



Addenda #1, 2, and 3 to Compaq Professional Workstation AP550 Maintenance & Service Guide

Compaq Professional Workstation AP550

Part number 135618-003

Spare part number 158279-001

The complete MSG follows these addenda.

These addenda contain changes to the original document.

Spare Part Numbers

Description	Spare Part Number	Warranty Tier
Intel Pentium III processor with heatsink (154293-001) and clip (120891-001)		
600 MHz/133-MHz	162996-001	A
800 MHz/133-MHz	174768-001	A
867 MHz/133-MHz	180221-001	A
Intel Pentium III processor with heatsink (210720-001), air baffle (167373-001) and clip (120891-001)		
1 GHz/133 MHz	210403-001	A
Memory Modules		
64-MB ECC Direct Rambus Inline Memory Module (RIMM) 800-MHz	157108-001	A
512-MB ECC (100-MHz SDRAM)	317748-001	A
Graphics Controllers		
Matrox MGA-G400A, AGP 2x/4x	163361-001	A
Intense3D Wildcat 4110, AGP 2X,	166013-001	A
Intense3D Wildcat 4210, AGP Pro	202996-001	A
Nvidia TNT2 PRO, 16-MB SGRAM	179997-001	A
ELSA Gloria II AGP, 64 MB	174641-001	A
Matrox G200 MMS	171975-001	A
Graphics adapter, DVI-i to VGA	202997-001	A
Hard Drives		
10-GB Ultra ATA Hard Drive, 7200 RPM	330520-001	A
20-GB Ultra ATA Hard Drive, 7200 RPM	157403-001	A
20-GB Ultra ATA Hard Drive, 7200 RPM	180475-001	A
30-GB Ultra ATA Hard Drive, 7200 RPM, Quiet Drive	180477-001	A
36.2-GB Wide-Ultra 160 SCSI Hard Drive	192197-001	A
Other Drives		
48X Max CD-ROM Drive	187263-001	A
32X Max R-W CD-ROM Drive	173747-001	A
DVD-ROM Drive, 6x/32x, Opal	120417-001	B
DVD-ROM Drive, 10x/40x, Opal	161430-001	B
LS-120 SuperDisk	209938-001	A

Continued

Spare Part Numbers (continued)

Description	Spare Part Number	Warranty Tier
Fast Ethernet NIC PCI, 10/100, Wake-On-LAN	116188-001	A
NIC 10/100 PCI card with Wake-On/Alert-On LAN	118042-001	A
Miscellaneous Cable Kit	179182-001	D
CD-ROM data, 12.5" (179048-001)		
CD-ROM data, 12.5" (105876-001)		
Diskette drive, 15.5" (179049-001)		
CD-ROM audio, 12" (288489-001)		
Thermal sensor (166785-001)		
Hard drive/CD-ROM drive data, 14" (242947-001)		
Hard drive data, 7" (247116-001)		
Hard drive/CD-ROM drive data, 14.25" (242947-008)		
Diskette drive data, 12" (247176-003)		
Hard drive, CD-ROM drive data, 10" (247116-002)		
Y-adapter, hard drive data (296563-001)		

Specifications – Graphics Controllers

Matrox MGA-G400A Graphics Controller

Maximum display resolution				
Graphics memory	Color palette*	Double-buffering without Z-buffering	Double buffering with 16-bit Z-buffering	Double buffering with 32-bit Z-buffering
16 MB	64 K colors (16-bit)	2048 x 1536	1800 x 1440	1600 x 1200
	16 M colors (32-bit)	1600 x 1200	1280 x 1024	1280 x 1024
32 MB	64 K colors (16-bit)	2048 x 1536	2048 x 1536	2048 x 1536
	16 M colors (32-bit)	2048 x 1536	2048 x 1536	1800 x 1440

* 3D acceleration is only available with a 16- or 32-bit color palette.

Intense3D Wildcat 4110 Graphics Controller

Supported Resolutions Without Multisampling				
Aspect Ratio	bits per pixel			
	96	128	160	192
4 x 3	1824x1368 (65 Hz)	1600x1200 (75 Hz)	1824x1368 (65 Hz)	1600x1200 (75 Hz)
5 x 4	1280x1024 (85 Hz)	1280x1024 (85 Hz)	1280x1024 (85 Hz)	1280x1024 (85 Hz)
16 x 9	2048x1152 (70 Hz)	1920x1080 (75 Hz)	2048x1152 (70 Hz)	1920x1080 (75 Hz)
16 x 10	1920x1200 (70 Hz)	1824x1128 (75 Hz)	1920x1200 (70 Hz)	1824x1128 (75 Hz)
5 x 4 Frame Sequential Stereo	1280x1024 (52 Hz)	N/A	1280x1024 (52 Hz)	N/A
4 x 3 Frame Sequential Stereo	1280x960 (60 Hz)	1152x864 (60 Hz)	1280x960 (60 Hz)	1152x864 (60 Hz)

Supported Resolutions with Multisampling		
Aspect Ratio	128 bits per pixel	192 bits per pixel
4 x 3	1152x864 (85 Hz)	1024x768 (85 Hz)
5 x 4	N/A	N/A
16 x 9	1360x766 (85 Hz)	1280x720 (85 Hz)
16 x 10	1280x800	N/A
4 x 3 Frame Sequential Stereo	800x600 (60 Hz)	800x600 (60 Hz)

Intense3D Wildcat 4210 Graphics Controller**Supported Resolutions Without Multisampling**

Aspect Ratio	bits per pixel			
	96	128	160	192
4 x 3	1920 x 1440 (60 Hz)	1920 x 1440 (60 Hz)	1920 x 1440 (60 Hz)	1920 x 1440 (60 Hz)
5 x 4	1600 x 1280 (76 Hz)	1600 x 1280 (76 Hz)	1600 x 1280 (76 Hz)	1600 x 1280 (76 Hz)
16 x 9	2048 x 1152 (75 Hz)	2048 x 1152 (75 Hz)	2048 x 1152 (75 Hz)	2048 x 1152 (75 Hz)
16 x 10	1920 x 1200 (75 Hz)	1920 x 1200 (75 Hz)	1920 x 1200 (75 Hz)	1920 x 1200 (75 Hz)
5 x 4 Frame Sequential Stereo	1280 x 1024 (60 Hz)	1280 x 1024 (60 Hz)	1280 x 1024 (60 Hz)	1280 x 1024 (60 Hz)
4 x 3 Frame Sequential Stereo	1280 x 960 (60 Hz)	1280 x 960 (60 Hz)	1280 x 960 (60 Hz)	1280 x 960 (60 Hz)

Supported Resolutions with Multisampling

Aspect Ratio	128 bits per pixel	192 bits per pixel
4 x 3	1600 x 1200 (85 Hz)	1360 x 1024 (85 Hz)
5 x 4	1600 x 1280 (76 Hz)	1280 x 1024 (94 Hz)
16 x 9	1920 x 1080 (85 Hz)	1600 x 900 (85 Hz)
16 x 10	1824 x 1128 (75 Hz)	1600 x 1024 (76 Hz)
4 x 3 Frame Sequential Stereo	1280 x 960 (60 Hz)	1280 x 960 (60 Hz)

Matrox G200 Quad MMS Graphics Controller

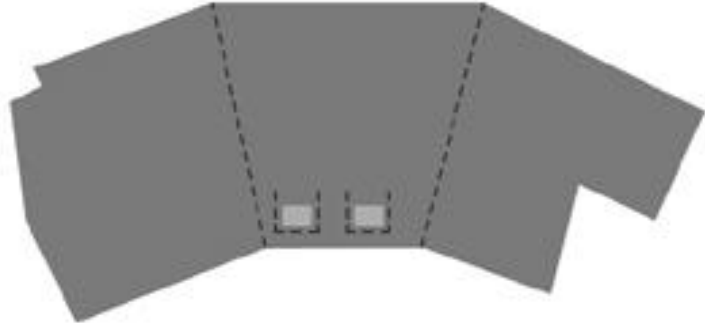
Graphics Memory	Aspect Ratio	Resolution	Refresh Rate/Display	
			Vertical	Horizontal
32 MB	4:3/5:4	640 x 480	60 - 200 Hz	31 – 102 kHz
		800 x 600	60 - 200 Hz	38 – 114 KHz
		1024 x 768	30 - 140 Hz	48 - 113 kHz
		1152 x 864	60 - 120 Hz	54 - 110 kHz
		1280 x 1024	60 - 100 Hz	64 - 107 kHz
		1600 x 1200	60 - 90 Hz	75 - 13 kHz
		1800 x 1440	60 - 70 Hz	89 - 1 04 kHz
32 MB	16:9/16:10	856 x 480	60 – 200 Hz	30 – 108 kHz
		1280 x 720	60 – 100 Hz	44 – 76 kHz
		1600 x 1024	60 - 100 Hz	64 – 108 kHz
		1920 x 1080	60 - 80 Hz	70 – 94 kHz
		1920 x 1200	60 - 76 Hz	75 – 95 kHz

