the speaker connector from the backplane board.
6. Remove the speaker from the backplane cage assembly by sliding it up and then lifting it out of the cage.



**Figure 5-12.** Removing the Speaker

To install the speaker, reverse the above procedure.



**CAUTION:** When handling the speaker, take care not to damage the speaker cone.



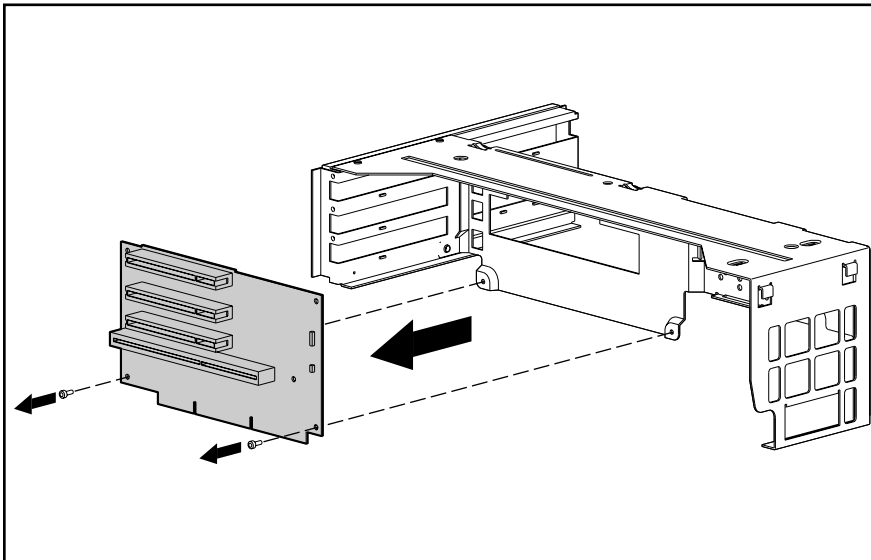
**CAUTION:** Make sure the retaining screw firmly clamps the speaker to the backplane cage assembly.

---

## 5.9.2 Backplane Board

To remove the backplane board, complete the following steps:

1. Perform the preparation procedures (Section 5.3).
2. Remove the workstation cover (Section 5.6).
3. Remove the backplane cage assembly (Section 5.9).
4. Remove all expansion boards from the backplane board (Section 5.9.3).
5. Remove any cables attached to the backplane board.
6. Remove the two screws that secure the backplane board to the backplane cage assembly.
7. Remove the backplane board from the backplane cage assembly.

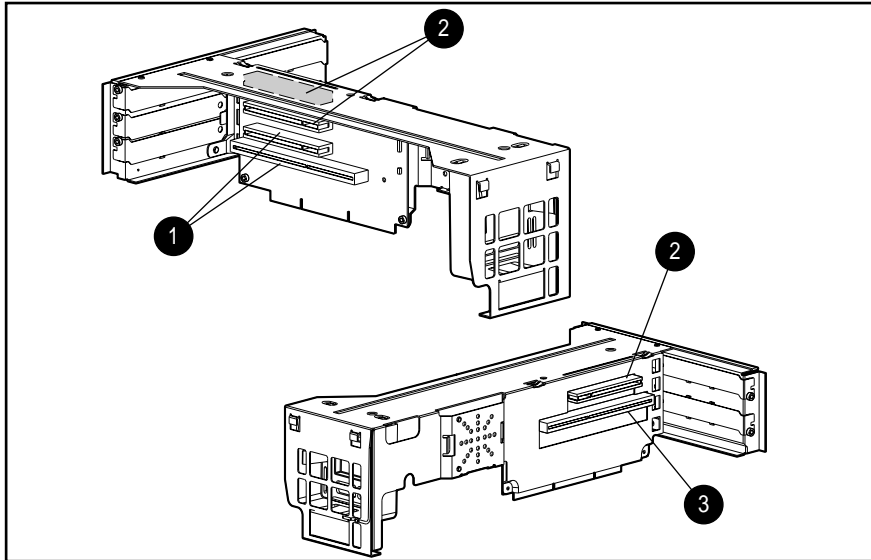


**Figure 5-13.** Removing the Backplane Board

To replace the backplane board, reverse the previous procedure, taking care to align the top edge of the backplane board into the slots in the backplane cage assembly.

### 5.9.3 Expansion Boards

The backplane cage assembly contains five expansion slots:



**Figure 5-14.** *Compaq Professional Workstation Expansion Slots*

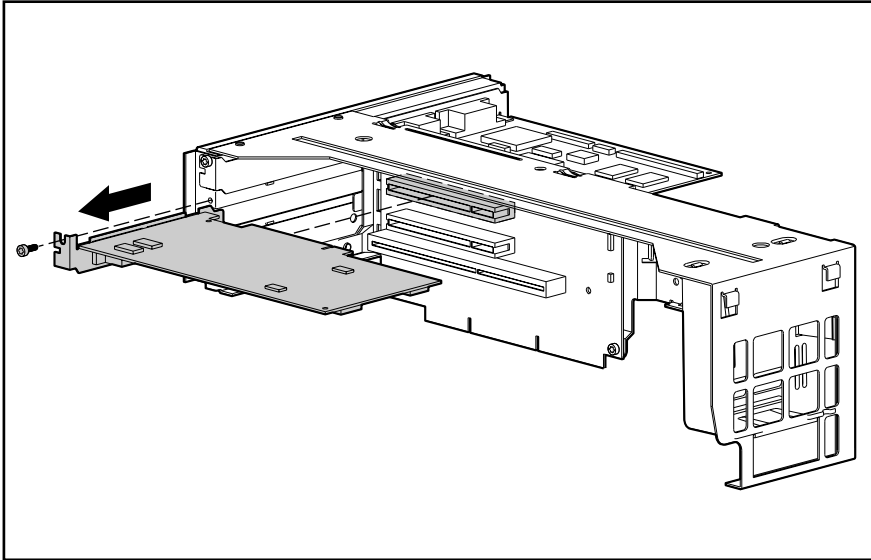
- 1 One PCI/ISA (Peripheral Component Interconnect/Industry Standard Architecture) shared expansion slot
- 2 Three PCI (Peripheral Component Interconnect) expansion slots
- 3 One ISA (Industry Standard Architecture) expansion slot

To remove an expansion board, complete the following steps:

1. Perform the preparation procedures (Section 5.3).
2. Remove the workstation cover (Section 5.6).
3. Remove the backplane cage assembly (Section 5.9) if the expansion board is located in a slot near the power supply. Removing the backplane cage assembly is unnecessary if the expansion board is in a slot facing away from the power supply.
4. If cables are attached to an expansion board, disconnect them.



5. Remove the expansion board screw from the backplane cage assembly.
6. Slide the expansion board out of the expansion slot.



**Figure 5-15.** Removing an Expansion Board



**CAUTION:** If you permanently remove an expansion board, install an expansion board slot cover to ensure proper cooling.

---

To install an expansion board, reverse the above procedure.

- ✎ If you are installing an expansion board for the first time in a slot, remove the retaining screw and the expansion board slot cover before installing the board.

## 5.9.4 Graphics Controller Memory

Depending on the model, the Compaq Professional Workstation ships standard with one of the following:

- Gloria-L graphics controller with 8-megabytes VRAM standard for display memory and 8-megabytes DRAM for the Z-buffer; DRAM upgradeable to 16 megabytes
- Matrox MGA Millennium 64-bit, PCI-based graphics controller with 2-megabytes WRAM standard; upgradeable to 4- or 8-megabytes WRAM

### Gloria-L 3D Graphics Controller



**CAUTION:** Static electricity can damage the electronic components of the workstation. Before beginning these procedures, ensure that you are discharged of static electricity by briefly touching a grounded metal object.

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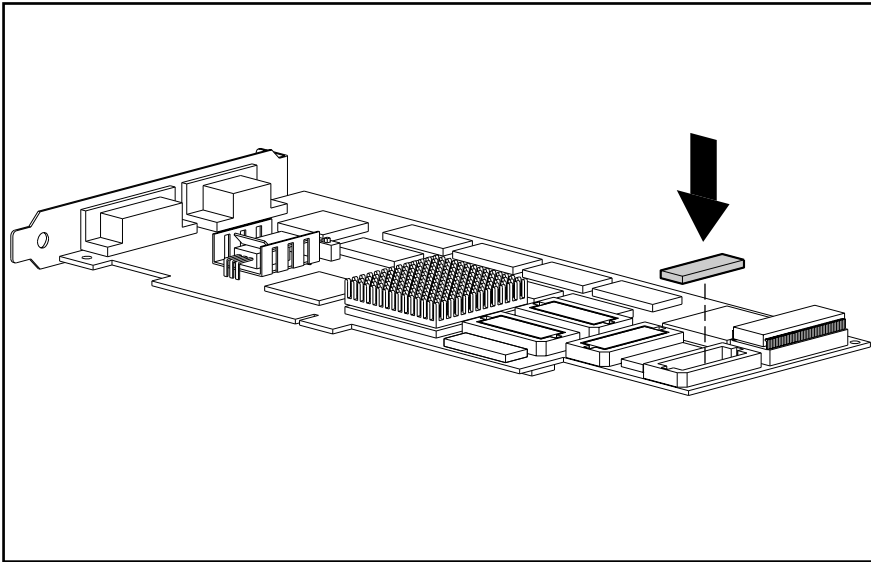
To install additional memory onto the Gloria-L Graphics Controller, complete the following steps:

1. Perform the preparation procedures (Section 5.3).
2. Remove the workstation cover (Section 5.6).
3. Remove the backplane cage assembly (Section 5.9).
4. Remove the Gloria-L 3D Graphics Controller (Section 5.9.3).

5. Place the graphics controller on a flat, static-dissipative surface and install the upgrade module.

- ✎ Ensure that all pins on the connector are properly aligned to avoid damaging the memory module and/or the graphics controller.

If you are removing a memory module, rock the module gently while pulling it up.



**Figure 5-16.** *Installing a Memory Upgrade Module on the Gloria-L Graphics Controller*

6. Replace the graphics controller in the same expansion slot, securing it with the previously removed screw.

7. Replace the backplane cage assembly.

8. Replace the workstation cover.

- ✎ Select the Display icon in Windows NT or Windows 95 to take advantage of the additional display modes now available with the upgraded memory. Follow the instructions on the screen.

## Matrox MGA Millennium Graphics Controller



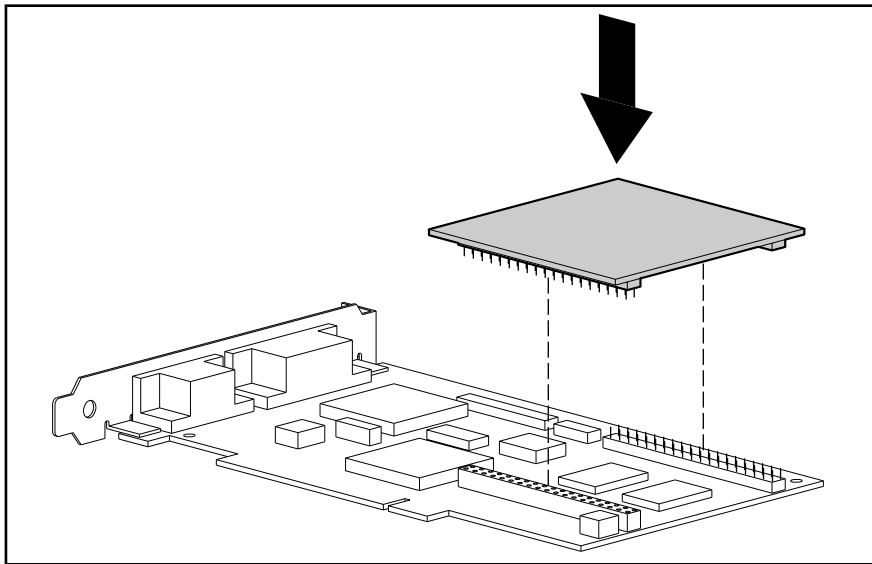
**CAUTION:** Static electricity can damage the electronic components of the workstation. Before beginning these procedures, ensure that you are discharged of static electricity by briefly touching a grounded metal object.

To install additional WRAM onto the Matrox MGA Millennium Graphics board, complete the following steps:

1. Perform the preparation procedures (Section 5.3).
2. Remove the workstation cover (Section 5.6).
3. Remove the backplane cage assembly (Section 5.9).
4. Remove the Matrox MGA Millennium Graphics Controller (Section 5.9.3).
5. Place the graphics controller on a flat, static-dissipative surface and install the upgrade module.

✎ Ensure that all pins on the connector are properly aligned to avoid damaging the memory module and/or the graphics controller.

If you are removing an upgrade module, rock the module gently while pulling it up.



**Figure 5-17.** Installing a WRAM Upgrade Module on the Graphics Board

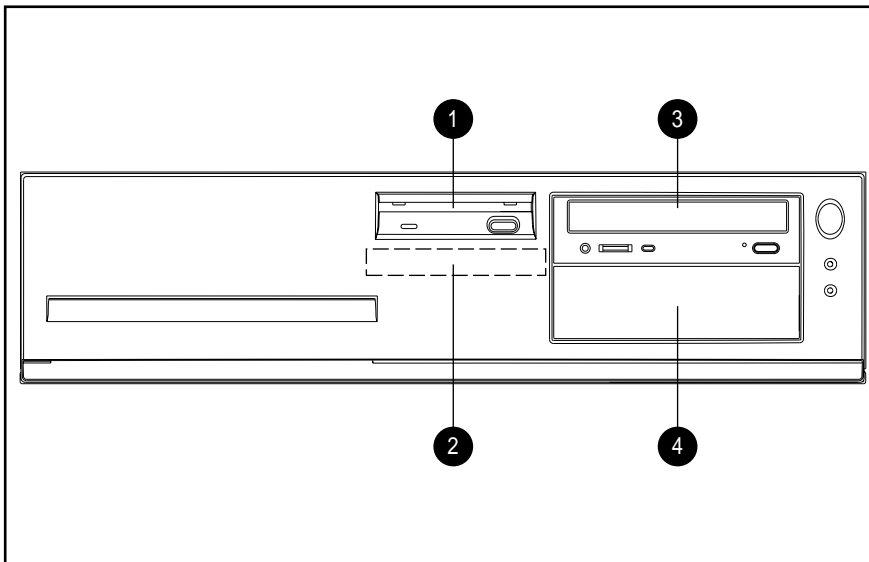
6. Replace the graphics controller in the same expansion slot, securing it with the previously removed screw.
  7. Replace the backplane cage assembly.
  8. Replace the workstation cover.
- ✎ Select the Display icon in Windows NT or Windows 95 to take advantage of the additional display modes now available with the upgraded memory. Follow the instructions on the screen.

## 5.10 Mass Storage Devices

This section discusses removal and replacement procedures for the mass storage devices supported on the Compaq Professional Workstation.

### 5.10.1 Drive Positions

The Professional Workstation can house up to four mass storage devices. The following illustration and table describe the recommended drive configurations.



**Figure 5-18.** Drive Positions

**Table 5-1**  
**Drive Positions**

Drive	Configuration
1	Standard, 3.5-inch 1.44MB diskette drive
2	Standard 3.5-inch internal hard drive, third height (2.1-GB)
3	Standard 5.25-inch CD-ROM drive, half height
4	Standard 4.3-GB internal hard drive, or optional diskette drive, tape drive, hard drive, PD-CD drive, or CD-ROM drive (5.25-inch, half height)



**CAUTION:** If no drive is installed in drive positions 3 or 4, ensure that a blank bezel is installed to ensure proper airflow and cooling. See Section 5.8.

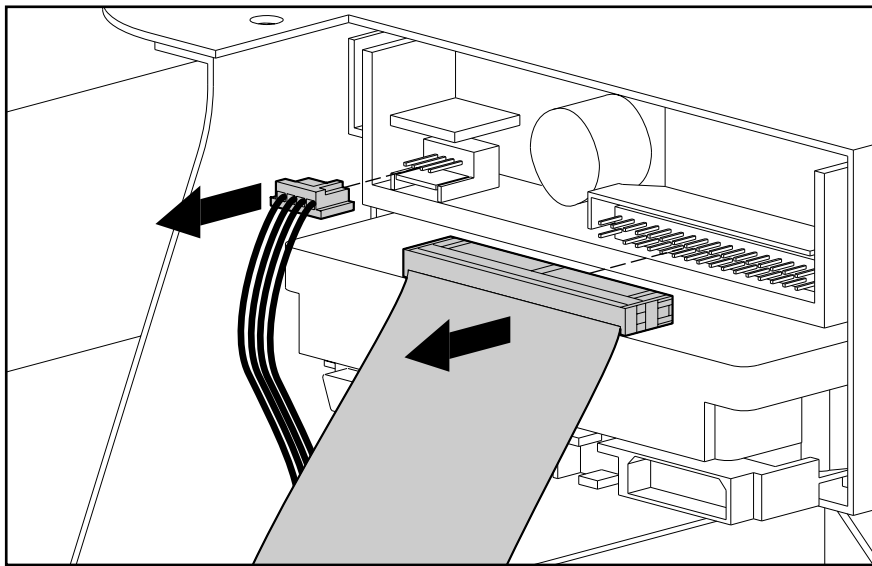
To verify the type, size, and capability of the mass storage devices installed in the computer, run the View System Information (INSPECT) utility available through Compaq Configuration and Diagnostics. Refer to Chapter 2, “Troubleshooting,” for more information.

## 5.10.2 Diskette Drive

Before beginning the removal procedure, ensure that no diskette is in the drive.

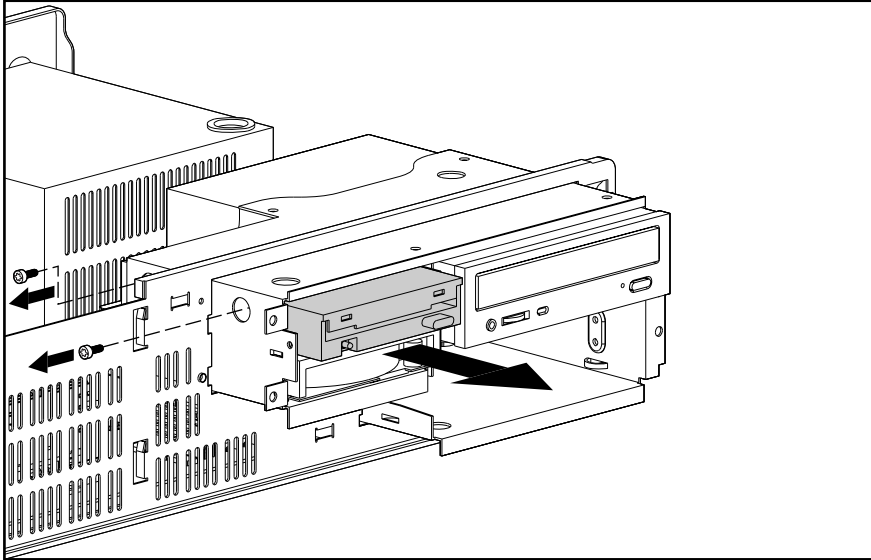
To remove the diskette drive from the drive bay, complete the following steps:

1. Perform the preparation procedures (Section 5.3).
2. Remove the workstation cover (Section 5.6).
3. Remove the front bezel (Section 5.7).
4. Disconnect the cables from the back of the diskette drive.



**Figure 5-19.** *Disconnecting the Cables from the Diskette Drive*

5. Remove the two screws on the left of the diskette drive that secure it in the drive cage.
6. Pull the diskette drive straight out of the chassis.



**Figure 5-20.** Removing the Diskette Drive

If you are replacing this drive with a new one, transfer the guide screw from the old drive to the new one. Ensure that the guide screw is placed in the first hole on the right side of the drive. You may also use the extra screws stored on the front of the computer chassis.

To replace the diskette drive, reverse the above procedure.



**CAUTION:** Use only 3/16-inch or 5-mm long screws. Longer screws can damage the internal components of the drive.



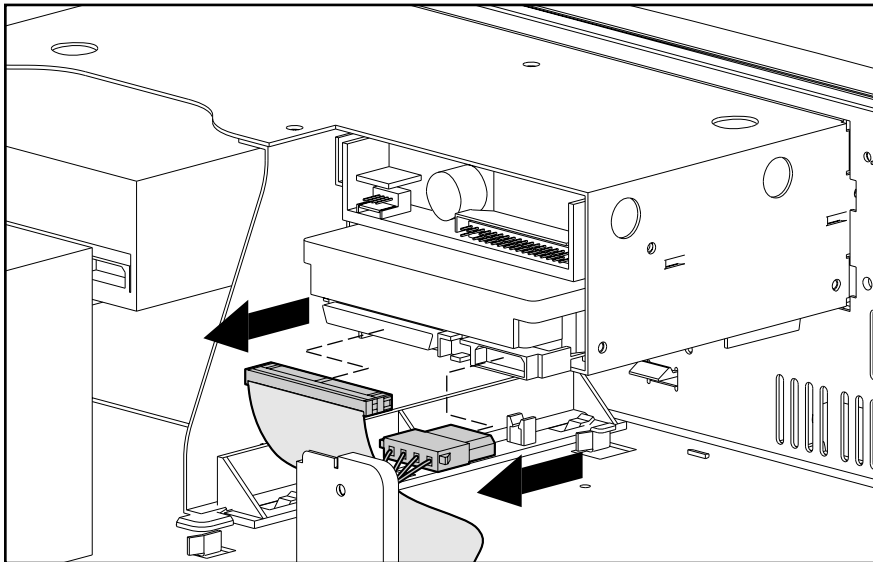
**CAUTION:** When servicing this computer, ensure that cables are placed in their proper locations during the reassembly process. Improper cable placement can damage the computer.

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### 5.10.3 Hard Drive

To remove the hard drive from the 3.5-inch drive bay, complete the following steps:

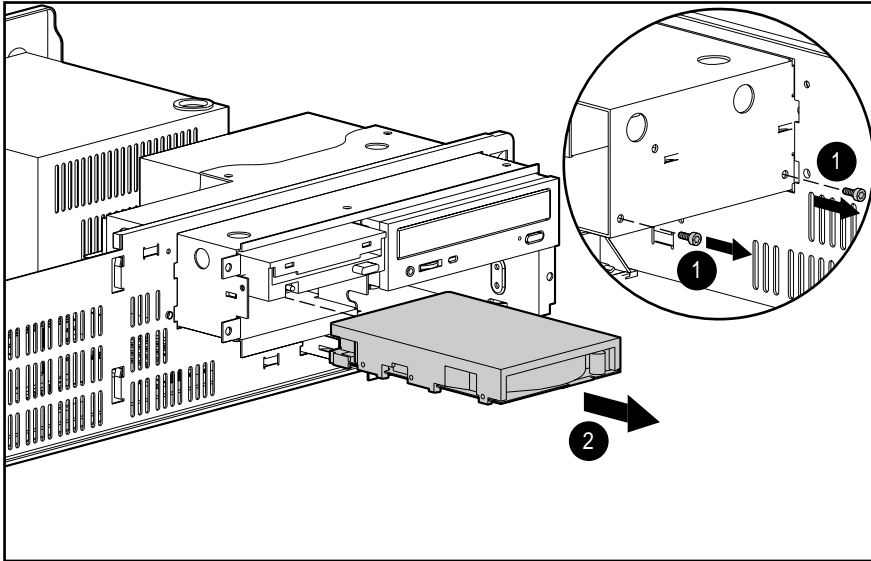
1. Perform the preparation procedures (Section 5.3).
2. Remove the workstation cover (Section 5.6).
3. Remove the front bezel (Section 5.7).
4. Disconnect the cables from the back of the drive.



**Figure 5-21.** *Disconnecting the Cables from the Hard Drive*



5. Remove the two screws on the left of the drive that secure it in the drive cage 1.
6. Pull the hard drive straight out of the chassis 2.



**Figure 5-22.** Removing the Hard Drive

If you are replacing this drive with a new one, transfer the guide screw from the old drive to the new one. Ensure that the guide screw is placed in the first hole on the right side of the drive. You may also use the extra screws stored on the front of the computer chassis.

To replace the hard drive, reverse the above procedure.



**CAUTION:** Use only 3/16-inch or 5-mm long screws. Longer screws can damage the internal components of the drive.

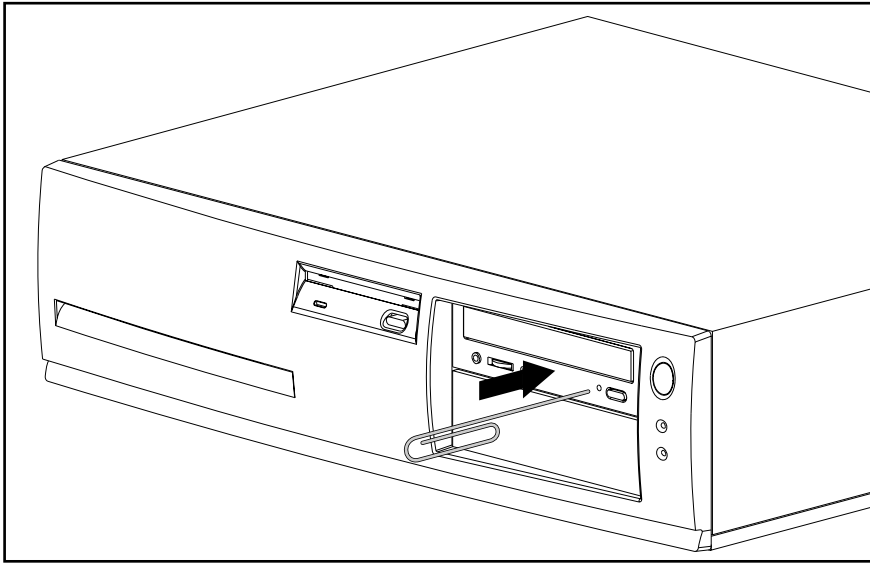


**CAUTION:** When servicing this computer, ensure that cables are placed in their proper locations during the reassembly process. Improper cable placement can damage the computer.

---

## 5.10.4 CD-ROM Drive

If you need to manually eject a CD from the CD-ROM drive, insert a metal rod that is approximately 1.2 mm in diameter and at least 35 mm in length (1/16 x 1 3/8 inches) into the manual eject hole and push firmly. A straightened paper clip works well. The tray will come out 0.25 to 0.50 inch. Pull the tray out by hand until the CD can be removed.



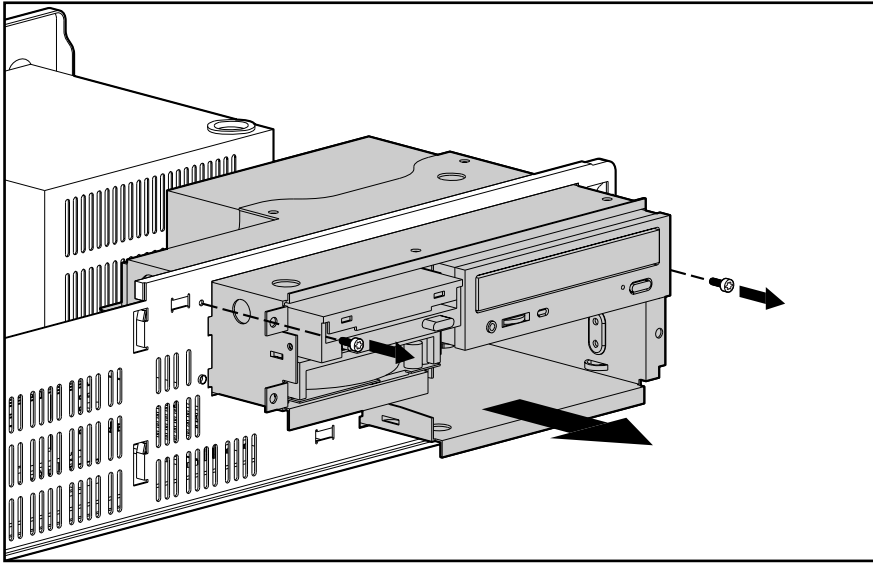
**Figure 5-23.** *Manually Ejecting a Compact Disc*

To remove the CD-ROM drive from the drive bay, complete the following steps:

1. Perform the preparation procedures (Section 5.3).
2. Remove the workstation cover (Section 5.6).
3. Remove the front bezel (Section 5.7).
4. Remove the two screws securing the drive cage to the front of the workstation chassis.

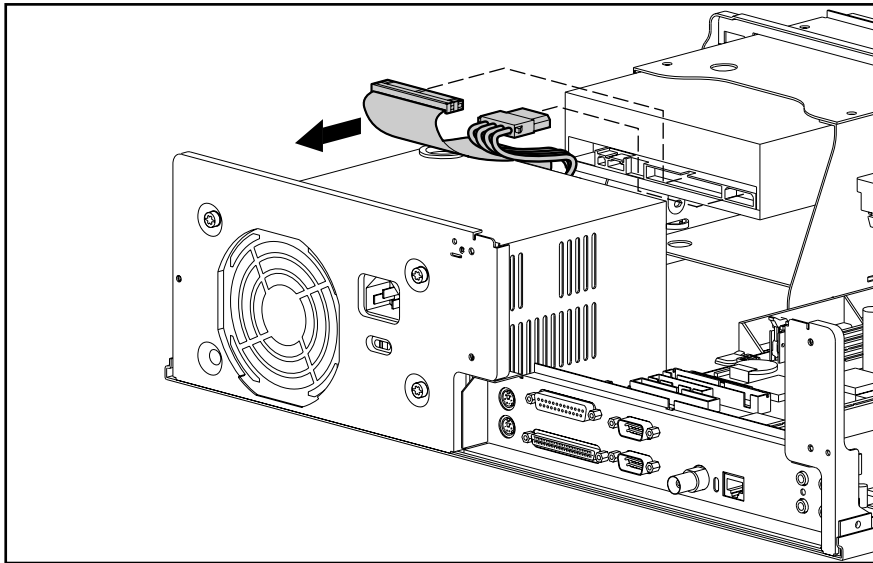
5. Grasp the front of the drive cage and pull to slide the drive cage halfway out of the chassis.

- ✎ The drive cage slides out halfway and stops. It is not necessary to completely remove the drive cage to remove any drives.



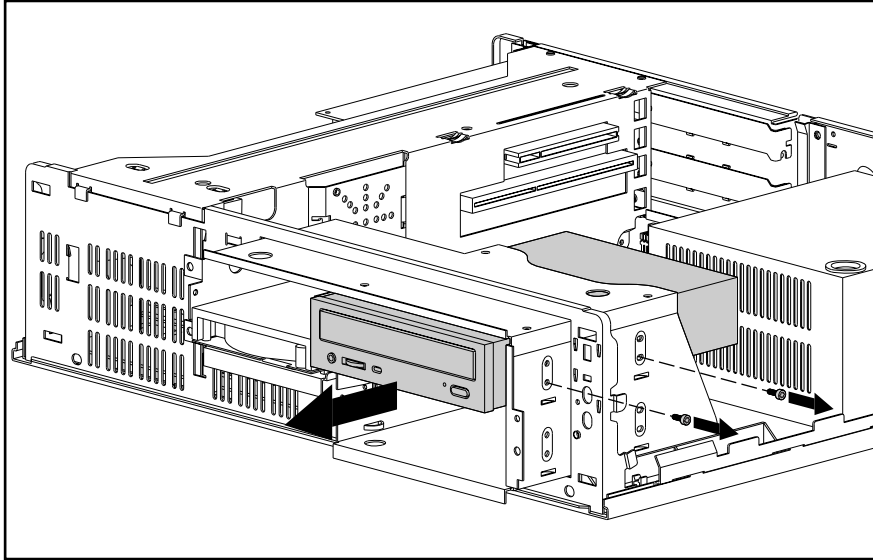
**Figure 5-24.** Sliding Out the Drive Cage

6. Disconnect all cables from the rear of the drive.



**Figure 5-25.** Disconnecting the Cables from the CD-ROM Drive

7. Remove the two screws on the right side of the drive that secure it in the chassis.
8. Pull the CD-ROM drive straight out of the chassis.



**Figure 5-26.** Removing the CD-ROM Drive

To replace the CD-ROM drive, complete the following steps:

1. Transfer the guide screw from the old drive to the new one. The screw is installed on the left front side of the drive.



**CAUTION:** Use only 3/16-inch or 5-mm screws as guide screws. Longer screws can damage the internal components of the drive.



**CAUTION:** When servicing this computer, ensure that cables are placed in their proper locations during the reassembly process. Improper cable placement can damage the computer.

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2. Reverse the above procedures.

### 5.10.5 3.5-Inch Drives into 5.25-Inch Option Drive Bay

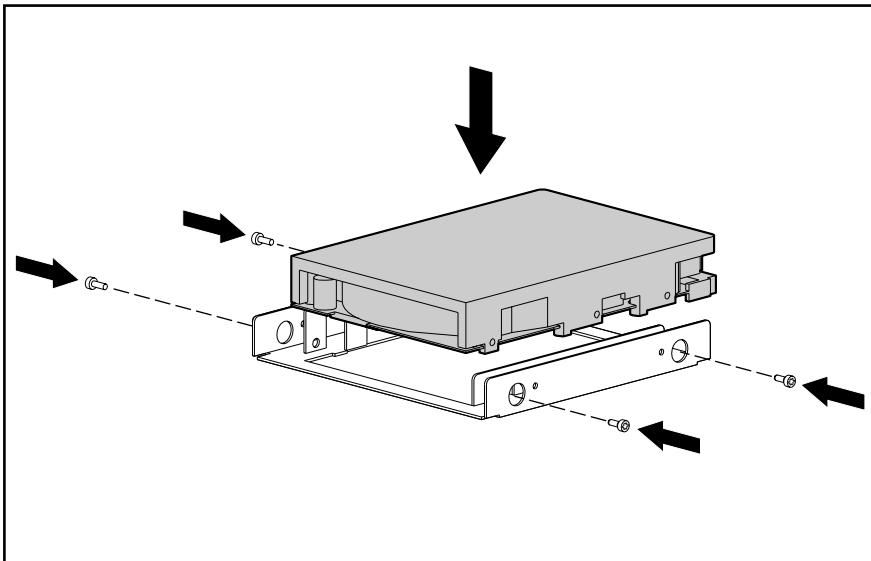
You can install 3.5-inch drives into the 5.25-inch option drive bay using drive bracket mounting. Complete the following steps to install a 3.5-inch drive into the 5.25-inch option drive bay:

1. Place the 3.5-inch drive into the bracket.
2. Insert the screws into the bracket holes on each side of the bracket to secure the drive.