ELSA Gloria II AGP Graphics Controller

Graphics Memory	Maximum Colors Supported	Resolution	Maximum Refresh Rate	Memory Dedicated to Texture Support
64 MB	16.7M	640 x 480	120 Hz	60 MB
		800 x 600	120 Hz	58 Mb
		1024 x 768	120 Hz	54 MB
		1152 x 864	100 Hz	52 MB
		1280 x 800	100 Hz	52 MB
		1280 x 960	100 Hz	49 MB
		1280 x 1024	100 Hz	48 MB
		1600 x 1000	100 Hz*	45 MB
		1600 x 1000	85 Hz	45 MB
		1600 x 1200	85 Hz	41 MB
		1600 x 1280	85 Hz	40 MB
		1600 x 1280	75 Hz	40 MB
		1900 x 1080	85 Hz	39 MB
		1920 x 1080	75 Hz	39 MB
		1920 x 1200	85 Hz*	37 MB
		1900 x 1200	75 Hz	37 MB
2048 x 1536	75 Hz	27 MB		

* Refresh rate may function but may not be officially supported by Compaq.

Air Baffle Assembly





Compaq Professional Workstation AP550

Maintenance and Service Guide



COMPAQ



Professional Workstation AP550

Maintenance and Service Guide

First Edition (October 1999)
Part Number 135618-001
Spare Part Number 158279-001
Compaq Computer Corporation

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About This Guide

This maintenance and service guide is a troubleshooting guide that can be used for reference when servicing Compaq Professional Workstation AP550.



WARNING: To reduce the risk of personal injury from electrical shock and hazardous energy levels, only authorized service technicians should attempt to repair this equipment. Improper repairs could create conditions that are hazardous.

IMPORTANT: The installation of options and servicing of this product shall be performed by individuals who are knowledgeable of the procedures, precautions, and hazards associated with equipment containing hazardous energy circuits.

Symbols in Text

These symbols may be found in the text of this guide. They have the following meanings.



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 information.

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

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

Compaq 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.



WARNING: To reduce the risk of personal injury from electrical shock and hazardous energy levels, do not exceed the level of repair specified in these procedures. Because of the complexity of the individual boards and subassemblies, do not attempt to make repairs at the component level or to make modifications to any printed wiring board. Improper repairs could create conditions that are hazardous.



WARNING: To reduce the risk of electric shock or damage to the equipment:

- If the system has multiple power supplies, disconnect power from the system by unplugging all power cords from the power supplies.
 - Do not disable the power cord grounding plug. The grounding plug is an important safety feature.
 - Plug the power cord into a grounded (earthed) electrical outlet that is easily accessible at all times.
-



CAUTION: To properly ventilate your system, you must provide at least 12 inches (30.5 cm) of clearance at the front and back of the computer.



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.

Where to Go for Additional Help

In addition to this guide, the following information sources are available:

- User documentation
- *Compaq Service Quick Reference Guide*
- Service Training Guides
- Compaq Service Advisories and Bulletins
- Compaq QuickFind
- Compaq Insight Manager
- Workstation Reference Library CD

NOTE: The Workstation Reference Library CD contains detailed product information on the graphics controller, certain options, and the safety and comfort guide. All documents are presented in PDF file format with an easy-to-use graphical interface. When the CD is inserted into the CD-ROM, the CD automatically detects the operating system language and loads the corresponding language files (if available).

- Compaq Download Facility: Call 1-281-518-1418

Telephone Numbers

For the name of your nearest Compaq authorized reseller:

- In the United States, call 1-800-345-1518
- In Canada, call 1-800-567-1616

For Compaq technical support:

- In the United States and Canada, call 1-800-386-2172
- For Compaq technical support phone numbers outside the United States and Canada, visit the Compaq website:

<http://www.compaq.com>

Chapter **1**

Illustrated Parts Catalog

This chapter provides an illustrated parts breakdown and a reference for spare parts for the Compaq Professional Workstation AP550.

Overview

Mechanical Parts

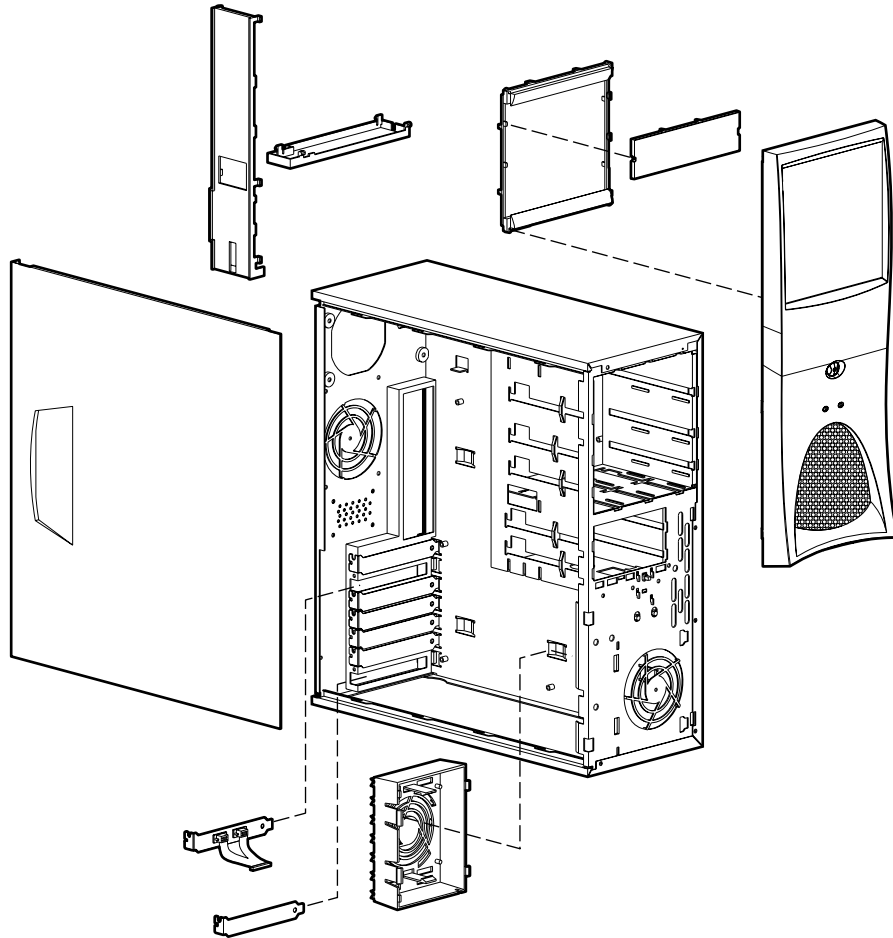


Figure 1-1. Exploded view for the Compaq Professional Workstation AP550 mechanical parts

System Components

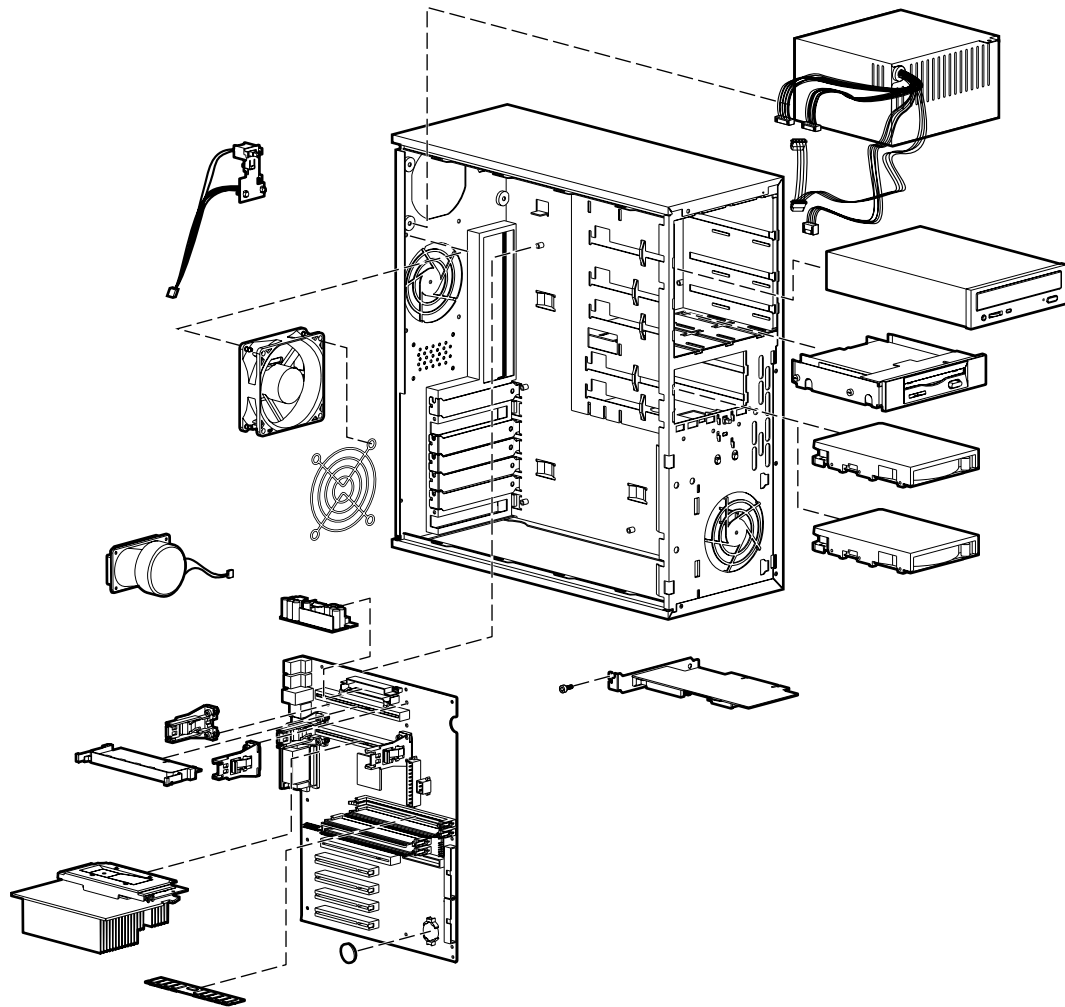


Figure 1-2. Exploded view for the Compaq Professional Workstation AP550 system components

Spare Parts List

Mechanical Components

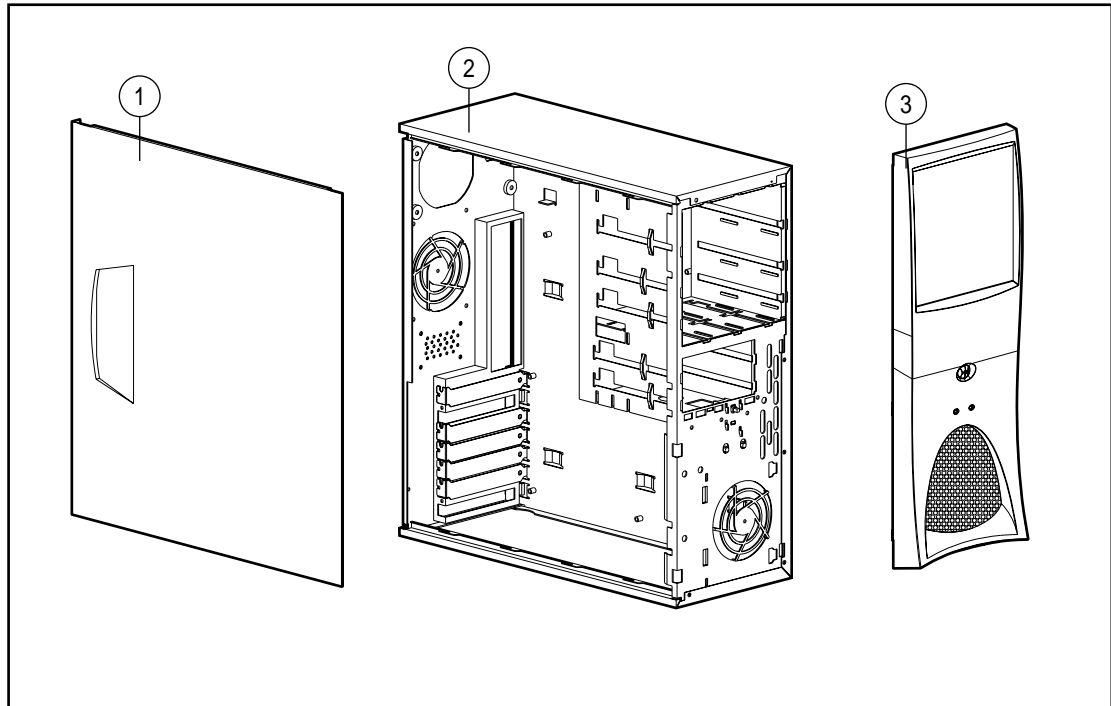


Figure 1-3. Mechanical components for the Compaq Professional Workstation AP550

Table 1-1
Mechanical Components Spare Parts List

Item	Description	Spare Part #
1	Workstation access panel	137384-001
2	Chassis	164540-001
3	Front bezel	158268-001

Note: Parts or components marked with an asterisk (*) are *not* illustrated.

System Components

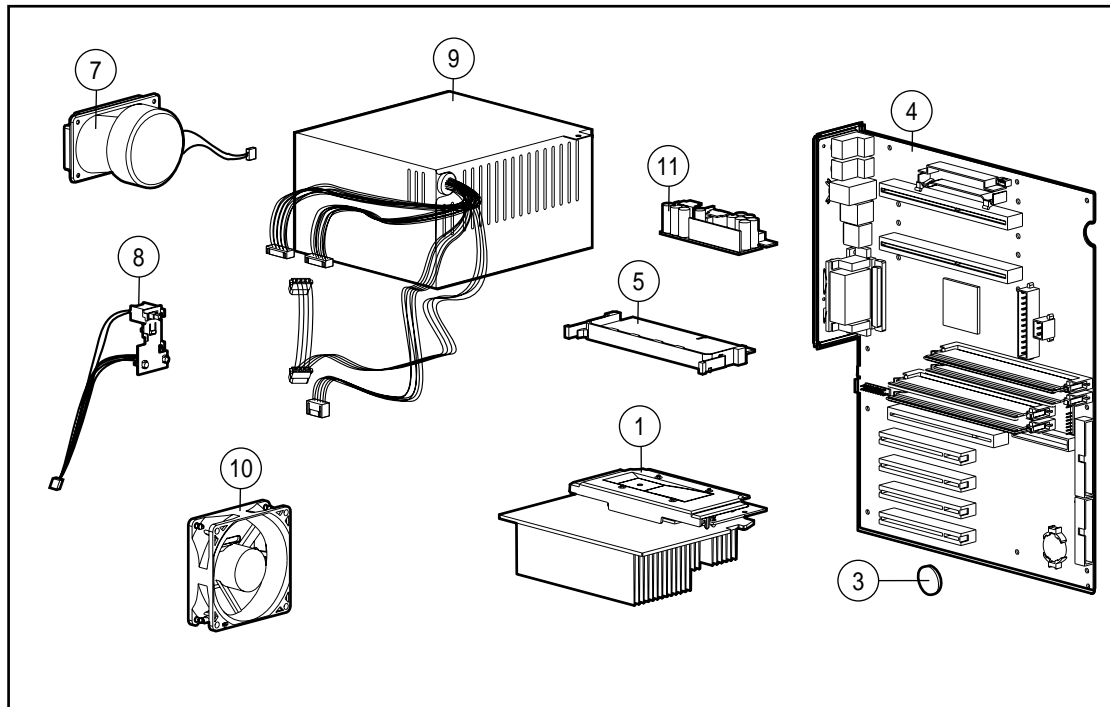


Figure 1-4. System components for the Compaq Professional Workstation AP550

Table 1-2
System Components Spare Parts List

Item	Description	Spare Part #
1	Intel Pentium III Processor, 600EB-MHz with a 133-MHz front-side bus	152818-001
2	Intel Pentium III Processor, 733-MHz with a 133-MHz front-side bus	163363-001*
3	Battery	153099-001
4	System board for the Compaq Professional Workstation AP550	158272-001
5	Terminator board for secondary processor slot	158271-001
6	Lock security bracket	199109-001*
7	Loud speaker	164416-001
8	Power switch and LEDs with cable	166925-001
9	375-W power supply with Power Factor Correction (PFC)	128399-001
10	Auxiliary fan (standard) on the Compaq Professional Workstation AP550	158275-001
11	Processor power module connector for optional processor	329267-001

Note: Parts or components marked with an asterisk (*) are *not* illustrated.