**CAUTION:** Use only 3/16-inch or 5-mm screws as mounting screws. Longer screws can damage the internal components of the drive.

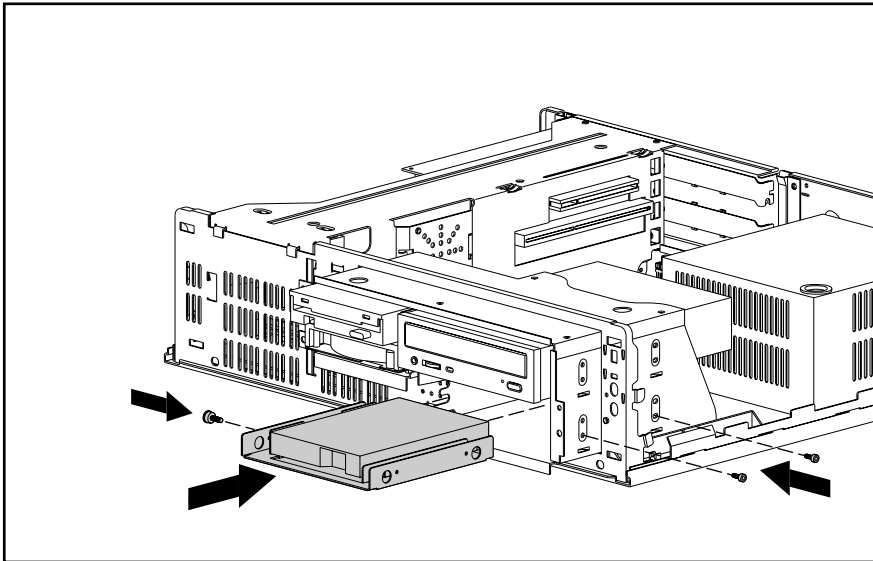
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**Figure 5-27.** *Placing the Hard Drive and Inserting Four Screws into the Bracket*

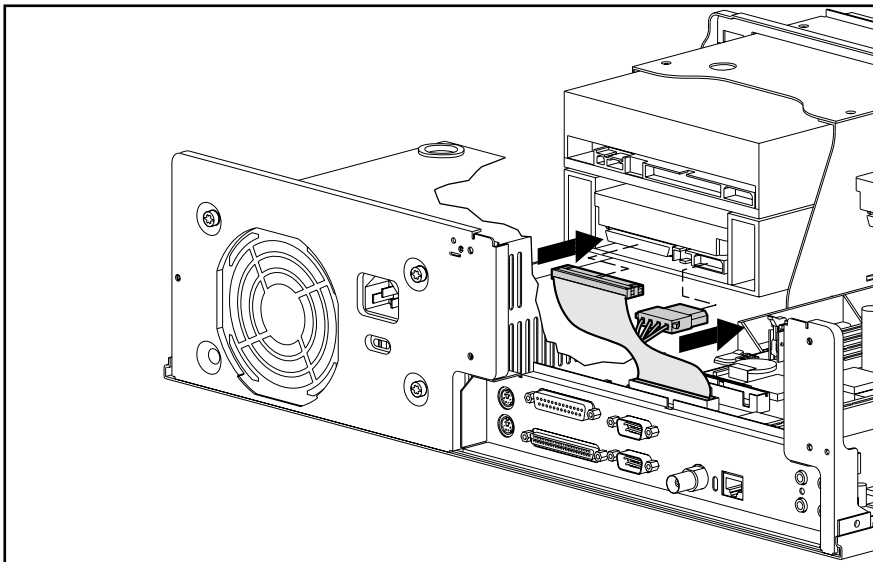
3. Install one metric guide screw into the front hole on the left side of the bracket. The guide screw is used to align the bracket in the drive bay.
4. Install the drive assembly into the drive bay, positioning the guide screw into the slot in the drive bay.

5. Secure the drive in the drive cage with two metric retaining screws on the right side of the drive.



**Figure 5-28.** *Installing the Hard Drive and Securing it with Retaining Screws*

6. Connect the drive cables.



**Figure 5-29.** *Connecting the Signal and Power Cables*

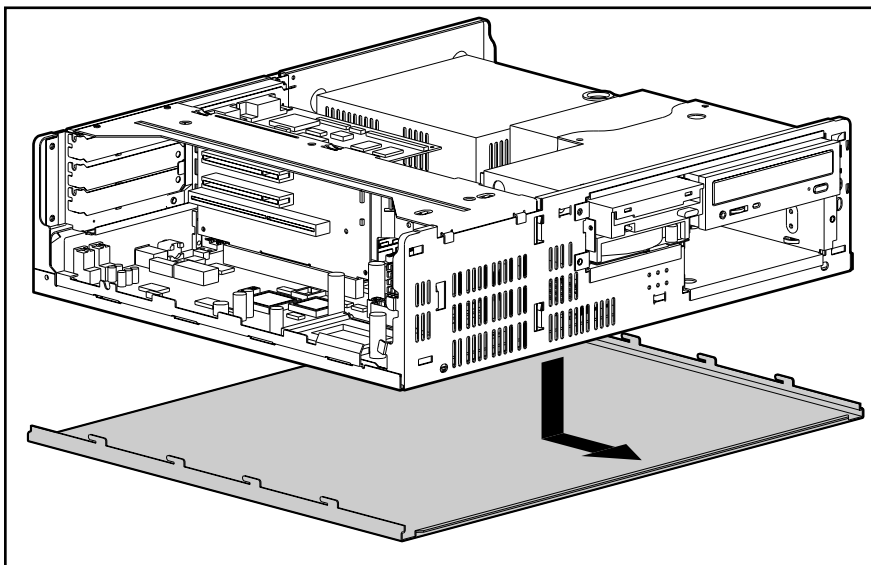
7. Remove the blank bezel from the front bezel if necessary (Section 5.7.3). If you are installing a hard drive, leave the blank bezel in place for proper cooling.
8. Install the front bezel.
9. Install the workstation cover.

10. The system will automatically recognize a hard drive sold by Compaq and will automatically reconfigure the computer. If you have installed a third-party hard drive, you will need to run Computer Setup to reconfigure the computer. Refer to Chapter 7, "Compaq Utilities," for information on Computer Setup.
11. Test the system (optional) using the Computer Checkup (TEST) utility. Refer to Chapter 2, "Troubleshooting."

## 5.11 Base Pan Cover

To remove the base pan cover, complete the following steps:

1. Perform the preparation procedures (Section 5.3).
2. Remove the workstation cover (Section 5.6).
3. Remove the front bezel (Section 5.7).
4. Turn the workstation on its end, with the front bezel end up.
5. Pull the base pan cover approximately 0.10 inch (2.5 mm) away from the base pan assembly, and pull the base pan cover toward the front bezel end. This unlocks a securing tab near the front center of the base pan cover.
6. Lift the base pan cover off the base pan assembly.



**Figure 5-30.** Removing the Base Pan Cover

To replace the base pan cover, reverse the above procedures.

## 5.12 Drive Cage Guides

To remove the drive cage guides that secure the drive cage to the chassis, complete the following steps:

1. Perform the preparation procedures (Section 5.3).
2. Remove the workstation cover (Section 5.6).
3. Remove the front bezel (Section 5.7).
4. Remove the base pan cover (Section 5.11).
5. With the workstation on its end, release the snap on the bottom of the guide.
6. Slide each guide as shown and remove it from the chassis.

To replace the drive cage guides, reverse the above procedures.

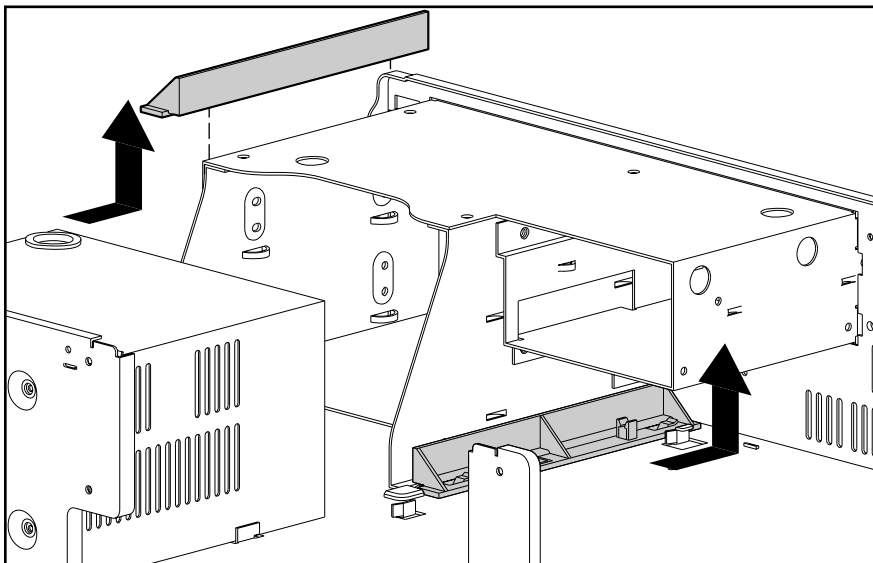


Figure 5-31. Removing the Drive Cage Guides

## 5.13 Drive Cage

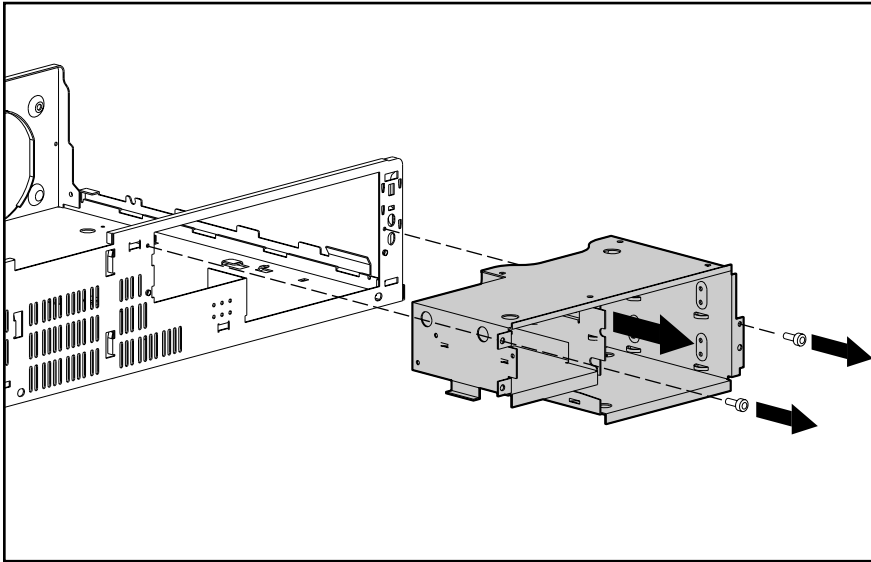
- ✎ It is not necessary to completely remove the drive cage to remove any drives. For instructions on sliding out the drive cage, see Section 5.10.4.

To remove the drive cage from the chassis, complete the following steps:

1. Perform the preparation procedures (Section 5.3).
2. Remove the workstation cover (Section 5.6).
3. Remove the front bezel (Section 5.7).



4. Remove all drives from the drive cage (Sections 5.10.2, 5.10.3, 5.10.4, 5.10.5).
5. Remove the base pan cover (Section 5.11).
6. Remove the drive cage guides (Section 5.12).
7. Remove the two screws securing the drive cage to the chassis.
8. Lift and pull the drive cage through the opening in the chassis.



**Figure 5-32.** Removing the Drive Cage

To replace the drive cage, complete the following steps:

1. With the chassis on its end, insert the drive cage through the front of the chassis about three inches into the chassis.
2. Place a drive cage guide on each side of the drive cage and snap them into place.
3. Replace all drives.
4. Slide the drive cage back into the chassis and secure it with two screws.

## 5.14 System Board Assembly

The system board assembly contains the system memory modules, heatsink and microprocessor, processor power module, system board tray, and the battery.

✎ See Chapter 3, “Illustrated Parts Catalog,” for spare part numbers for these items.

It is not necessary to remove the system board from the chassis to replace system board components.

## 5.14.1 Memory Modules

Depending on the model, the Compaq Professional Workstation ships standard with 32-, 64-, or 128-MB unbuffered EDO DRAM, with ECC support and a 4-KHz refresh rate.

Memory is expandable to 512 megabytes, installed in 16-, 32-, 64-, and 128-MB dual inline memory modules (DIMMs).



**CAUTION:** Static electricity can damage the electronic components of the workstation or optional boards. Before beginning these procedures, ensure that you are discharged of static electricity by briefly touching a grounded metal object.



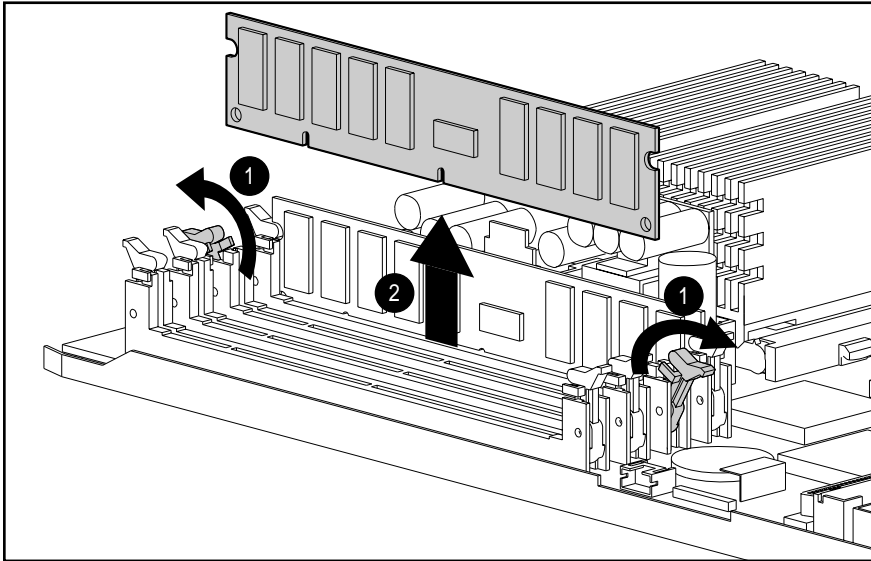
**CAUTION:** When handling a memory module, be careful not to touch any of the contacts. Doing so can damage the module.

---

To remove a memory module, complete the following steps:

1. Perform the preparation procedures (Section 5.3).
2. Remove the workstation cover (Section 5.6).
3. Remove the backplane cage assembly (Section 5.9).
4. Disconnect any cables from the system board.
5. Slide the system board tray halfway out of the chassis (Section 5.14.4).

6. Press outward on both latches of the DIMM at the same time 1. This releases the module and partially pushes it out of the socket.
7. Lift the module from the socket 2.



**Figure 5-33.** Removing a Memory Module

To install replacement DIMMs, reverse the above steps. Test the system (optional) using the Computer Checkup (TEST) utility. Refer to Chapter 2, “Troubleshooting.”

- ✎ The computer recognizes system memory upgrades and automatically reconfigures the computer. If the memory upgrades do not configure correctly, run Computer Setup to reconfigure the computer. Refer to Chapter 7, “Compaq Utilities,” for information on Computer Setup.

## 5.14.2 Microprocessor



**CAUTION:** Static electricity can damage the electronic components of the workstation. Before beginning these procedures, ensure that you are discharged of static electricity by briefly touching a grounded metal object.

---

To remove the microprocessor from the system board, complete the following steps:

1. Perform the preparation procedures (Section 5.3).
2. Remove the workstation cover (Section 5.6).



**WARNING:** To reduce the risk of personal injury from hot surfaces, allow the internal system components to cool before touching.

---

3. Remove the backplane cage assembly (Section 5.9).

4. Remove the retaining clip 1 by pressing down on the clip's extended tab until it releases from the safety catch.
5. Remove the heat sink 2, and thermal pad 3 from the processor.



**CAUTION:** The heatsink is easy to remove if it is warm to the touch. If it is cool, twist it slightly to break the adhesive bond. Do not lift the heatsink while twisting it or damage to the ZIF socket can result.

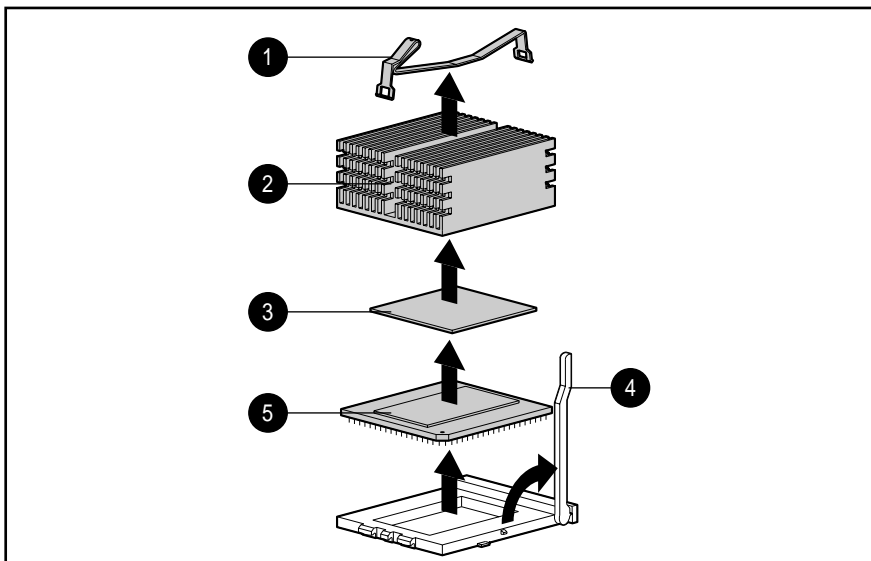
---

6. Lift the handle on the zero insertion force (ZIF) socket 4.



The handle on the ZIF socket in your computer may not look identical to the handle shown in the drawing. All handle types perform the same function.