Memory

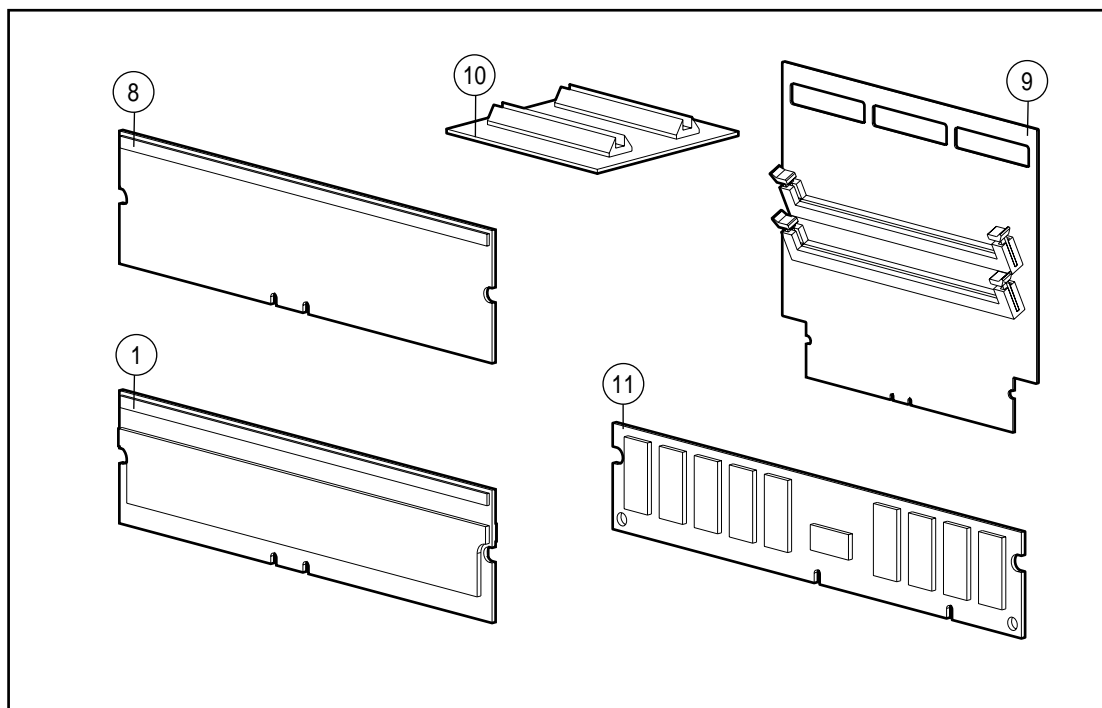


Figure 1-5. Memory for the Compaq Professional Workstation AP550

Table 1-3
Memory Spare Parts List

Item	Description	Spare Part #
1	64-MB ECC Direct Rambus Inline Memory Modules (RIMM) 600-MHz	157107-001
2	64-MB ECC Direct Rambus Inline Memory Modules (RIMM) 800-MHz	162995-001*
3	128-MB ECC Direct Rambus Inline Memory Modules (RIMM) 600-MHz	158264-001*
4	128-MB ECC Direct Rambus Inline Memory Modules (RIMM) 600-MHz	164539-001*
5	128-MB ECC Direct Rambus Inline Memory Modules (RIMM) 800-MHz	157112-001*
6	256-MB ECC Direct Rambus Inline Memory Modules (RIMM) 600-MHz	161453-001*
7	256-MB ECC Direct Rambus Inline Memory Modules (RIMM) 800-MHz	161454-001*
8	Continuity RIMMs (CRIMMs)	158265-001
9	SDRAM expansion board	158273-001
10	SDRAM expansion board stabilizer card	158276-001
11	64-MB ECC memory modules (Registered 100-MHz SDRAM)	329340-001
12	128-MB ECC memory modules (Registered 100-MHz SDRAM)	329341-001*
13	256-MB ECC memory modules (Registered 100-MHz SDRAM)	329343-001*
14	512-MB ECC memory modules (Registered 100-MHz SDRAM)	329344-001*

Note: Parts or components marked with an asterisk (*) are *not* illustrated.

Mass Storage Devices

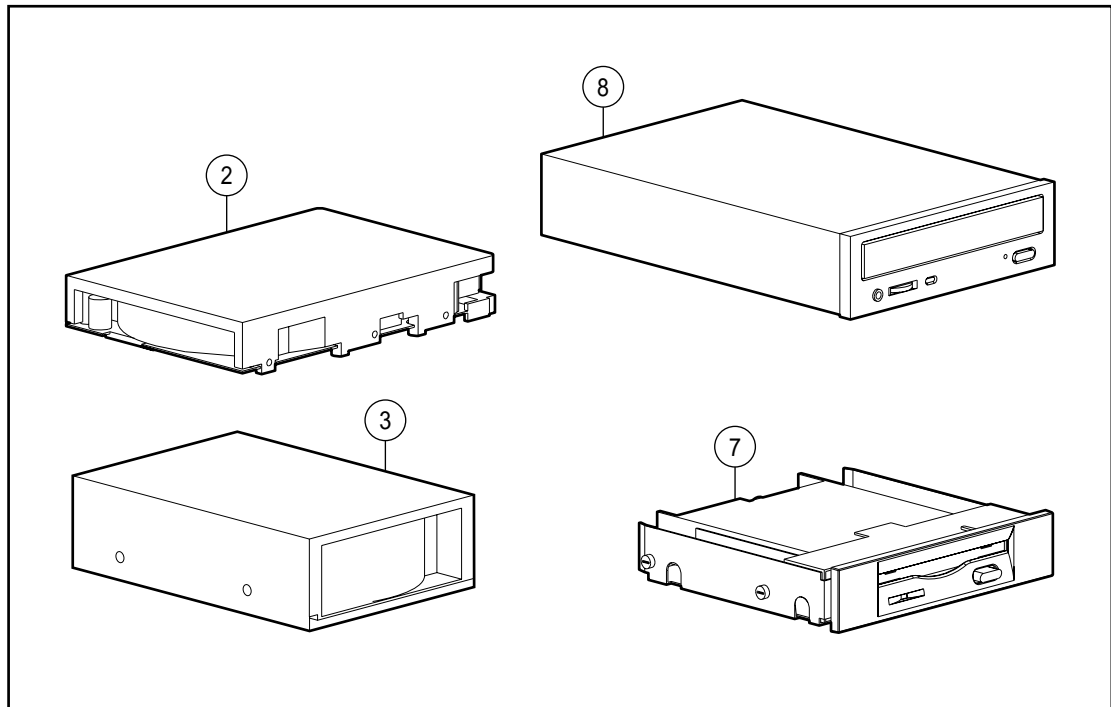


Figure 1-6. Mass storage devices for the Compaq Professional Workstation AP550

Table 1-4
Mass Storage Device Spare Parts List

Item	Description	Spare Part #
1	DVD-ROM drive (6X is available on select models)	105771-001*
2	9-GB Ultra3 SCSI hard drive (10,000 rpm)	160062-001
3	18-GB Ultra3 SCSI hard drive (10,000 rpm)	160063-001
4	10-GB Ultra ATA/66 IDE hard drive (7,200 rpm)	135364-001*
5	18-GB Ultra3 SCSI hard drive (7,200 rpm)	153650-001*
6	72 TrueX CD-ROM drive (optional)	134195-001*
7	1.44-MB diskette drive	158266-001
8	40X CD-ROM drive	400807-001
9	250-MB Zip Drive (optional)	125776-001*
10	100-MB Zip Drive	401624-001*

Note: Parts or components marked with an asterisk (*) are *not* illustrated.

Cable Kits

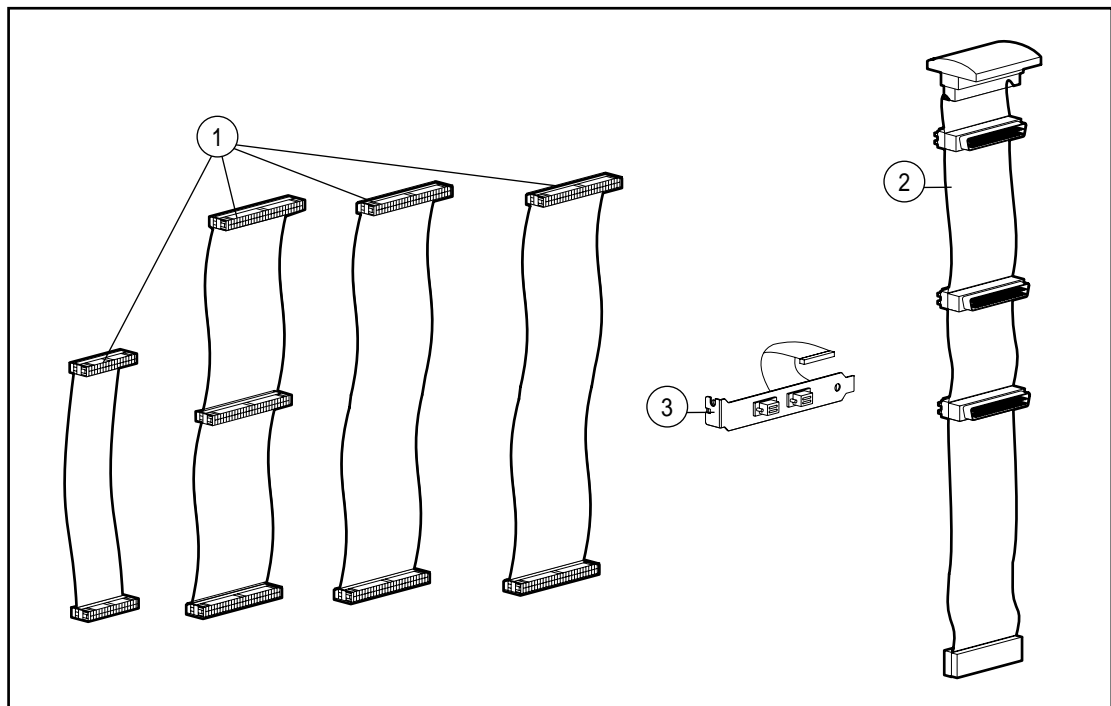


Figure 1-7. Cable kits for the Compaq Professional Workstation AP550

Table 1-5
Cable Kits Spare Parts List

Item	Description	Spare Part #
1	Miscellaneous Cable Kit (166838-001, 288489-002, 247116-001, 242947-001)	166879-001
2	SCSI LVD 3-device twisted pair cable	158277-001
3	Serial port cover connector	158274-001
4	NIC Wake-on-LAN cable	166974-001*
5	Power cord	121258-001*
6	Video cable, 60 POS	164415-001*

Note: Parts or components marked with an asterisk (*) are *not* illustrated.

Graphic Controllers

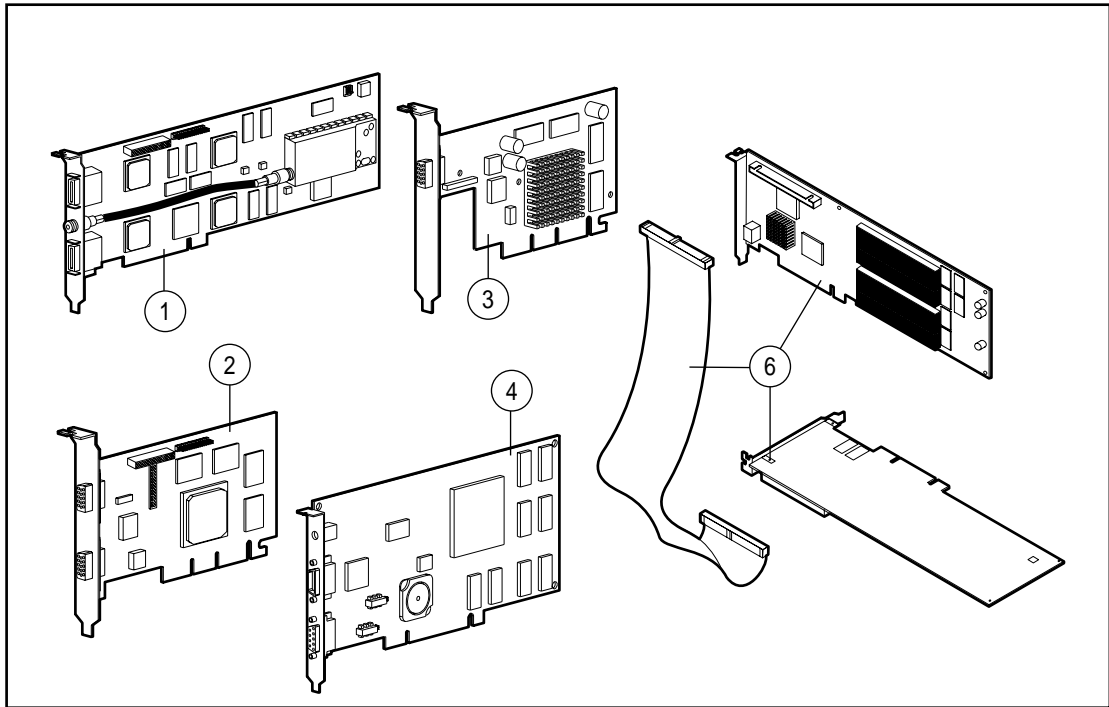


Figure 1-8. Graphic controllers for the Compaq Professional Workstation AP550

Table 1-6
Graphics Controllers Spare Parts List

Item	Description	Spare Part #
1	Matrox Productiva G100 Multi-Monitor	101239-001
2	Matrox G400 16-MB 4X AGP (2D)	400437-001
3	ELSA Synergy II 32-MB 4X AGP (entry-3D)	146140-001
4	3Dlabs Oxygen GVX1 AGP (mid-3D)	146141-001
5	3Dlabs Oxygen GVX1 PCI (mid-3D)	159629-001*
6	PowerStorm 600 (enh-3D)	122926-001

Note: Parts or components marked with an asterisk (*) are *not* illustrated.

Network Controllers

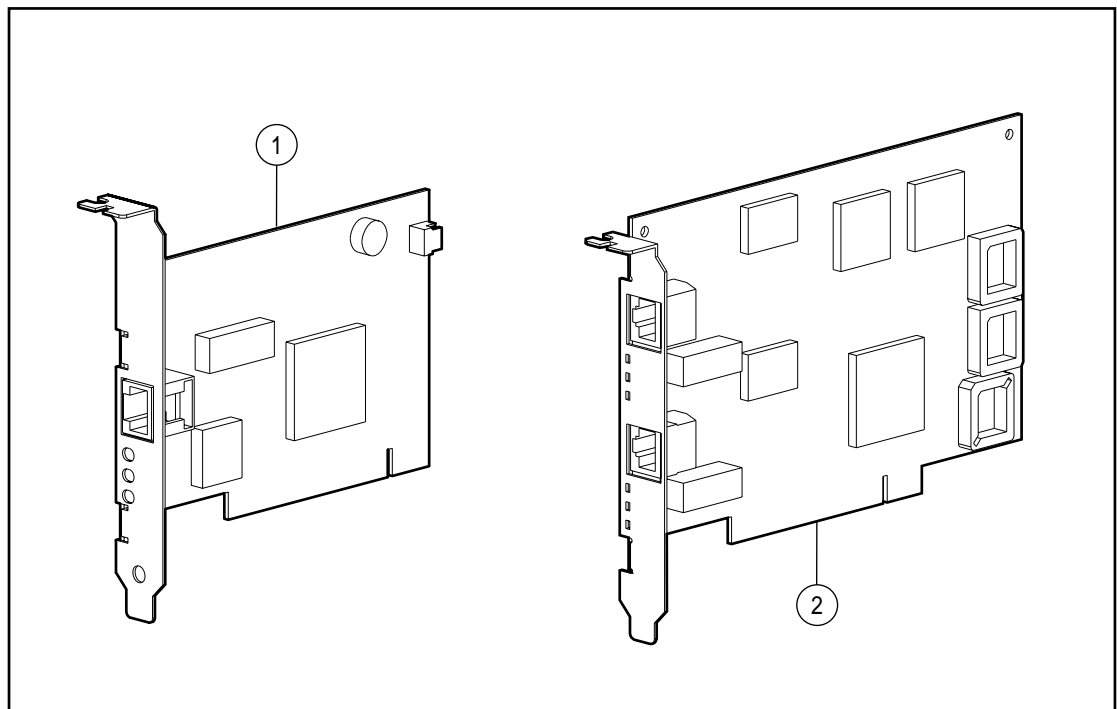


Figure 1-9. Network controllers for the Compaq Professional Workstation AP550

Table 1-7
Network Controllers Spare Parts List

Item	Description	Spare Part #
1	Compaq NC3121 Fast Ethernet NIC PCI, 10/100, Wake-on-LAN	323556-001
2	Netelligent 16/4 TR PCI UTP/STP Controller	268010-001
3	Compaq NC3120 Fast Ethernet NIC PCI, 10/100	317606-001*
4	Compaq NC3123 Fast Ethernet NIC PCI, 10/100, Wake-on-LAN	174831-001*

Note: Parts or components marked with an asterisk (*) are *not* illustrated.