7. Lift the processor 5 out of the processor socket.



**Figure 5-34.** Removing the Microprocessor from the System Board

To install a replacement microprocessor, complete the following steps:

1. Reverse the above steps.



**CAUTION:** When replacing the processor, align it so that the diagonal corner of the processor aligns with the upper-left corner of the socket (viewing the workstation from the front bezel).

---

2. Run the Computer Setup utility. Refer to Chapter 7, "Compaq Utilities."
3. Test the system (optional) using the Computer Checkup (TEST) utility. Refer to Chapter 2, "Troubleshooting."

### 5.14.3 Processor Power Module (Voltage Regulator Module - VRM)



**CAUTION:** Static electricity can damage the electronic components of the workstation. Before beginning these procedures, ensure that you are discharged of static electricity by briefly touching a grounded metal object.

---

The processor power module is located on the system board. To remove the processor power module, complete the following steps:

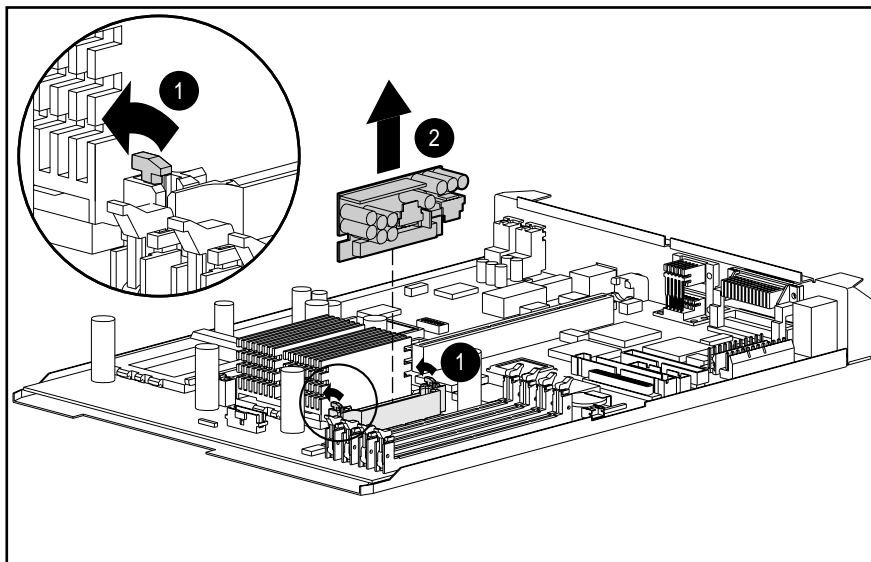
1. Perform the preparation procedures (Section 5.3).
2. Remove the workstation cover (Section 5.6).



**WARNING:** To reduce the risk of personal injury from hot surfaces, allow the internal system components to cool before touching.

---

3. Remove the backplane cage assembly (Section 5.9).
- ✎ For better access to the processor power module, you might need to slide the system board out halfway (Section 5.14.4).
4. Press outward on both latches of the processor power module at the same time 1, and lift it from the system board 2.



**Figure 5-35.** Removing the Processor Power Module (Voltage Regulator Module - VRM)

To install a processor power module, reverse the above steps.

## 5.14.4 System Board Tray



**CAUTION:** Static electricity can damage the electronic components of the workstation. Before beginning these procedures, ensure that you are discharged of static electricity by briefly touching a grounded metal object.

---

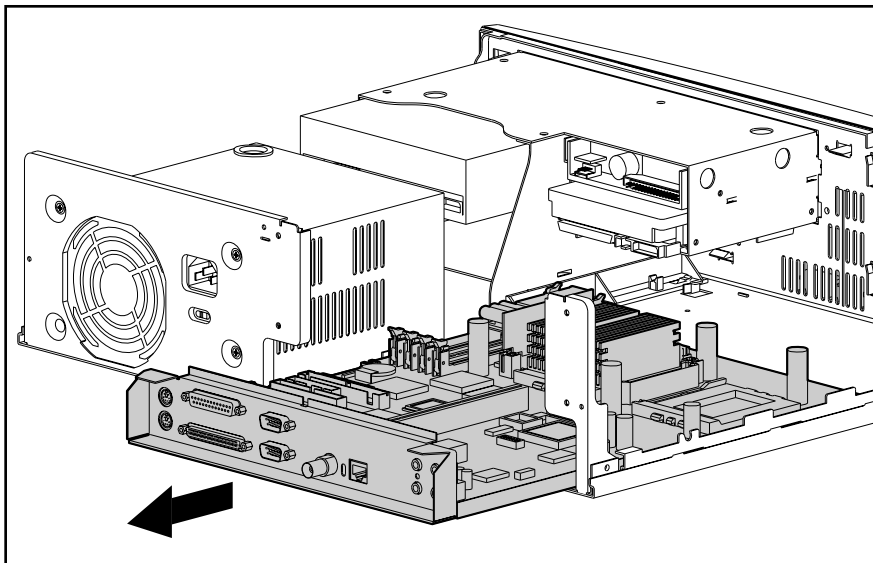
To remove the system board tray, complete the following steps:

1. Perform the preparation procedures (Section 5.3).
2. Remove the workstation cover (Section 5.6).
3. Remove the backplane cage assembly (Section 5.9).
4. Disconnect any mass storage, audio, and power cables plugged into the system board.
5. Grasp the back edge of the system board tray and slide it out of the chassis.



**CAUTION:** If any optional 64-MB DIMMs are installed in the two outside slots, remove them before sliding out the system board tray. The tray cannot slide out entirely with the 64-MB modules installed.

---



**Figure 5-36.** Removing the System Board Tray

To install a new system board tray, follow these steps:

1. Remove the installed DIMMs from the system board tray you are replacing (Section 5.14.1). If the DIMMs are not 64-MB, install them on the new system board tray. If the DIMMs are 64-MB and are located in the outer two slots, place them on a protected work surface. These DIMMs must be installed after the new system board tray is in the chassis.
2. Remove the microprocessor (Section 5.14.2) and the processor power module (Section 5.14.3) from the system board tray you are replacing and install them on the new system board.

3. Slide the system board tray into the chassis.
4. If removed earlier, install any 64-MB DIMMs in the outer two slots on the new system board.
5. Connect the mass storage, audio, and power cables to the system board.
6. Replace the backplane cage assembly.
7. Replace the workstation cover.
8. Run the Computer Setup utility to reconfigure the system. Refer to Chapter 7, "Compaq Utilities."


### 5.14.5 Replacement Battery

The real-time clock battery that came with the computer is nonreplaceable and is permanently installed on the system board.



**WARNING:** The system board contains a clock/CMOS lithium battery. The lithium battery may explode if mistreated. The battery is soldered in and may not be removed. Do not abuse or disassemble. Use only replacement batteries supplied by Compaq Computer Corporation.

---

 It is important to make a set of backup diagnostics diskettes before you install a new battery.

To install the external real-time clock battery, complete the following steps:



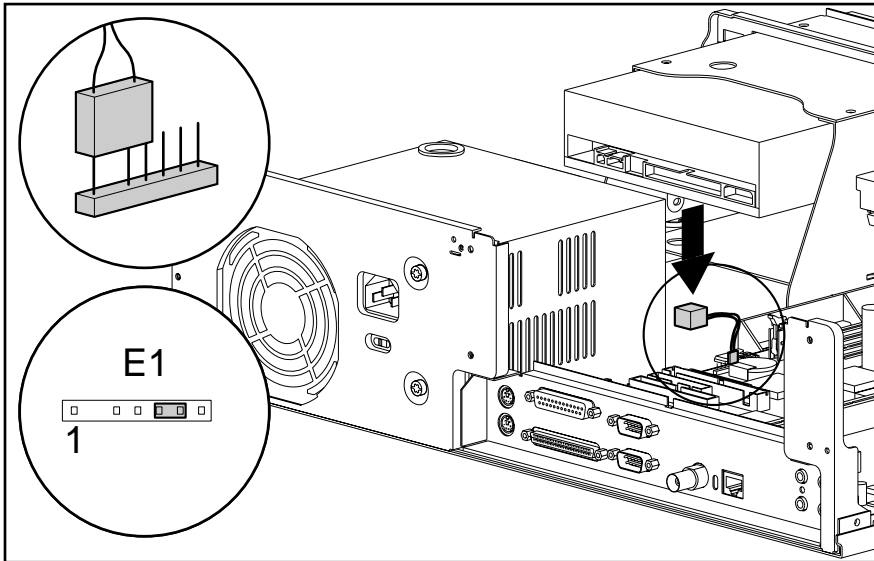
**CAUTION:** Static electricity can damage the electronic components of the workstation. Before beginning these procedures, ensure that you are discharged of static electricity by briefly touching a grounded metal object.

---

1. Perform the preparation procedures (Section 5.3).
2. Remove the workstation cover (Section 5.6).
3. Remove the backplane cage assembly (Section 5.9).



4. Remove the backing from the adhesive on the hook-and-loop fastener strip, and attach the battery near the E1 jumper.
5. Connect the battery to E1 pins 1 through 4 and move the jumper from pins 6 and 7 to pins 5 and 6.



**Figure 5-37.** *Installing the Replacement Battery*

6. Replace the backplane cage assembly.
7. Replace the workstation cover.
8. Place the sticker included with your battery kit on the back of the computer above the power connector.
9. Plug in the computer and reconnect any external devices.



**WARNING:** This equipment is designed for connection to a grounded (earthed) outlet. The grounding type plug is an important safety feature. To avoid the risk of electrical shock or damage to the equipment, do not disable this feature.

---

10. Turn on the computer.
11. Run the Computer Setup utility to reconfigure the system. Refer to Chapter 7, "Compaq Utilities."

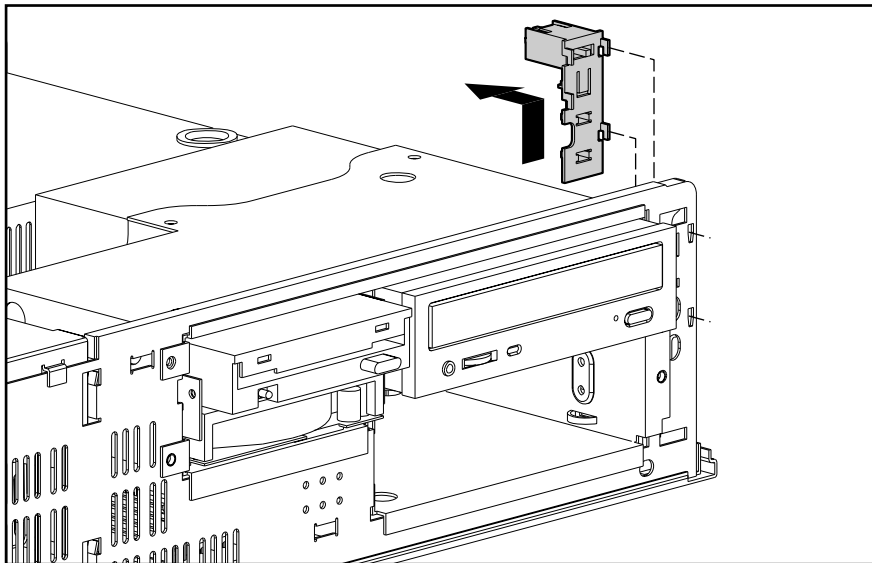
## 5.15 Power Supply Assembly

The power supply assembly consists of the power switch holder and the power supply.

### 5.15.1 Power Switch Holder

The power switch holder can be replaced without removing the power supply. To remove the power switch, complete the following steps:

1. Perform the preparation procedures (Section 5.3).
2. Remove the workstation cover (Section 5.6).
3. Remove the plastic switch holder from the front of the chassis by pulling up the tab in the center of the holder and sliding the holder up and out.



**Figure 5-38.** Removing the Plastic Switch Holder

4. Unsnap the switch from the power switch holder.
5. Remove the wires from the switch.
6. Remove the wires from the two plastic clips on the chassis.

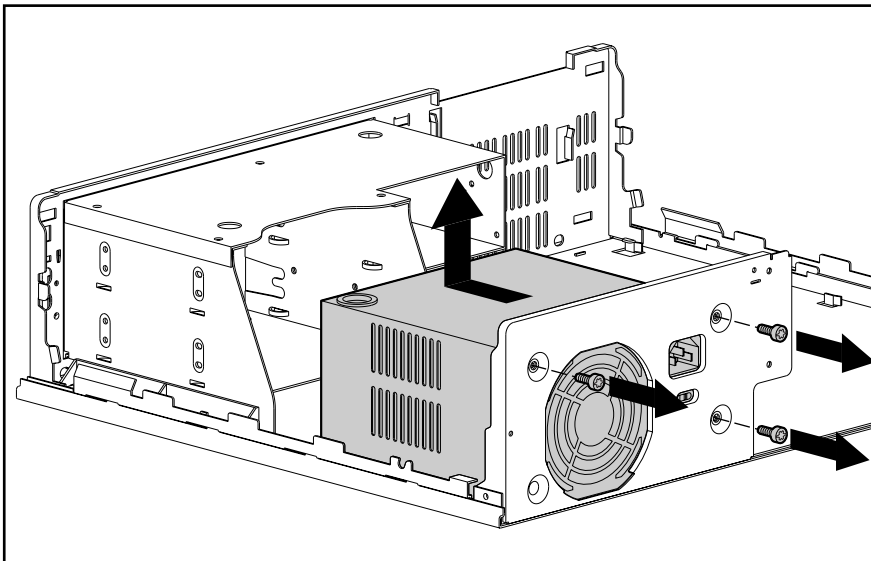
To install the power switch holder, reverse the above procedures.

### 5.15.2 Power Supply

To remove the power supply, complete the following steps:

1. Perform the preparation procedures (Section 5.3).
2. Remove the workstation cover (Section 5.6).

3. Remove the plastic switch holder from the chassis (Section 5.15.1).
4. Disconnect all power cables from the mass storage devices and the system board.
  - ✎ To facilitate reassembly, note the orientation of each cable connector and the routing of each cable before you remove it.
  - ✎ You may need to slide the drive cage forward, depending on the devices installed in the optional drive bays. Refer to Section 5.10.4 for more information.
5. Remove the three screws that secure the power supply to the back of the chassis.
6. Slide the power supply toward the front of the computer chassis, and lift up to remove it from the chassis.



**Figure 5-39.** Removing the Power Supply

To replace the power supply assembly, reverse the above procedure.



**WARNING:** This equipment is designed for connection to a grounded (earthed) outlet. The grounding type plug is an important safety feature. To reduce the risk of electrical shock, damage to the equipment, or loss of the data, do not disable this feature.



**CAUTION:** Ensure that the voltage select switch is in the proper position (115 or 230 VAC). Failure to do so will result in damage to the equipment.



**WARNING:** This procedure should be performed only by qualified personnel. Do not reconnect power to the computer until the computer cover is replaced. Connecting the power before replacing the computer cover can result in personal injury or equipment damage.

---

## 5.16 Base Pan Assembly

To remove the base pan assembly, you must remove all components from the chassis. Complete the following steps:

1. Perform the preparation procedures (Section 5.3).
2. Remove the workstation cover (Section 5.6).
3. Remove the front bezel (Section 5.7).
4. Remove the backplane cage assembly (Section 5.9).
5. Remove the system board assembly (Section 5.14).
6. Remove the power supply assembly (Section 5.15).
7. Remove all drives from the drive cage (Sections 5.10.2, 5.10.3, 5.10.4, 5.10.5).
8. Remove the base pan cover (Section 5.11).
9. Remove the drive cage guides (Section 5.12).
10. Remove the drive cage (Section 5.13).

The base pan assembly is essentially the chassis, or the frame that is left after removing all the components above. To install a new base pan assembly, reverse the above steps.

# chapter 6

## JUMPER AND SWITCH INFORMATION

### 6.1 System Board

This chapter provides jumper and switch information for the system board and drives for the Compaq Professional Workstation. The components on the system board, which is Pentium-Pro based, are illustrated in the following figure. Refer to Table 6-1 for component names.