Input/Output Devices

Table 1-8
Input/Output Devices Spare Parts List

Item	Description	Spare Part #
Keyboard and Mouse		
1	Keyboard, space saver	269513-001*
2	3-button mouse	327716-001*
3	Spaceball 4000 3D motion control input device (optional)	118029-001*
Monitors		
4	P75	307806-xxx*
5	P1610 color monitor (Beach)	305708-xxx*
6	P1610 color monitor (Opal)	325500-xxx*
7	P110 monitor	325600-xxx*
8	TFT5000 flat panel monitor TC099 opal, touch screen, NA	325700-xxx*
9	TFT8000 flat panel monitor Opal, without protective panel, TC095,WW	307906-001*
10	TFT8000 flat panel monitor Opal, with protective panel, TC095,WW	307931-xxx*
11	TFT8000 flat panel monitor Carbon, without protective panel, TC095,WW	307932-xxx*
12	TFT8000 flat panel monitor Carbon, with protective panel, TC095,WW	307935-xxx*
13	TFT5000S Flat Panel Color (EMEA)	104751-021*
14	TFT5000S Flat Panel Color (outside EMEA)	122729-xx1*
15	V1000 Color Monitor	351756-xxx*
16	V900 Color Monitor	303500-xxx*
17	V700 Color Monitor	325800-xxx*
18	S900 Color Monitor	360512-xxx*
19	S700 Color Monitor	360512-xxx*
20	TFT 500: <i>Order TFT 500 spare part from the TFT 500 guide (PN 285012-001)</i>	*

Note: Parts or components marked with an asterisk (*) are *not* illustrated.

Software and Miscellaneous

Table 1-9
Software and Miscellaneous Spare Parts List

Item	Description	Spare Part #
Software		
1	Microsoft Windows NT Workstation 4.0 CD	275573-xx1*
Miscellaneous		
2	3.5- to 5.25-inch diskette drive mounting bracket with screws and brace for use in bay 3 only	166923-001*
3	3.5- to 5.25-inch hard drive mounting bracket	243231-001*
4	3.5- to 5.25-inch ½ height mounting bracket for use in bays 1 and 2 only	243230-002*
5	Shipping box with buns (US)	166990-001*
6	Shipping box with buns (INTL)	166990-002*

Note: Parts or components marked with an asterisk (*) are *not* illustrated.

Documents

Table 1-10
Document Spare Parts List

Item	Description	Spare Part #
1	Maintenance and Service Guide	158279-001*
2	Illustrated Parts Map	158280-001*
3	Service Quick Reference Guide (revision 040)	162212-001*

Note: Parts or components marked with an asterisk (*) are *not* illustrated.

Chapter 2

Service Preliminaries

Overview

This chapter identifies the following service considerations:

- Preliminary warnings and cautions
- Electrostatic discharge information
- Equipment symbols
- Tools and software requirements
- Warranty information

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

Preliminary Warnings and Cautions

The following should be noted when operating or servicing the Compaq Professional Workstation AP550:



WARNING: To reduce the risk of electric shock or damage to the equipment:

- If the system has multiple power supplies, disconnect power from the system by unplugging all power cords from the power supplies.
 - Do not disable the power cord grounding plug. The ground plug is an important safety feature.
 - Plug the power cord into a grounded (earthed) electrical outlet that is easily accessible at all times.
-



WARNING: To reduce the risk of personal injury from hazardous energy levels, only authorized service technicians should attempt to repair this equipment. 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



CAUTION: The power supply in the Compaq Professional Workstation AP550 has an auxiliary power section. This section is always active as long as the unit is plugged into a live AC outlet. Be sure to turn off the switch and unplug the power cord before performing any service work.



CAUTION: To properly ventilate the system, you must provide at least 6 inches (15 cm) of clearance at the front of the workstation and 3 inches (7.6 cm) at the back.



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



CAUTION: RIMMs can reach a temperature of 212° F (100° C) in a matter of minutes. Caution should be excised whenever removing or replacing these components.

IMPORTANT: Any indications of component replacement or printed wiring board modifications may void any warranty.

Electrostatic Discharge Information

A discharge of static electricity can damage static-sensitive devices or microcircuitry. Proper packaging and grounding techniques are necessary precautions to prevent damage. To prevent electrostatic damage:

- Transport products in static-safe containers such as conductive tubes, bags, or boxes.
- Keep electrostatic-sensitive parts in their containers until they arrive at static-free stations.
- Cover workstations with approved static-dissipating material. Provide a wrist strap connected to the work surface and properly grounded tools and equipment.
- Keep work area free of non-conductive materials such as ordinary plastic assembly aids and foam packing.
- Always be sure you are properly grounded when touching a static-sensitive component or assembly.
- Avoid touching pins, leads, or circuitry.
- Always place drives PCB assembly-side down.
- Use conductive field service tools.

Equipment Symbols

The following symbols are located on applicable components of the workstation and should be observed when servicing the workstation to avoid personal injury or damage to the components:



WARNING: Any surface or area of the equipment marked with these symbols indicates the presence of a hot surface or hot component. If this surface is contacted, the potential for injury exists. To reduce risk of injury from a hot component, allow the surface to cool before touching.



WARNING: Any surface or area of the equipment marked with these symbols indicates the presence of electrical shock hazards. The enclosed area contains no operator-serviceable parts. To reduce risk of personal injury from electrical shock hazards, do not open this enclosure.



WARNING: Any RJ-45 receptacle marked with this symbol indicates a Network Interface Connection. To reduce risk of electrical shock, fire, or damage to the equipment, do not plug telephone or telecommunications connectors into this receptacle.

Tools and Software Requirements

To service the workstation, you might need the following:

- Torx T-10 screwdriver
- Torx T-15 screwdriver
- Flat-blade screwdriver
- Diagnostics diskette

IMPORTANT: Before servicing the workstation, be sure that the drivers from the latest Compaq workstation SSD for Windows NT are installed. See Chapter 4 for installation procedures.

Warranty Information

The workstation comes *standard* with the following warranties:

- **Standard Warranty**—Refer to the warranty card included with the unit.
- **Pre-Failure Warranty**—A special warranty that extends the Compaq three-year limited warranty by applying it to critical system components before they fail. This 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.

NOTE: For more information about Compaq Insight Manager, see Chapter 4.

The Pre-Failure Warranty covers the following workstation components:

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

In addition to the above warranties, an optional Extended Warranty is available through CarePac. A post warranty contract is also available on this product. If purchased, this warranty extends the Standard Warranty's one-year coverage for labor and on-site service by two additional years.

IMPORTANT: Observe all warnings and cautions provided herein. Failure to do so may void warranty for damaged components.

Chapter **3**

Removal and Replacement Procedures

Introduction

This chapter provides subassembly/module-level removal and replacement procedures for the Compaq Professional Workstation AP550.

After completing all necessary removal and replacement procedures, run the Compaq Setup and Diagnostics program to verify that all components are operating properly.

Serial Number

Provide the computer serial number to Compaq whenever you request information or order spare parts. The serial number is located on the top corner of the workstation ❶ and on the rear of the chassis ❷.

For asset control, the serial number is embedded in the EPROM on the system board. If the system board is replaced with a spare part from Compaq, an invalid serial number condition will be reported during Power-On Self-Test (POST). To clear the condition, reenter the original serial number through Computer Setup.

NOTE: POST recognizes the serial number as a valid number if a system board from another workstation is installed.

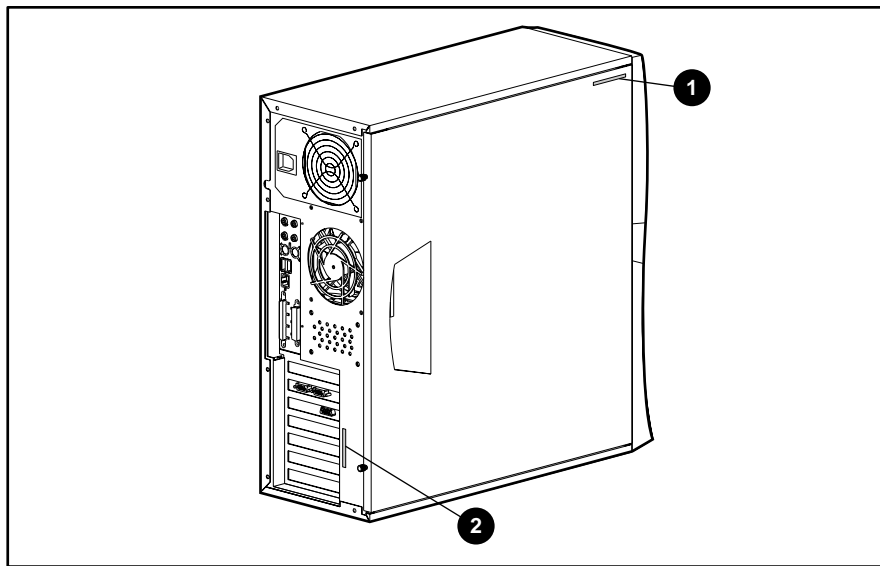


Figure 3-1. Identifying serial number locations

Service Preparations



CAUTION: Electrostatic discharge can damage electronic components. Be sure you are properly grounded before beginning any installation procedure. See “Electrostatic Discharge Information” in Chapter 2 for more information.

Before beginning any of the removal and replacement procedures, complete the following steps:

1. Turn off the workstation.
2. Disconnect the power cord from the grounded AC outlet and then from the workstation.

IMPORTANT: On a power-managed system, the power cord **must** be disconnected from the grounded AC outlet.

3. Turn off all peripheral devices and disconnect cables from the rear of the workstation.

NOTE: See Chapter 2 for more information on preparing the workstation for service.

Cable Lock

The workstation comes standard with a cable lock provision for attaching a padlock and/or cable lock. If installed, the locks must be removed before you can access internal components.

To remove the lock (199109-001):

1. Unlock and remove the cable lock and/or the padlock.
2. Remove the security bracket (plate) ❶, which is seated over the cable lock bracket ❷.
3. Unfasten the retaining screw ❸ to free the cable lock bracket and to release the screw security bracket ❹.

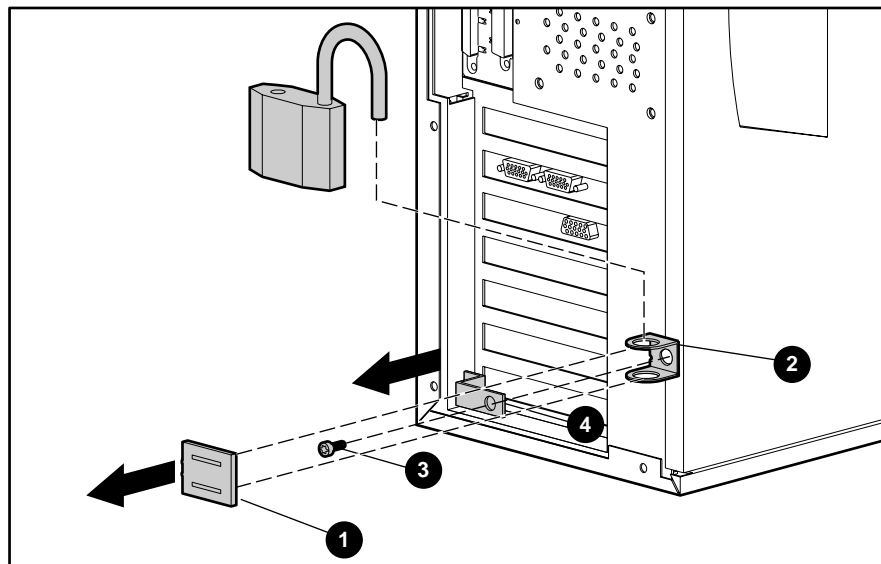


Figure 3-2. Removing the cable lock

To replace the cable lock, reverse the above procedure.

Workstation Access Panel

To remove the workstation access panel (137384-001):

1. Perform the steps in the “Service Preparations” section as previously shown.



CAUTION: Before removing the workstation access panel, ensure that the workstation is turned off, all cables are disconnected from the back of the workstation, and the power cord is disconnected from the grounded AC outlet

2. Loosen the two thumbscrews that secure the workstation access panel to the workstation chassis.

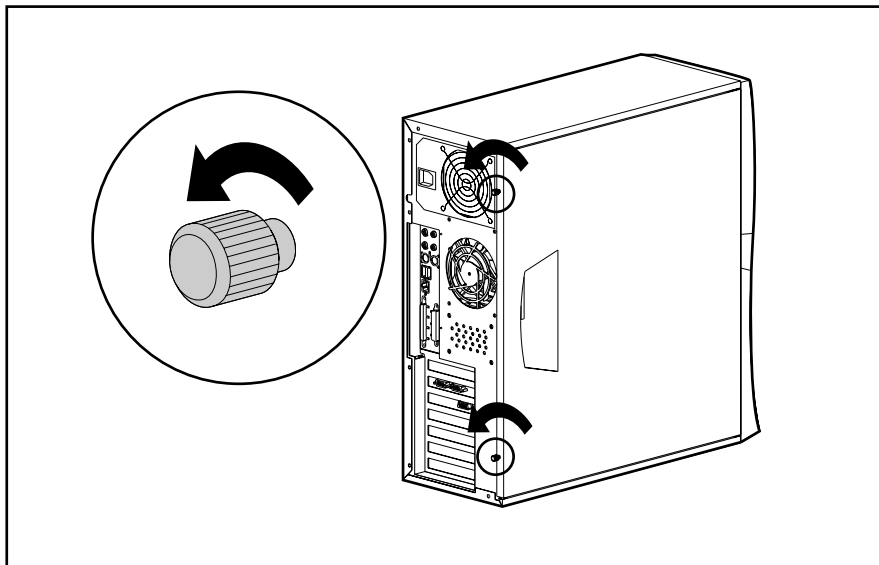


Figure 3-3. Loosening the side workstation access panel thumbscrews

3. Slide the workstation access panel back about 1 inch (2.5 cm), then lift it off the workstation.

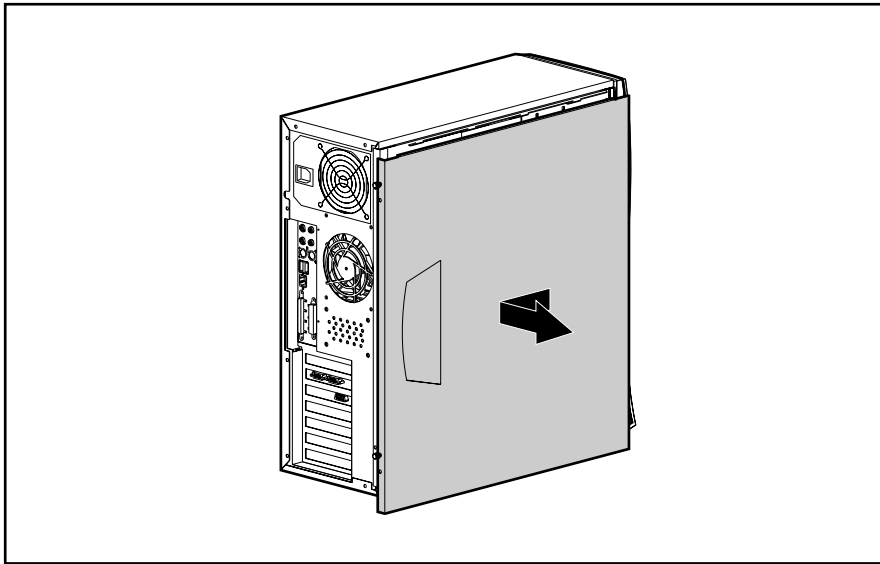


Figure 3-4. Removing the workstation access panel

To replace the workstation access panel, reverse the above procedure.

Front Bezel

To remove the front bezel (158278-001):

1. Perform the steps in the “Service Preparations” section as previously shown.



CAUTION: Before removing the workstation access panel, ensure that the workstation is turned off, all cables are disconnected from the back of the workstation, and the power cord is disconnected from the grounded AC outlet.

2. Remove the workstation access panel.
3. Press in on the two release tabs **1**, then rotate the front bezel away from the chassis to remove it from the workstation **2**.