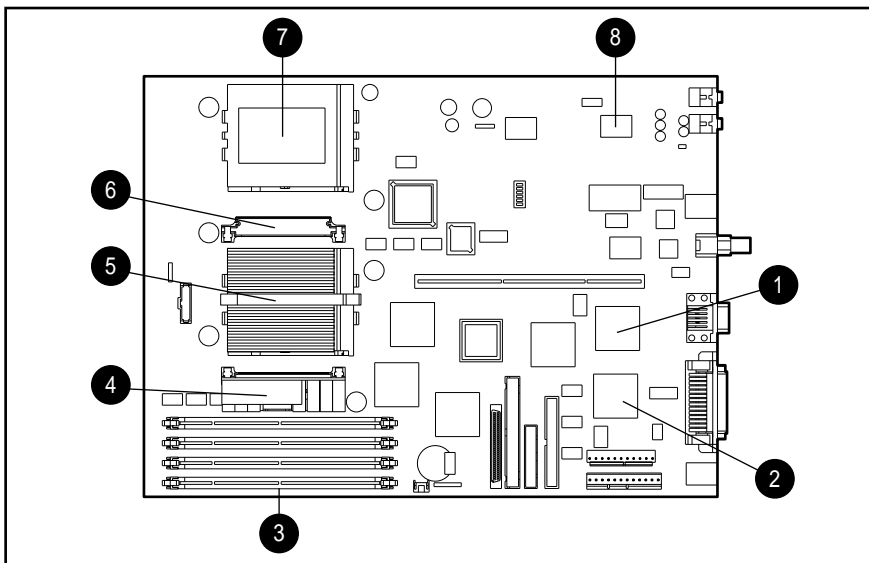
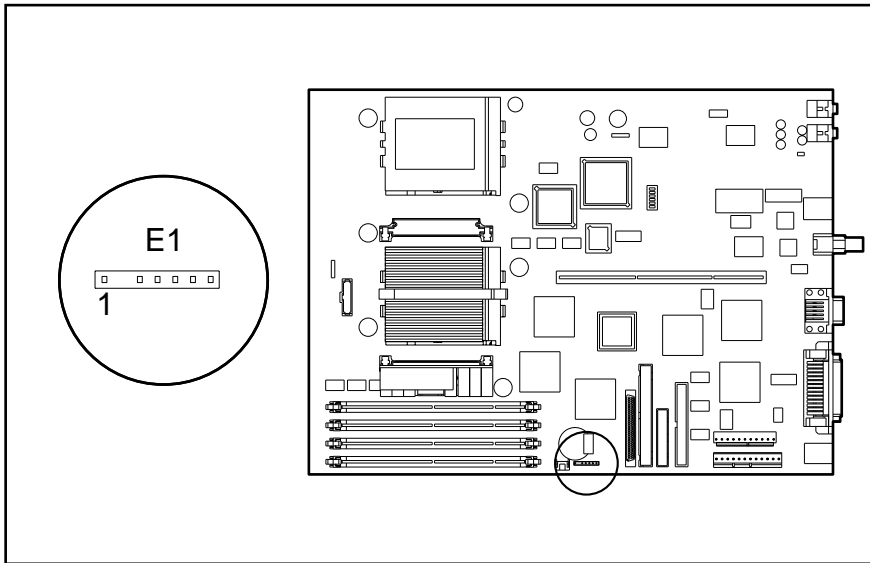


Figure 6-1. System Board Components

Table 6-1  
System Board Components

Reference	Component
1	Network Interface Controller
2	Ultra-Wide SCSI Controller
3	Memory Module (DIMM) Sockets
4	Voltage Regulator (Primary)
5	Processor (Primary or Processor 0)
6	Voltage Regulator (Secondary)
7	Processor (Secondary or Processor 1)
8	Audio Controller

## 6.1.1 Jumpers



**Figure 6-2.** E1 Jumper Location

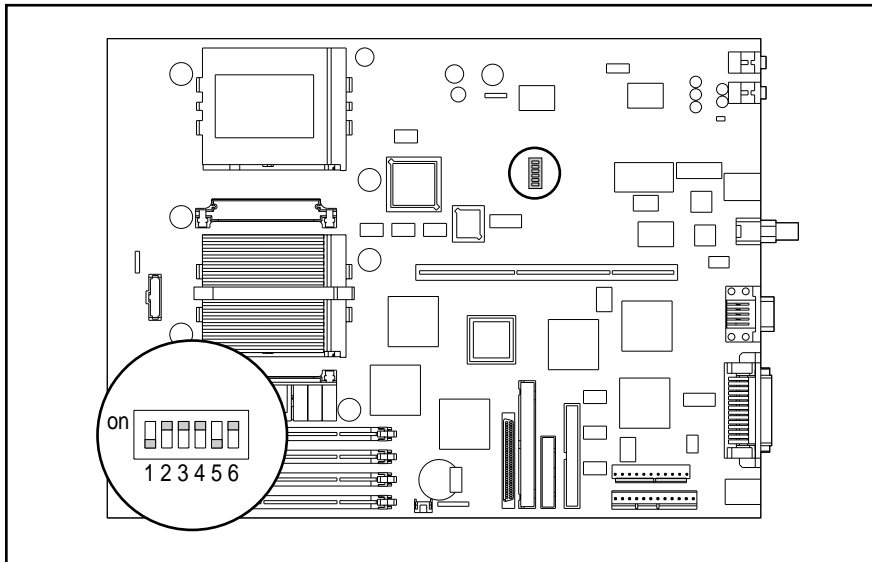
**Table 6-2**  
**System Board**  
**Configuration Jumper E1 Settings**

Jumper	Setting	Function	Description
E1	1-4	Battery	External battery connection
	5-6	Battery	External battery jumper
	6-7	Battery	Internal battery jumper (default)

## 6.1.2 Switch Settings

The system board has one switch module (SW1). SW1 is used to enable or disable the power-on password and to set the operating frequency for the Pentium Pro microprocessor.

The following illustration shows the switch location.



**Figure 6-3.** System Board Switch Location

The computer is shipped with the power-on password feature enabled. To disable the power-on password, set S1 on SW1 to ON.

---

**Table 6-3**  
**SW1 Switch Settings (S1)**  
**Power On Password**

<b>S1</b>	<b>Password</b>
OFF	Enabled (default)
ON	Disabled

---

**Table 6-4**  
**SW1 Switch Settings (S2)**  
**CPU Bus Frequency**

<b>S2</b>	<b>CPU Bus Frequency</b>
OFF	60 MHz
ON	66 MHz (default)

**Table 6-5**  
**SW1 Switch Settings (S3 - S6)**  
**Bus/CPU Core Frequency Ratio**

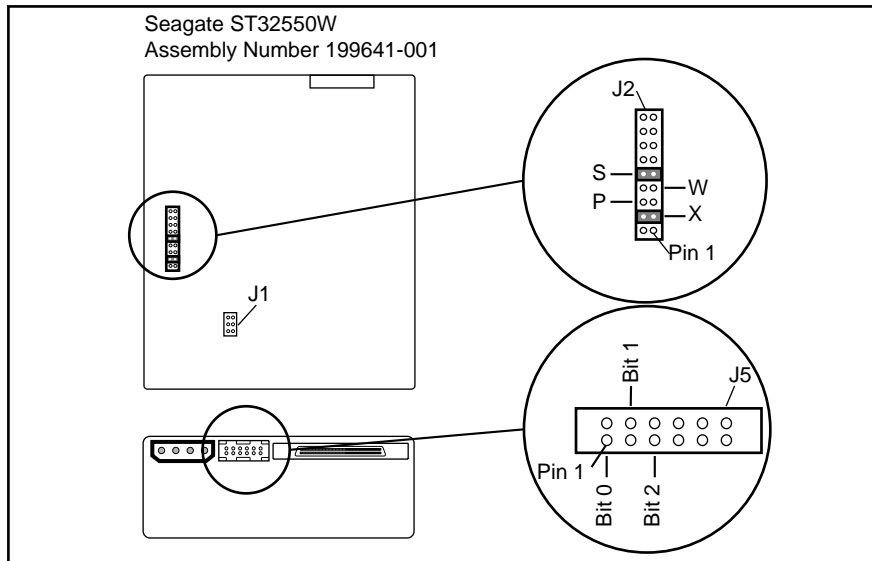
<b>S3</b>	<b>S4</b>	<b>S5</b>	<b>S6</b>	<b>Bus/CPU Core Frequency Ratio</b>
ON	ON	ON	ON	2/4
ON	ON	ON	OFF	2/5
ON	ON	OFF	ON	2/6 (default)
ON	ON	OFF	OFF	2/7
ON	OFF	ON	ON	2/8
ON	OFF	ON	OFF	2/9
ON	OFF	OFF	ON	2/10
ON	OFF	OFF	OFF	2/11



## 6.2 Hard Drives

The Compaq Professional Workstation ships with a 2.1- or 4.3-GB Fast-Wide SCSI-2 hard drive.

### 6.2.1 2.1-GB Fast-Wide SCSI-2 Hard Drive

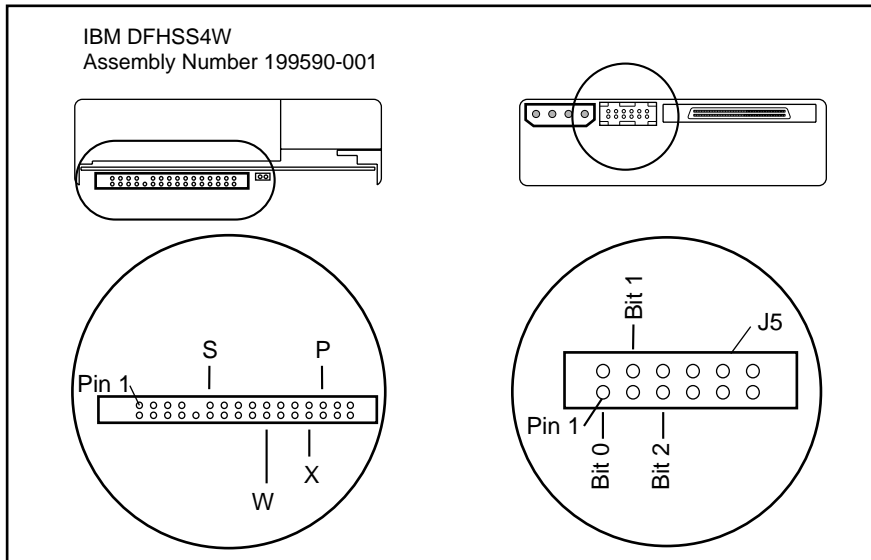


**Figure 6-4.** Jumper Positions for the 2.1-GB Fast-Wide SCSI-2 Hard Drive

**Table 6-6**  
2.1-GB Fast-Wide SCSI-2 Jumper Options  
(Default Configuration)

Jumper	Option	Description
<b>J1</b>		
1-2	OFF	Disable Terminator Power
3-6	OFF	
<b>J2</b>		
1-2	OFF	Reserved
3-4	ON	(X) Initiate SDTR message at power-on and reset (default)
5-6	OFF	(P) Enable parity checking
7-8	OFF	(W) Disable write protect
9-10	ON	(S) Spin up at start unit command (default)
11-12	OFF	Delayed motor start disabled
13-18	OFF	Reserved
<b>J5</b>		
1-2	OFF	SCSI Address, Unit Select 0
3-4	OFF	SCSI Address, Unit Select 1
5-6	OFF	SCSI Address, Unit Select 2
7-8	OFF	SCSI Address, Unit Select 3
9-10	OFF	Remote LED Connector
11-12	OFF	Spindle sync

## 6.2.2 4.3-GB Fast-Wide SCSI-2 Hard Drive



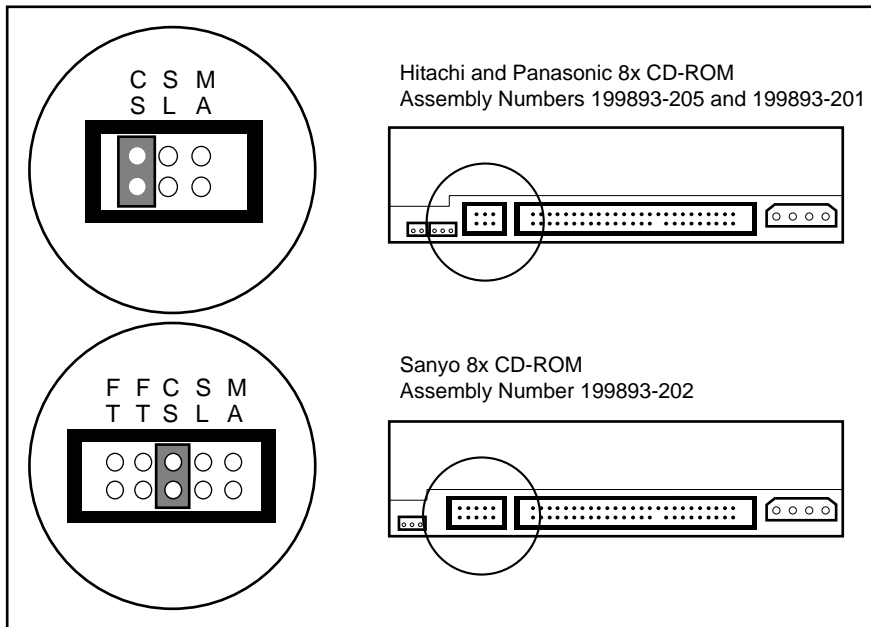
**Figure 6-5.** Jumper Positions for the 4.3-GB Fast-Wide SCSI-2 Hard Drive

**Table 6-7**  
**4.3-GB Fast-Wide SCSI-2 Jumper Options**  
**(Default Configuration)**

Jumper	Option	Description
<b>J5</b>		
1-2	OFF	SCSI Address, Bit 0
3-4	OFF	SCSI Address, Bit 1
5-6	OFF	SCSI Address, Bit 2
7-8	OFF	SCSI Address, Bit 3
9-12	OFF	Reserved
<hr/>		
1-8	OFF	Reserved
9-10	key	
11-12	OFF	(S) Spin up with start unit command
13-14	OFF	Terminator, disabled
15-16	OFF	Master/slave spindle sync
17-18	OFF	LED, disabled
19-20	OFF	(W) Write Protect, disabled
21-22	OFF	Auto Start delay, disabled
23-24	OFF	Option block, disabled
25-26	OFF	(X) SDTR, enabled
27-28	OFF	(D) Parity, enabled
29-30	OFF	Unit Attention, enabled
31-32	OFF	Reserved

## 6.3 8X CD-ROM Drive

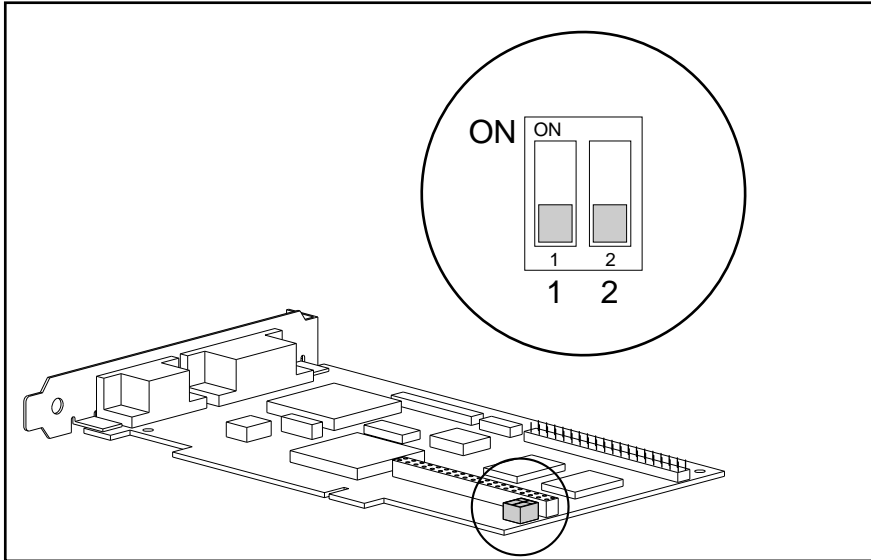
The jumper settings for the 8X IDE CD-ROM drive are shown in the following illustration.



**Figure 6-6.** Jumper Positions for the 8X IDE CD-ROM Drives

## 6.4 Matrox MGA Millennium Board

The jumper settings for the Matrox MGA Millennium board are shown in the following illustration.



**Figure 6-7.** Jumper Positions for the Matrox MGA Millennium Board

### Switch 1: Flash EPROM Switch for VGA BIOS

To upgrade your VGA BIOS, set Switch 1 to ON, and reprogram the Flash EPROM by using the software utility and BIOS upgrade diskettes included with your option kit.



**CAUTION:** Do not leave Switch 1 ON during normal use. If Switch 1 is left on, the Flash EPROM may be erased without warning.

---

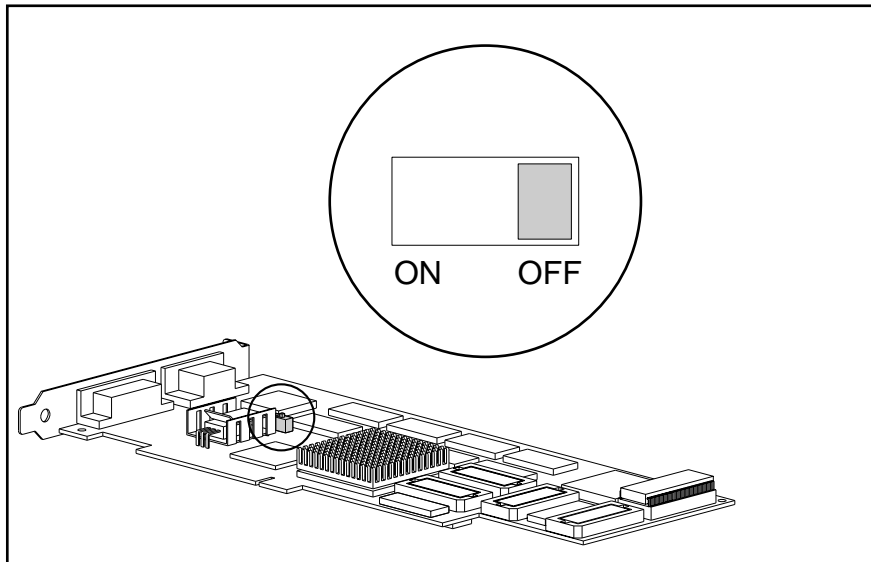
### Switch 2: VGA Disable Switch

The Matrox MGA Millennium board is shipped with the VGA enabled (Switch 2=OFF).

To use a dual-screen or two-monitor configuration, a second VGA must be installed in the computer system. Then set Switch 2 to ON on one of the boards.

## 6.5 Gloria-L Graphics Controller Board

The jumper settings for the Gloria-L graphics controller board are shown in the following illustration.



**Figure 6-8.** Jumper Positions for the Gloria-L Graphics Controller Board

The Gloria-L graphics controller board is shipped with the VGA enabled (Switch=OFF). When the switch is ON, VGA is disabled.

# *chapter* 7

## COMPAQ UTILITIES

This chapter contains descriptions of Compaq utilities that can be helpful when servicing the Compaq Professional Workstation. These utilities include:

- Configuration and Diagnostics
- ROMPaq
- Compaq Insight Manager
- NT SSD

See Chapter 2 for more information on the Configuration and Diagnostics utilities and the power-on password.

✍ References to Windows NT in this guide refer to Microsoft Windows NT Workstation 4.0.

### 7.1 Configuration and Diagnostics

The Configuration and Diagnostics utilities are located on a hard disk partition on the workstation. These utilities include Setup, TEST, and INSPECT.

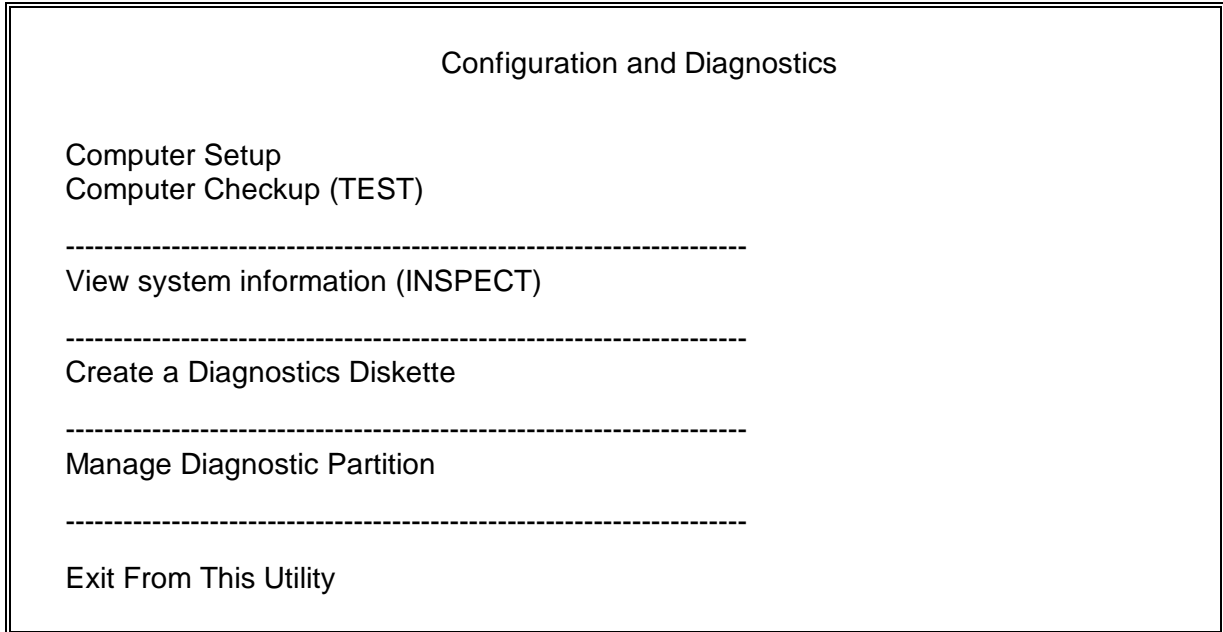
You can run Configuration and Diagnostics from diskette, or use the SmartStart and Support Software CD to install a system partition containing Configuration and Diagnostics utilities.

✍ Additional diagnostic utilities are in Windows NT under Administrative Tools and Control Panel.

Use the Compaq Configuration and Diagnostics utilities in the following instances:

- When a system configuration error is detected during the Power-On Self-Test (POST).
- To change factory default settings for some of the computer features.
- To change the system configuration, which is sometimes necessary when you add or remove optional hardware.
- To set system configuration features.

To display the Configuration and Diagnostics menu, restart the computer, then press **F10** when the square cursor displays in the upper-right corner of the screen.



**Figure 7-1.** Configuration and Diagnostics Menu

### 7.1.1 Security Features

Computer Setup offers security management features that provide solutions for a variety of concerns. Use Security Management within Computer Setup in the following instances:

- To set or change the power-on password.
- To set, change, or delete the setup password, which protects the computer's configuration.
- To set the power-on password, when prompted, after turning on the computer.
- To set or change QuickLock/QuickBlank features.

Use Storage within Computer Setup in the following instances:

- To enable or disable the diskette drive.
- To enable or disable diskette boot ability.
- To enable or disable diskette write control.

Use Communications within Computer Setup in the following instance:

- To enable or disable the serial or parallel ports.

Security features available for the Professional Workstation are presented in Table 7-1.

**Table 7-1  
Security Features**

<b>Feature</b>	<b>Purpose</b>	<b>How It Is Established</b>
SETUP Password	Allows configuration to be changed.	Computer Setup
Power-On Password	Prevents use of the computer when the computer boots up unless the password is entered.	Computer Setup; SW1-S1
Windows NT Password	Prevents use of the computer when Windows NT starts up unless the password is entered.	In Windows NT, run User Manager. At the Start menu, highlight Programs and select Administrator Tools.
Windows 95 Password	Prevents use of the computer when Windows 95 starts up unless the Windows 95 password is entered or the computer has just booted and the power-on password was entered.	Control Panel Passwords
QuickLock/QuickBlank*	Disables keyboard and can blank the screen without exiting application; enabled with a password.	Computer Setup
Serial Interface Control*	Prevents transfer of data through the integrated serial interface.	Computer Setup
Parallel Interface Control*	Prevents transfer of data through the integrated parallel interface.	Computer Setup
Removable Media Control	1. Prevents startup from the diskette drive.  2. Prevents writing to the diskette drive. Allows read only.	Computer Setup
Smart Cover Sensor	Indicates when computer cover has been removed.	Computer Setup
Cable Lock Provision	Inhibits access to the interior of the computer to prevent unwanted configuration changes or component removal. Can also be used to secure the computer to a fixed object.	Optional hardware. Install a padlock with the security bracket to inhibit access to the interior of the computer; add a cable lock to secure the computer to a fixed object.

\*Must be used in combination with a power-on password.

## **Establishing a Password in Windows NT**

To establish a password in Windows NT, complete the following steps:

1. At the Start menu, highlight Programs and select Administrator Tools.
2. Select User Manager and follow the instructions to set a new password for "new user."


## **Establishing a Password in Windows 95**

To establish a password in Windows 95, complete the following steps:


1. Click the My Computer icon.
2. Click the Control Panel folder.
3. Double-click the Passwords icon and follow the instructions to set a new password.

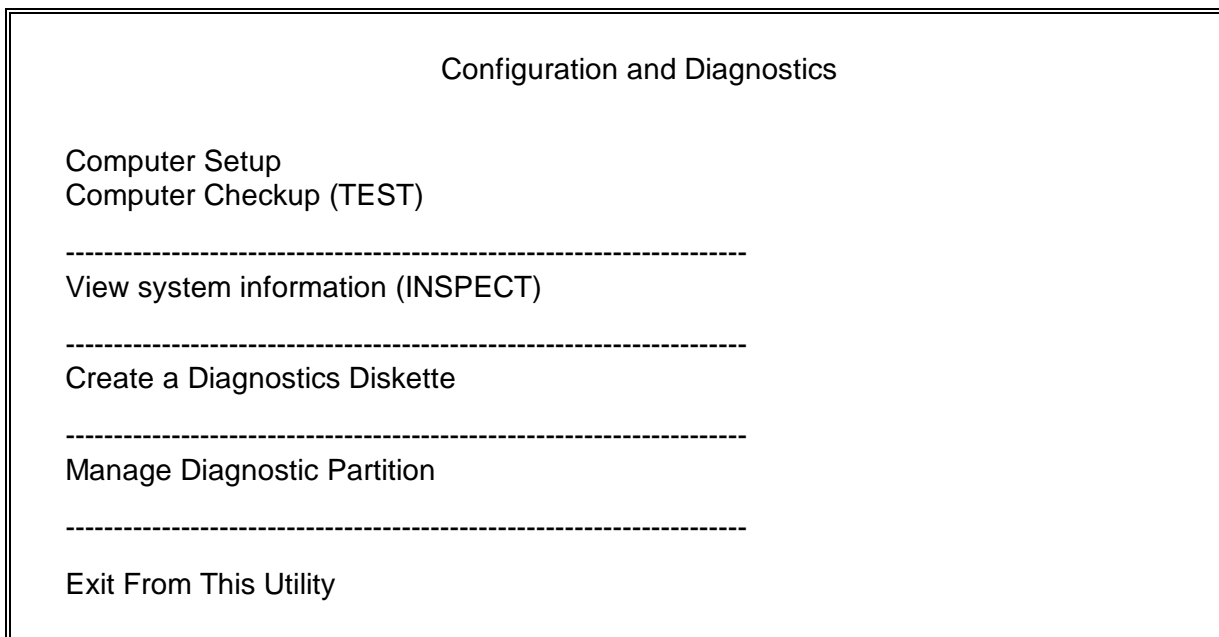


## Establishing a Power-On Password Using Computer Setup

Establishing a power-on password through Computer Setup prevents access to the computer when power is turned on, unless the password is entered. The password must be entered each time the computer is turned on, when the key icon (  ) appears on the monitor.

To establish a power-on password through Computer Setup, complete the following steps:

1. Turn on the computer.
2. When the cursor appears in the upper-right corner of the screen, press the **F10** key.
  -  The cursor displays in the upper-right corner of the screen for approximately two seconds. If you do not press the **F10** key during this time, you must turn the computer off, then on again to access the utility.
3. Press the **Enter** key to bypass the welcome screens and display the main menu.





**Figure 7-2.** Configuration and Diagnostics Menu


4. From the main menu, select Computer Setup, and press the **Enter** key.
5. Select Built-in Devices, then select the Security Management feature.
6. Locate the power-on password option and follow the instructions provided to enable it.
7. Save the configuration and exit the utility.

## Entering a Power-On Password

To enter the power-on password, complete the following steps:


1. Turn on the computer.
2. When the key icon (  ) appears on the monitor, enter your current password.

 Type carefully; for security reasons, the characters you type do not appear on the screen.


If you enter the password incorrectly, a broken key icon (  ) appears. Try again. After three unsuccessful tries, you must turn off the computer, then turn it on again before you can continue.


## Changing a Power-On Password

To change the password, complete the following steps:

1. Turn on the computer.
2. When the key icon (  ) appears, type your current password, a slash (/) or alternate delimiter character, your new password, another slash (/) or alternate delimiter character, and your new password again as shown:

current password/new password/new password


 Refer to the “National Keyboard Delimiter Characters” section in this chapter for information about the alternate delimiter characters.

 For security reasons, the characters you type do not appear on the screen.


Completing this procedure causes the new password to take effect the next time you turn on the computer.

## Deleting a Power-On Password

To delete the password, complete the following steps:

1. Turn on the computer.
2. When the key icon (  ) appears, type your current password followed by a slash (/) or alternate delimiter character as shown:

current password/

 Refer to the “National Keyboard Delimiter Characters” section in this chapter for information about alternate delimiter characters.

Completing this procedure deletes the password until you establish a new one through Security Management.

## National Keyboard Delimiter Characters


Each keyboard is designed to meet country-specific requirements. The syntax and keys that you use for changing or deleting your password depend on the keyboard that came with your computer.

To determine the delimiter key required for changing or deleting your password, find your keyboard in the table below:

**Table 7-2  
National Keyboard Delimiter Characters**

Arabic	/	Greek	-	Slovakian	-
Belgian	=	Hungarian	-	Spanish	-
BHCSY*	-	Italian	-	Swedish/Finnish	/
Brazilian	/	Japanese	/	Swiss	-
Chinese	/	Korean	/	Taiwanese	/
Czech	-	Latin American	-	Thai	/
Danish	-	Norwegian	-	Turkish	.
French	!	Polish	-	U.K. English	/
French Canadian	é	Portuguese	-	U.S. English	/
German	-	Russian	/		

\* For Bosnia-Herzegovina, Croatia, Slovenia, and Yugoslavia

 To clear the power-on password, see Chapter 2, "Troubleshooting."

## 7.1.2 Advanced Security Management

You can access the following security features through the Computer Setup option on the Compaq Utilities menu.

- Storage (under Built-in Devices)
- Disable removable media boot ability
- Disable removable media write ability
- Communication (under Built-in Devices)
- Disable serial port
- Disable parallel port
- Disable external infrared transceiver port (under Serial Port 2)
- Security Management (under Built-in Devices)
- QuickLock/QuickBlank
- Smart Cover Sensor

### QuickLock/QuickBlank

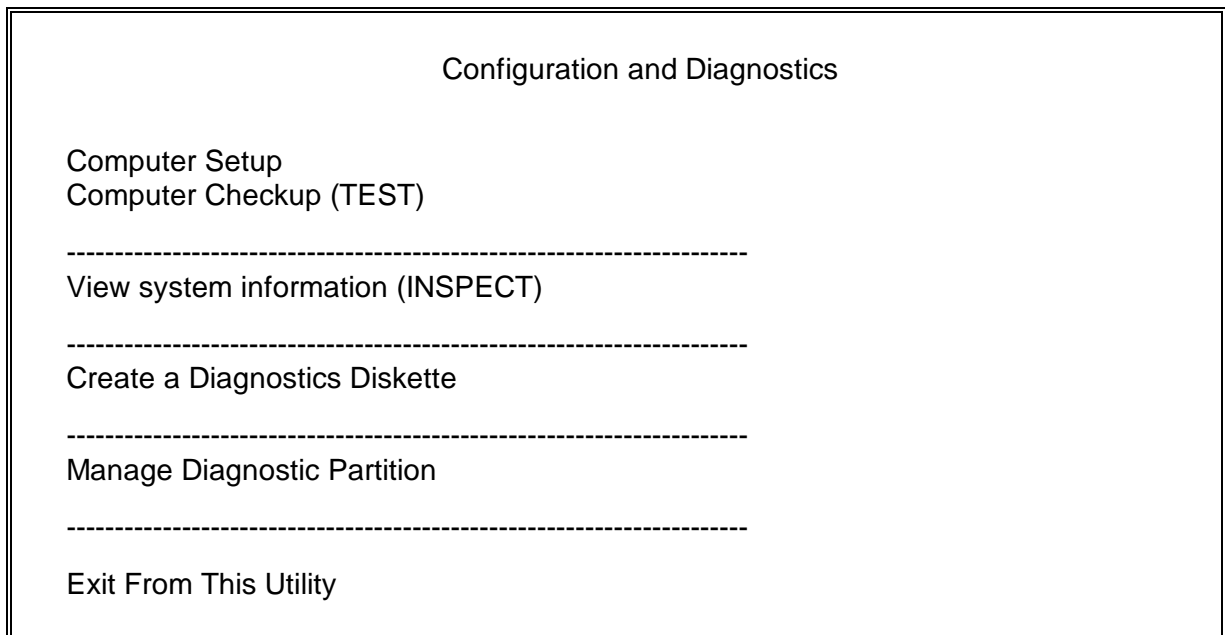
The QuickLock and QuickBlank features can disable the keyboard and mouse interfaces and blank the screen while an application is open. The feature is enabled with a power-on password. If QuickBlank is also enabled, the screen blanks. When this feature is used, the computer is secure until you enter the power-on password.

QuickLock and QuickBlank are enabled through Security Management. The keyboard and mouse interface can be disabled and the screen blanked from within an application. Entering a QuickLock key combination (**Ctrl+Alt+L**) disables the keyboard and the mouse interface. If QuickBlank is not activated, the application remains in view on the screen, but it cannot be accessed.

To re-enable the input device interface and access the application, you must enter the power-on password established in Security Management.

To enable the QuickLock and QuickBlank features from the Configuration and Diagnostics Menu, complete the following steps:

1. Turn on the computer.
2. When the cursor appears in the upper-right corner of the screen, press **F10**.
  - ✎ The cursor displays in the upper-right corner of the screen for approximately 2 seconds. If the user does not press **F10** during this time, turn the computer off, then on again to access the utility.
3. Press **Enter** to bypass the welcome screens and display the main menu.



**Figure 7-3.** Configuration and Diagnostics Menu


4. From the main menu, select Computer Setup and press **Enter**.
5. Select Built-ins and press **Enter**.
6. Select the Security Management feature, and press **Enter**.
7. When the steps in the Security Management screen display, select Enable QuickLock of the Keyboard.
8. Select QuickLock and/or QuickBlank.

9. Select OK to save the configuration.
10. On the Main screen, select Save and exit from the File menu.

## Keyboard and Mouse Interface

Once in an application, enter the QuickLock key combination (**Ctrl+Alt+L**). The keyboard and mouse (or other input device connected to the mouse connector) are disabled. The application cannot be accessed at this time, but remains in view, unless the QuickBlank feature was also enabled through the Configuration utility.

To enable the keyboard and input device connected to the mouse connector, enter the password.

-  For security reasons, the characters you type do not appear on the screen. The application will not be affected by the characters typed.

## Smart Cover Sensor

Smart Cover Sensor is a combination of hardware and software technology that can alert you when the workstation cover has been removed. There are three levels of protection, described in the following table:

<b>Level</b>	<b>Setting</b>	<b>Description</b>
Level 0	Disabled	Smart Cover Sensor is disabled. (Default when shipped.)
Level 1	Notify User	When computer is restarted, the screen displays a message indicating that the computer cover has been removed.
Level 2	Setup Password	When computer is restarted, the screen displays a message indicating that the computer cover has been removed. You must enter the Setup password to continue.

## 7.2 ROMPaq

The Compaq Professional Workstation comes with re-programmable Flash ROM (Read Only Memory). Flash ROM Lock, set to its default setting of OFF, protects the Flash ROM from being upgraded and the System BIOS from being updated.


To update the ROM, order the ROMPaq diskette from Compaq. To upgrade the ROM, complete the following procedures:

1. Insert the ROMPaq diskette into the floppy drive.
2. Turn on the workstation.



**CAUTION:** If the computer does not have a Setup Password enabled, then the ROM is not write-protected and unauthorized updates can occur. The Setup Password is disabled when the computer is shipped from the factory.

3. If prompted, enter the Setup Password.

4. If the Setup Password is entered correctly, the ROMPaq utility takes over and runs the flash ROM upgrade.
-  If the Setup Password is entered incorrectly, the procedure terminates and no changes are made to the ROM.




**CAUTION:** Do not turn the power off during a firmware upgrade. A loss of power during upgrade might corrupt the upgrade.

---

5. When the utility has finished upgrading the ROM, remove the diskette from the diskette drive and reboot the computer.

## 7.3 Compaq Insight Manager

Compaq Insight Manager is a client/server software application you can use to remotely manage and receive information about Compaq computers. Insight Manager remotely gathers information about workstations needing service; for example, Insight Manager can inform you if workstation components are experiencing failure or prefailure errors.

-  Compaq Insight Manager requires the installation of Insight Agents for Windows NT on the Professional Workstation, and the installation of the Insight Manager console on a computer used as a management console. The Agent and the console are provided on the SmartStart for Workstations CD. Before installing the Insight Agents on the Professional Workstation, be sure to install SNMP service and SNMP trap service (for Windows NT 4.0) from the Microsoft NT CD. See installation instructions provided on the SmartStart for Workstations CD.

Compaq Insight Manager provides the following features to help you support Professional Workstations:

- Remote alerts for P6 processor prefailure, ECC DIMM memory single bit error prefailure, and SCSI disk drive prefailure notification
- Alerts logged to the local Windows NT Event Log (logged by the Insight Agents)
- Asset and configuration information collected into a database and accessed by the Insight Manager console for remote tracking of workstation assets and configurations
- Print configuration (similar to INSPECT) reports at the Insight Manager console for remote workstations
- Setting of performance thresholds on a workstation; you can receive an alert when a threshold is exceeded (such as PCI bus utilization threshold or disk volume usage threshold)
- Remote warm and/or cold reboot of a workstation
- Version Control to view versions of Compaq drivers, agents and system ROM currently running on a remote workstation; you can receive a recommendation on updates available from Compaq
- Alpha pager forwarding to forward workstation alerts to an alpha or numeric pager

- Ability to view health logs on remote workstations to see previous Power-on Self Test (POST) errors, critical errors and ECC memory errors
- Environment alerts for workstations with a temperature out of the normal range; you can also be alerted when the hood is removed
- Out-of-band management via a modem using point-to-point protocol (PPP) for workstations not connected to a network

## NT SSD

The NT SSD is a set of Compaq-specific drivers that enable the Professional Workstation to operate at optimum performance. The NT SSD is provided on the SmartStart for Workstations CD. Updates are available on the Compaq Web site (<http://www.compaq.com/>) and are also available through subscription to the Compaq Support Software CD.

NT SSD installation program automatically detects the components on a Professional Workstation and determines if the drivers need to be updated. The drivers provided on the initial release of the NT SSD with the Compaq Workstation include:

- NetFlex-3 NIC driver
- Symbios C875 SCSI driver
- Systems Management driver (required by Compaq Insight Manager)
- Compaq HAL for Microsoft NT 3.51.

Future versions of the NT SSD will include support for workstation audio and video drivers.

When you service a Professional Workstation, make sure that it is running the latest version of the NT SSD drivers for optimum performance. To determine the version of NT SSD installed on the workstation, use the Version Control task in Insight Manager, or look at the version in the file properties of the SETUPAPP.EXE file in the \winnt\system32\cpqntssd workstation directory.

# chapter 8

## SPECIFICATIONS

This chapter provides physical, environmental, and performance specifications for the computer, keyboard, and mass storage devices.

### 8.1 System

**Table 8-1  
System Specifications**

	<b>U. S.</b>	<b>Metric</b>
<b>Desktop Dimensions</b>		
Height	5.25 in	13.34 cm
Width	19.25 in	48.90 cm
Depth	15.69 in	39.85 cm
<b>Weight</b> (approximate)	35.65 lb	12.85 kg
<b>Power Supply</b>		
Operating Voltage Range	90-132 VAC	180-264 VAC
Rated Voltage Range	100-120 VAC	220-240 VAC
Rated Line Frequency	50 - 60 Hz	50 - 60 Hz
<b>Rated Input Current</b> (maximum)	5 A	5 A
<b>Power Output</b>	240 W	240 W
<b>Environmental Requirements</b>		
<b>Temperature</b>		
Operating	50° to 95°F	10° to 35°C
Shipping	-4° to 140°F	-20° to 60°C
<b>Relative Humidity (noncondensing)</b>		
Operating	8% to 90%	8% to 90%
Nonoperating	5% to 95%	5% to 95%
<b>Maximum Altitude (unpressurized)</b>		
Operating	10,000 ft	3048 m
Nonoperating	30,000 ft	9144 m
<b>Heat Dissipation (nominal)</b>	770 Btu/hr	3.23 kg-cal/min



**Table 8-2  
System Interrupts**

<b>Hardware IRQ</b>	<b>System Function</b>
IRQ 0	System timer
IRQ 1	Keyboard (Not on ISA Bus)
IRQ 2	Unused
IRQ 3	Serial Port (COM 2)
IRQ 4	Serial Port (COM 1)
IRQ 5	ESS sound chip
IRQ 6	Diskette Drive
IRQ 7	Parallel Port (LPT 1)
IRQ 8	Real-time clock
IRQ 9	Unused
IRQ 10	Unused
IRQ 11	PCI Interrupts
IRQ 12	Mouse
IRQ 13	Non-catastrophic errors / CPU error
IRQ 14	IDE Controller
IRQ 15	Unused

**Table 8-3  
System DMA**

<b>Hardware DMA</b>	<b>System Function</b>
DMA 0	Unused
DMA 1	Business Audio (Default; Alternate = DMA0, DMA3, None)
DMA 2	Diskette Drive
DMA 3	ECP Parallel Port LPT1 (Default; Alternate = DMA 0)
DMA 4	DMA Controller Cascading (Not on ISA Bus)
DMA 5	Unused
DMA 6	Unused
DMA 7	Unused

**Table 8-4  
System I/O**

<b>I/O Address (Hex)</b>	<b>System Function (Shipping Configuration)</b>
000 - 00F	DMA Controller # 1
010 - 01F	Unused
01F - 01FF	IDE Controller
020 - 03F	Interrupt Controller # 1
040 - 043	Counter/Timer
044 - 05F	Unused
060	Keyboard Controller
061	Port B
062 - 063	Unused
064	Keyboard Controller
065 - 06F	Unused
070 - 071	NMI Enable/Real-Time Clock
072 - 07F	Unused
080 - 08F	DMA Page Registers
090 - 091	Unused
092	Port A
093 - 09F	Unused
0A0 - 0BF	Interrupt Controller # 2
0C0 - 0DF	DMA Controller # 2
0E0 - 0EB	Unused
0EC - 0ED	483 Configuration Index/Data
0EE - 0EF	483 Fast A20/Fast Reset
0F0 - 0F1	Co-Processor Busy Clear/Reset
0F2 - 0F3	Unused
0F4 - 0F5	483 CPU Speed Slow/Fast
0F6 - 0F8	Unused
0F9	483/PGL Configuration Lock
0FA	Unused
0FB	483/PGL Configuration Unlock
0FC - 0FF	Unused
100 - 12F	Unused
130 - 131	Modem PGL Index/Data (Default; Alt = 140h, 260h, 270h)
132 - 16F	Unused
170 - 177	Reserved; IDE Controller can be set here in Setup.
178 - 1EF	Unused
1F0 - 1F7	Fixed Disk Controller
1F8 - 1FF	Unused
200	Unused
201	Unused

*Continued*

**Table 8-4** *Continued*

<b>I/O Address (Hex)</b>	<b>System Function (Shipping Configuration)</b>
202 - 21F	Unused
220 - 22F	Business Audio (Default; Alter =230h, 240h, 250h)
230 - 277	Unused
278 - 27F	Reserved Parallel Port
280 - 2E7	Unused
2E8 - 2EF	Reserved Serial Port
2F0 - 2F7	Unused
2F8 - 2FF	Modem (COM 2)
300 - 317	Unused
318 - 319	Unused
31A - 36F	Unused
370 - 377	Reserved (2nd Diskette Drive)
378 - 37F	Parallel Port (Primary)
380 - 387	Unused
388 - 38B	FM Synthesizer - OPL3
38C - 397	Unused
398 - 399	Super AI/O Index/Data (Default; Alt = 26Eh, 15Ch, 02Eh)
39A - 3AF	Unused
3B0 - 3BB	MDA, EGA/VGA
3BC - 3BF	Reserved (Parallel Port)
3C0 - 3DF	EGA/VGA
3E0 - 3E7	Unused
3E8 - 3EF	Reserved (Serial Port)
3F0 - 3F7	Diskette Controller
3F8 - 3FF	Serial Port (Primary)

**Table 8-5  
System Memory Map**

<b>Size</b>	<b>Memory Address</b>	<b>System Function</b>
64 KB	FFFFFFFFh to FFFC0000h	System ROM (alias at 000C0000h - 000FFFFFFh)
2,080,512 KB	FFFBFFFFh to 81000000h	PCI Memory Expansion
16,384 KB	80FFFFFFh to 80000000h	ISA Memory Mapped I/O Devices
1,835,008 KB	7FFFFFFFh to 10000000h	PCI Memory Expansion
245,760 KB	0FFFFFFFh to 01000000h	HOST or PCI Memory Expansion
15,360 KB	00FFFFFFh to 00100000h	HOST, PCI, or ISA Memory Expansion
64 KB	000FFFFFFh to 000F0000h	System ROM
64 KB	000EFFFFh to 000E0000h	Unused
80 KB	000DFFFFh to 000CC000h	Unused
16 KB	000CBFFFh to 000C8000h	SCSI Support
6 KB	000C7FFFh to 000C6800h	Video ROM
2 KB	000C67FFh to 000C6000h	Unused
24 KB	000C5FFFh to 000C0000h	Video ROM
128 KB	000BFFFFh to 000A0000h	Video RAM
640 KB	0009FFFFh to 00000000h	Base Memory

1 KB = 1024 bytes. All memory above the first 256 MB is non-cacheable. All PCI memory is non-cacheable.

## 8.2 Drives

**Table 8-6**  
**1.44-MB Diskette Drive**

<b>Size and Capacity</b>	
Size (in)	3.5
High Density (MB)	1.44
Low Density (KB)	720
<b>Light</b>	Green
<b>Height</b>	One third
<b>Bytes per Sector</b>	512
<b>Sectors per Track</b>	
High Density	18
Low Density	9
<b>Tracks per Side</b>	
High Density	80
Low Density	80
<b>Read/Write Heads</b>	2
<b>Average Access Time (ms)</b>	
Track-to-Track (high/low)	3/3
Average (high/low)	94/94
Latency Average (ms)	100
<b>Data Transfer Rate (Mbit/s)</b>	
High/Low (To/From Media)	500/250 Kb/s

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**Table 8-7**  
**8X CD-ROM Drive**

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<b>Access Time</b>	
Random	150 ms (8X speed)
Full stroke	350 ms (8X speed)
<b>Audio Output Level</b>	
Line out	0.7 V rms
<b>Cache/Buffer</b>	
	128 Kbytes minimum
<b>Data Transfer Rate</b>	
Sustained	150 Kbytes/s (single speed)
Burst	1200 Kbytes/s (8X speed)
<b>Error Rates</b>	
Soft error	$10^{-9}$
Hard error	$10^{-12}$
Seek error	$10^{-6}$
<b>Interface Cable Length</b>	
(maximum)	18 in (45.7 cm)
<b>Reliability</b>	
Read error rate (includes retry)	L-EC on 1 Block/ $10^{12}$ bits L-EC off 1 Block/ $10^9$ bits
<b>Start up Time</b>	
	<7 sec single session
<b>Stop Time</b>	
	<4 sec

---

**Table 8-8  
Fast-Wide SCSI-2 Hard Drives**

	<b>2.1 GB</b>	<b>4.3 GB</b>
<b>Formatted Capacity</b>		
Physical (MB)	2.14	4.51
Logical (MB)	2.10	4.29
<b>Compaq Spares Part Number</b>		
	269415-001	269387-001
<b>Transfer Rate</b>		
Media (MB/sec)	5.04-7.68	6.14-8.29
Interface (MB/sec)	20.0	20.0
<b>Typical Seek Time (including settling)</b>		
Single Track (ms)	1.9	2.5
Average (ms)	10.0	9.5
Full Stroke (ms)	20.0	18.0
<b>Disk Rotational Speed (rpm)</b>		
	7200	7200
<b>Cylinders</b>		
Physical	3511	4390
<b>Data Heads</b>		
Physical	11+1 (Data + Servo)	16 (Embedded Servo)
<b>Sectors per Track</b>		
Physical	86-125 (26 zones)	100-135 (10 zones)
<b>Buffer Size (KB)</b>		
	954	512

**Table 8-9  
PD-CD Drive**

<b>Disc</b>	
Application Disc	
CD-ROM	Mode 1 & 2, CD-DA
CD-XA	Mode 2, Form 1 & 2
CD-I	Mode 2, Form 1 & 2
CD-I Ready	CD-Bridge
Photo CD	Single & Multi session
CD-WO	Fixed and Variable packets
Block Size	
CD-ROM	
Mode 0	2366,2352 (bytes)
Mode 1	2352, 2340, 2336, 2048, 1024 (bytes)
Mode 2	2646, 2352, 2340, 2336, 2048, 1024 (bytes)
PD	512 bytes
Capacity	
CD-ROM Mode 1	550 MB (12 cm)
CD-ROM Mode 2	640 MB (12cm), 180 MB (8 cm)
PD	650 MB, ZCAV
Diameter	12 cm, 8 cm (CD-ROM only)
Thickness	1.2 mm
Track Pitch	1.6 mm (CD) 1.2 mm (PD)
<b>Laser</b>	
Output Power	13.5 mW +/- 2.0 mW
Type	Semiconductor Laser GaAlAs
Wave Length	790 +/- 25 nm
Access Time	
Random	< 240 ms (quad-speed CD-ROM mode) < 200 ms (PD mode)
Full Stroke	< 350 ms (quad-speed CD-ROM mode) < 275 ms (PD mode)
Cache/Buffer	256 Kbytes
Data Transfer Rate	150 Kbytes/s (sustained, single-speed CD-ROM mode) 300 Kbytes/s (sustained, dual-speed CD-ROM mode) 600 Kbytes/s (sustained, quad-speed CD-ROM mode) 500-1100 Kbytes/s (sustained PD mode)
Error Rates	
Soft error	10 <sup>-9</sup>
Hard error	10 <sup>-12</sup>
Seek error	10 <sup>-6</sup>
Indicators	
Busy LED	Green = Drive ready and media is inserted Amber = Media access
Mode LED	Amber = PD, Green = CD

*Continued*



**Table 8-9 Continued**

Reliability	35,000 POH, 25% (MTBF) 30 minutes (MTTR) 5 years (service life) > 20,000 drawer in/out cycles > 3 × 10 <sup>6</sup> full stroke seeks		
SCSI Bus Rate	3.0 MB/s (asynchronous) 5.0 MB/s (synchronous)		
Startup Time	< 7 seconds (typical)		
Stop Time	< 3 seconds (typical)		
<b>Environmental Conditions</b>			
Power Requirement	+5VDC	Tolerance +/- 10% Ripple 100 mVp-p Current	1.2 A (typical)
		1.5 A (maximum) < 250 mA (spun-down)	
	+12VDC	Tolerance +/- 5% Ripple 200 mVp-p Current	< 600 mA (hold)
		< 1500 mA (seek, spin-up) < 100 mA (spun-down)	
<b>Physical Characteristics</b>			
Dimensions excluding projections)	146 mm × 42.9 mm × 201 mm (w/h/d)		
Weight	< 1100 g		

## 8.3 Audio System

**Table 8-10  
Audio System**

Sampling rate	5.51 KHz to 44 KHz (adjustable)
Maximum Voltage (rms)	
Microphone-in	0.030
Line-in	0.7
Headphone-out	n/a
Line-out	0.7
Impedance (nominal)	
Microphone-in	1-K ohm
Line-in	20-K ohms
Headphone-out	16 ohms (min.)
Line-out	20-K ohms
Speaker	
Frequency response	450 Hz to 4000 Hz
Data Types	
alaw	8-/16-bit
μlaw	8-/16-bit
mono/stereo	16-bit

## 8.4 Keyboard

**Table 8-11  
Compaq Enhanced Keyboard**

	<b>U.S.</b>	<b>Metric</b>
<b>Dimensions</b>		
Height	1.50 in	3.81 cm
Width	18.00 in	45.72 cm
Depth	6.50 in	16.51 cm
<b>Weight</b>	3.5 lb	1.59 kg

## 8.5 Mice

**Table 8-12  
2-Button Mouse**

	<b>U.S.</b>	<b>Metric</b>
<b>Dimensions</b>		
Height	1.34 in	3.4 cm
Length	4.45 in	11.3 cm
Width	2.36 in	6.0 cm
<b>Weight</b>	4.59 oz	130 g
<b>Base Resolution</b>	400 dpi	
<b>Tracking Speed</b> (maximum)	10 in/sec	25 cm/sec
<b>Temperature</b>		
Operating	32°F to 104°F	0°C to 40°C
Storage	-4°F to 140°F	-20°C to 60°C
<b>Lifetime</b>		
Mechanical	Exceeds 300 miles	Exceeds 483 km
Switch	Exceeds 1 million operations	Exceeds 1 million operations
<b>Relative Humidity</b>	10% to 90%, noncondensing	
<b>ESD</b>	No soft errors through 10 kV; No hard errors through 15 kV; specific performance depends on host system	

**Table 8-13  
3-Button Mouse**

	<b>U.S.</b>	<b>Metric</b>
<b>Dimensions</b>		
Height	1.42 in	3.6 cm
Length	4.17 in	10.7 cm
Width	2.87 in	7.4 cm
<b>Weight</b>	5.29 oz	150 g
<b>Base Resolution</b>	400 dpi	
<b>Tracking Speed</b> (maximum)	10 in/sec	25 cm/sec
<b>Temperature</b>		
Operating	32°F to 104°F	0°C to 40°C
Storage	-4°F to 140°F	-20°C to 60°C
<b>Lifetime</b>		
Mechanical	Exceeds 300 miles	Exceeds 483 km
Switch	Exceeds 1 million operations	Exceeds 1 million operations
<b>Relative Humidity</b>	10% to 90%, noncondensing	
<b>ESD</b>	No soft errors through 8 kV; no hard errors through 10 kV; specific performance depends on host system	

## 8.6 Supported Resolutions

**Table 8-14**  
**Supported Resolutions - Matrox MGA Millennium**

<b>Single Buffer Mode</b>			
<b>Colors Supported</b>			
<b>Resolution</b>	<b>2-MB WRAM</b>	<b>4-MB WRAM</b>	<b>8-MB WRAM</b>
1600 x 1200	256	64,000	16.7 million
1280 x 1024	256	16.7 million	16.7 million
1152 x 864	64,000	16.7 million	16.7 million
1024 x 768	64,000	16.7 million	16.7 million
800 x 600	16.7 million	16.7 million	16.7 million
640 x 480	16.7 million	16.7 million	16.7 million

<b>Double Buffer Mode</b>			
<b>Colors Supported</b>			
<b>Resolution</b>	<b>2-MB WRAM</b>	<b>4-MB WRAM</b>	<b>8-MB WRAM</b>
1600 x 1200	n/a	n/a	256
1280 x 1024	n/a	256	64,000
1152 x 864	n/a	256	64,000
1024 x 768	n/a	256	16.7 million
800 x 600	256	64,000	16.7 million
640 x 480	64,000	16.7 million	16.7 million

**Table 8-15**  
**Supported Resolutions - Gloria-L**

<b>Maximum Color Support</b>		
<b>Resolution</b>	<b>Single Buffer Mode</b>	<b>Double Buffer Mode</b>
1600 x 1200	16.7 million	65,000
1280 x 1024	16.7 million	65,000
1152 x 864	16.7 million	16.7 million
1024 x 768	16.7 million	16.7 million
800 x 600	16.7 million	16.7 million
640 x 480	16.7 million	16.7 million

## 8.7 Network

**Table 8-16**  
**Ethernet Network Interface Controller (NIC)**

Physical Connectors	RJ-45 BNC (thin coax; available in select geographic regions)
Operating Environment	
Temperature	50° to 95°F                      10° to 35°C
Humidity	10% to 90%, noncondensing
Electrical Bus	32-bit PCI bus

### Network Cable Specifications

The RJ-45 and the BNC connectors require different cables. Following are the specifications for the cable required for each type of connector.

#### Cable for RJ-45 Connections

The RJ-45 connections use an unshielded twisted pair (UTP) cable of 22, 24, or 26 gauge. The cable must comply with the IEEE 802.3 10BASE-T standard. The maximum distance between the computer and the hub is 100 meters.

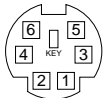
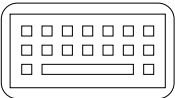
#### Cable for BNC Connections (available in select geographic regions)

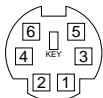
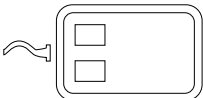
The BNC connection requires RG-58 coaxial cable conforming to the IEEE 10BASE-2 specification. The maximum trunk length with repeaters in the network is 300 meters. The maximum trunk length with no repeaters in the network is 185 meters.

# *appendix* A

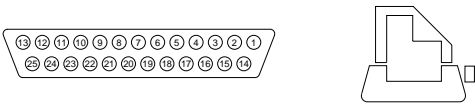
## CONNECTOR PIN ASSIGNMENTS

This appendix contains the pin assignments for all external connectors:

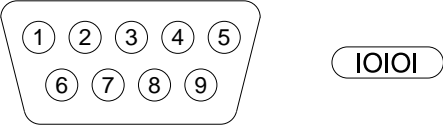
<b>Table A-1 Keyboard</b>		
<b>Connector and Icon (Orange)</b>	<b>Pin</b>	<b>Signal</b>
 	1	Data
	2	Unused
	3	Ground
	4	+5 VDC
	5	Clock
	6	Unused

<b>Table A-2 Mouse</b>		
<b>Connector and Icon (Green)</b>	<b>Pin</b>	<b>Signal</b>
 	1	Data
	2	Unused
	3	Ground
	4	+5 VDC
	5	Clock
	6	Unused

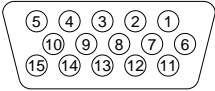
**Table A-3  
Parallel Interface**

Connector and Icon	Pin	Signal
	1	Strobe
	2	Data Bit 0
	3	Data Bit 1
	4	Data Bit 2
	5	Data Bit 3
	6	Data Bit 4
	7	Data Bit 5
	8	Data Bit 6
	9	Data Bit 7
	10	Acknowledge
	11	Busy
	12	Paper End
	13	Select
	14	Auto Linefeed
	15	Error
	16	Initialize Printer
	17	Select IN
18-25	Signal Ground	

**Table A-4  
Serial Interfaces**

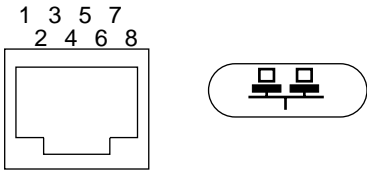
Connector and Icon	Pin	Signal
	1	Carrier Detect
	2	Receive Data
	3	Transmit Data
	4	Data Terminal Ready
	5	Signal Ground
	6	Data Set Ready
	7	Request to Send
	8	Clear to Send
	9	Ring Indicator

**Table A-5  
Monitor**

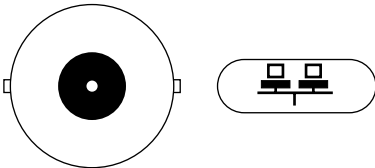
Connector	Pin	Signal
	1	Red Analog
	2	Green Analog
	3	Blue Analog
	4	Monitor ID Bit2
	5	Ground
	6	Ground Analog
	7	Ground Analog
	8	Ground Analog
	9	Not Connected
	10	Ground
	11	Monitor ID Bit 0
	12	Bi-directional Data (SDA)*
	13	Horizontal Sync
	14	Vertical Sync
	15	Data Clock (SCL)*

\* For DDC support (I<sup>2</sup>C monitors)

**Table A-6  
Ethernet RJ-45**

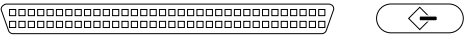
Connector and Icon	Pin	Signal
	1	(+) Transmit Data
	2	(-) Transmit Data
	3	(+) Receive Data
	4	Unused
	5	Unused
	6	(-) Receive Data
	7	Unused
	8	Unused

**Table A-7  
Ethernet BNC**

Connector and Icon	Pin	Signal
	1 (Inside)	Data
	2 (Outside)	Ground



**Table A-8  
Ultra-Wide SCSI Connector**

Connector and Icon	Pin	Signal
	1-16	Ground
	17 - 18	TERMPWR
	19	Reserved
	20 - 34	Ground
	35	-D12
	36	-D13
	37	-D14
	38	-D15
	39	-DP1
	40	-D0
	41	-D1
	42	-D2
	43	-D3
	44	-D4
	45	-D5
	46	-D6
	47	-D7
	48	-DP0
	49 - 50	Ground
	51 - 52	TERMPWR
	53	Reserved
	54	Ground
	55	-ATN
	56	Ground
	57	-BSY
	58	-ACK
	59	-RST
	60	-MSG
	61	-SEL
	62	-C/D
	63	-REQ
	64	-I/O
	65	-D8
	66	-D9
67	-D10	
68	-D11	

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**Table A-9  
Line-In Audio Connector**

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**Connector and Icon**

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1/8-inch Miniphone

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**Table A-10  
Line-Out Audio Connector**

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**Connector and Icon**

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1/8-inch Miniphone

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**Table A-11  
Microphone Connector**

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**Connector and Icon (Blue)**

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Stereo 1/8-inch Miniphone

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**Table A-12  
Headphone Connector**

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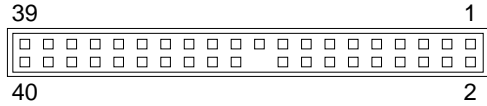
**Connector and Icon**

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Stereo 1/8-inch Miniphone

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**Table A-13  
CD-ROM Cable (IDE)**

<b>Pin</b>	<b>Signal</b>	<b>Pin</b>	<b>Signal</b>
1	RESET	21	DREQ
2	GND	22	GND
3	DD7	23	DIOW
4	DD8	24	GND
5	DD6	25	DIOR
6	DD9	26	GND
7	DD5	27	IORDY
8	DD10	28	CABLE SELECT
9	DD4	29	DMACK
10	DD11	30	GND
11	DD3	31	INTRQ
12	DD12	32	IOCS16
13	DD2	33	DA1
14	DD13	34	PDIA6
15	DD1	35	DA0
16	DD14	36	DA2
17	DD0	37	CS1FX
18	DD15	38	CS3FX
19	GND	39	DASP
20	(KEY)	40	GND

## appendix **B**

# POWER CORD SET REQUIREMENTS

The voltage select switch feature on the computer permits it to operate from any line voltage between 100-120 or 220-240 volts AC.

The power cord set received with the computer meets the requirements for use in the country where you purchased the equipment.

Power cord sets for use in other countries must meet the requirements of the country where you use the computer. For more information on power cord set requirements, contact your authorized Compaq dealer, reseller or service provider.

## General Requirements

The requirements listed below are applicable to all countries:

1. The length of the power cord set must be at least 6.00 feet (1.8 m) and a maximum of 9.75 feet (3.0 m).
2. All power cord sets must be approved by an acceptable accredited agency responsible for evaluation in the country where the power cord set will be used.
3. The power cord set must have a minimum current capacity of 10A and a nominal voltage rating of 125 or 250 volts AC, as required by each country's power system.
4. The appliance coupler must meet the mechanical configuration of an EN 60 320/IEC 320 Standard Sheet C13 connector, for mating with appliance inlet on the Switch Box.

## Country-Specific Requirements

Power Cord Set Requirements–By Country		
Country	Accredited Agency	Applicable Note Numbers
Australia	EANSW	1
Austria	OVE	1
Belgium	CEBC	1
Canada	CSA	2
Denmark	DEMKO	1
Finland	SETI	1
France	UTE	1
Germany	VDE	1
Italy	IMQ	1
Japan	JIS	3
Norway	NEMKO	1
Sweden	SEMKO	1
Switzerland	SEV	1
United Kingdom	BSI	1
United States	UL	2

### NOTES:

1. The flexible cord must be <HAR> Type HO5VV-F, 3-conductor, 1.0 mm<sup>2</sup> conductor size. Power cord set fittings (appliance coupler and wall plug) must bear the certification mark of the agency responsible for evaluation in the country where it will be used.
2. The flexible cord must be Type SJT or equivalent, No. 18 AWG, 3-conductor. The wall plug must be a two-pole grounding type with a NEMA 5-15P (15A, 125V) or NEMA 6-15P (15A 250V) configuration.
3. The appliance coupler, flexible cord, and wall plug must bear a "T" mark and registration number in accordance with the Japanese Dentori Law. The flexible cord must be Type VCT or VCTF, 3-conductor, 0.75 mm<sup>2</sup> conductor size. The wall plug must be a two-pole grounding type with a Japanese Industrial Standard C8303 (15A, 125V) configuration.

# *appendix* C

## ULTRA SCSI GUIDELINES

This appendix contains helpful guidelines for installing Small Computer System Interface (SCSI) devices.

### Guidelines for Installing Optional SCSI Devices

When installing and operating SCSI devices, you must adhere to the following guidelines:

- A single Ultra SCSI controller allows you to daisy-chain up to 15 SCSI devices. These can be hard drives, CD-ROM drives, scanners, tape drives, and/or other SCSI devices installed in your computer. Most SCSI controllers have connectors for both internal and external devices.
- **Every SCSI device must have a unique identification (ID) number.** The Ultra SCSI controller identifies signals to and from a SCSI device by its SCSI ID number rather than its location. Moving a SCSI device from one position to another on the SCSI chain does not affect the communication between the controller and the SCSI device. Check the information that came with your device for the recommended SCSI ID number to be applied. The reserved and available SCSI ID numbers for Compaq computers are as follows:
  - 0 is reserved for the primary hard drive.
  - The rest of the SCSI ID numbers are available for use by all SCSI devices.
  - 7 is reserved for the Ultra SCSI Controller.
- **Every SCSI chain or circuit must be terminated (closed) at both ends.** Termination can be accomplished in one of several ways:
  - Use a cable with a built-in terminator.
  - Use a cable with a terminating resistor plug in the last connector.
  - Connect a SCSI device, with the termination enabled, into the last connector.

Some systems have both ends of the SCSI cable connected to, and terminated by, the system board.

- **Turn on all external SCSI devices before turning on power to the computer.** This enables the controller to recognize the external SCSI devices and automatically reset. When an external SCSI device is connected to the external SCSI connector on the rear panel of the computer, that device becomes the end of the SCSI chain and must be terminated.
- **All SCSI hard drives must be either internal or external, but never both.** The system does accommodate a combination of other internal and external SCSI devices, such as SCSI tape and CD-ROM drives.

## Termination

1. Every SCSI chain must be terminated at both ends regardless of whether it is an internal SCSI chain, an external SCSI chain, or a combination internal-external SCSI chain.
2. Compaq SCSI-2 controllers have an automatic terminating device which turns OFF the terminator when both the external and internal SCSI signal ports connect to SCSI devices.
3. A terminating resistor plug is molded into one end of some internal flat SCSI signal cables. It may also be a separate electronic device that installs into the SCSI signal port of an external device, installs into an internal flat SCSI signal cable connector, or installs into the SCSI signal port of some non-Compaq SCSI-2 controllers.
4. Terminators are generally designated as being active or passive by the voltage limiting method used. The product documentation usually describes the terminator type.
5. All Compaq Ultra SCSI-2 controllers have active terminators. Active terminators more effectively filter out electronic noise (voltage surges) on the SCSI chain than passive terminators.
6. To ensure the integrity of data transferred faster than 5 megabytes per second, use active terminators to terminate the SCSI chain.

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