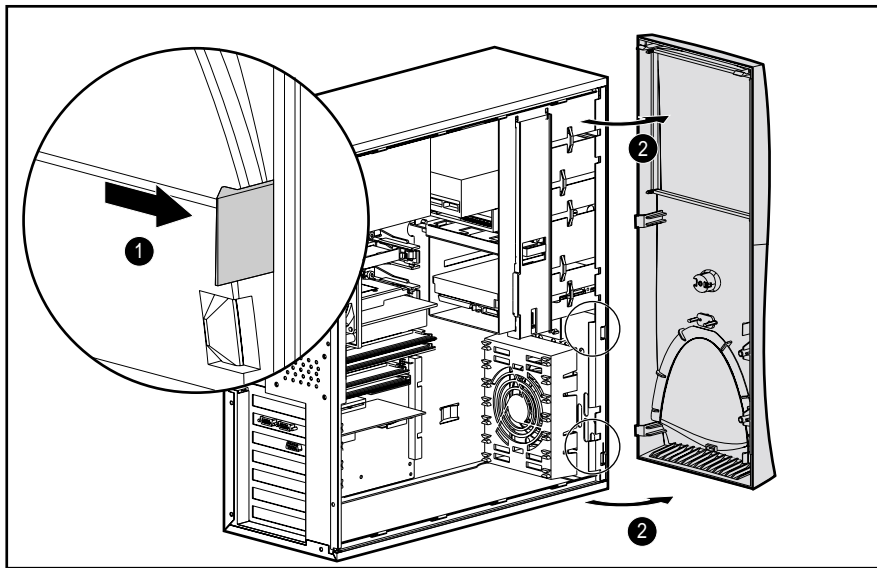


Figure 3-5. Removing the front bezel

To replace the front bezel, reverse the above procedure.

NOTE: When replacing the front bezel, be sure the bottom hinge points are properly placed in the chassis before rotating the front bezel back into its original position.

Subpanel and Bezel Blanks

NOTE: The subpanel and bezel blanks must be removed from the front bezel if you are installing a mass storage device for the first time, or if you are converting the unit from a minitower to a desktop configuration or from a desktop to a minitower configuration.

To remove the bezel blank from the front bezel:

1. Perform the steps in the “Service Preparations” section as previously shown.



CAUTION: Before removing the workstation access panel, ensure that the workstation is turned off, all cables are disconnected from the back of the workstation, and the power cord is disconnected from the grounded AC outlet.

2. Remove the side workstation access panel.
3. Remove the front bezel.
4. Gently pull the subpanel, with the bezel blank secured in it, away from the front bezel, and then remove the bezel blank.



CAUTION: Hold the subpanel straight when you pull it away from the front bezel. Pulling at an angle could damage the pins that align the subpanel within the front bezel.

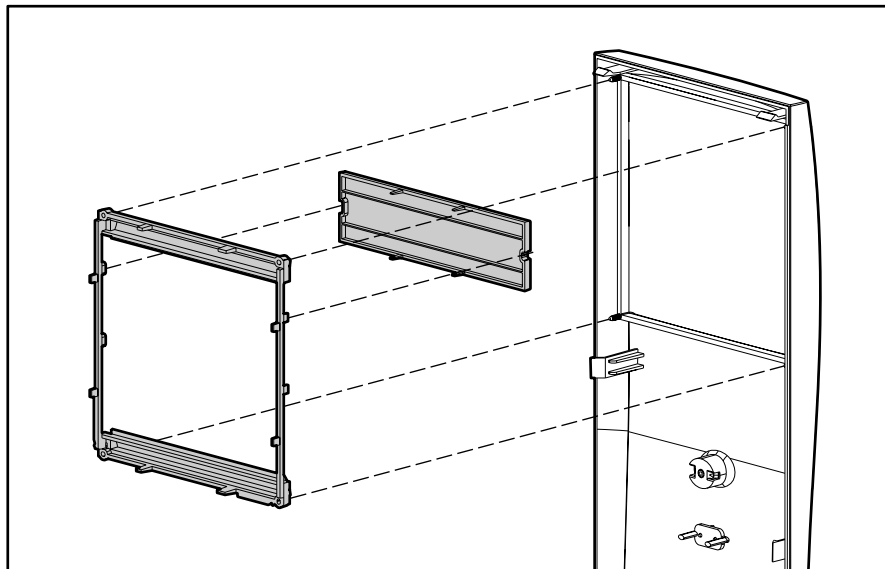


Figure 3-6. Removing the subpanel and bezel blanks

To replace the subpanel and bezel blanks, reverse the above procedure. Be sure the subpanel and front bezel align properly with the alignment tabs. See Figure 3-7 for the subpanel keyed-alignment positions.

NOTE: When switching from minitower to desktop orientation, the bezel blank should be switched out with the replacement provided to ensure that the Compaq logo is properly oriented.



CAUTION: When replacing the subpanel, be sure the aligning pins and any remaining bezel blanks are in the proper orientation to prevent damage to the alignment pins.

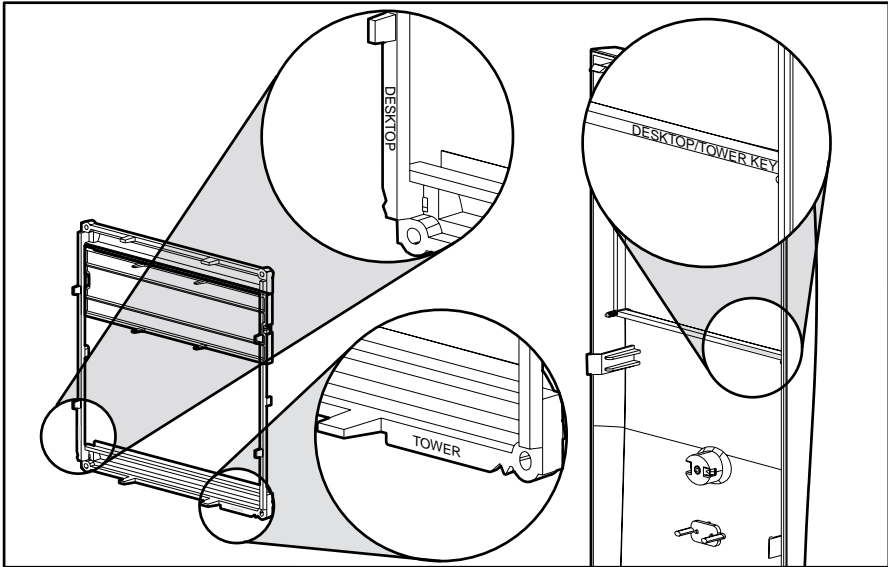


Figure 3-7. Identifying the subpanel keyed-alignment positions

Mass Storage Devices

This section discusses removal and replacement procedures for the mass storage devices supported on the Compaq Professional Workstation AP550.

Drive Positions

The Compaq Professional Workstation AP550 can house up to five mass storage devices. The following illustration identifies the physical drive locations. See the table below for a list of recommended drive configurations.

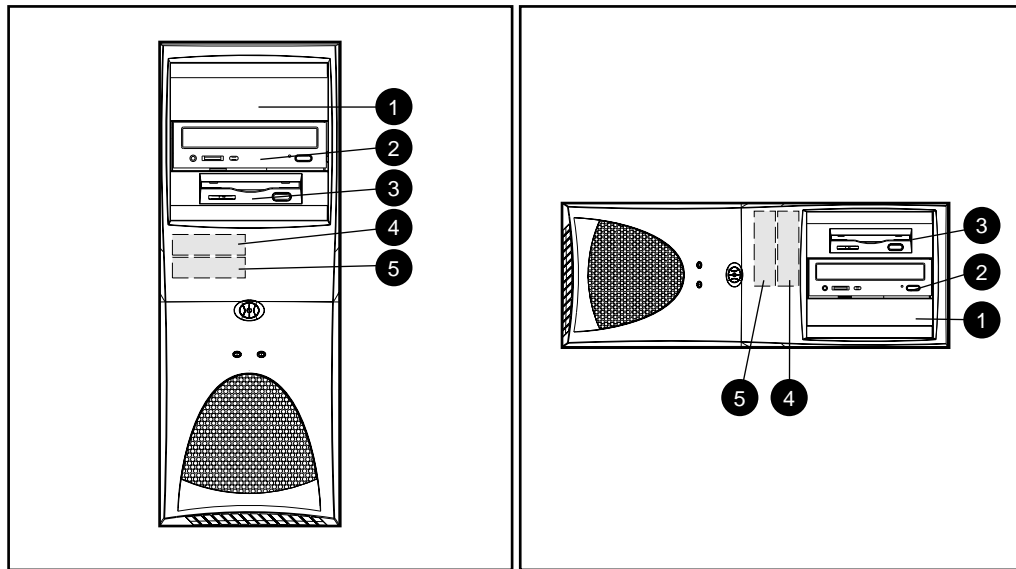


Figure 3-8. Identifying drive positions. The bay numbers are stamped on the chassis.

Table 3-1
Drive Positions

Bay	Bay Width	Bay Height	Device Configurations
①	5.25-inch bay	Half-height	Optional drive*
②	5.25-inch bay	Half-height	CD-ROM/optional drive (1.6-inch)
③	3.5-inch bay	Third-height	Standard 1.44-MB diskette drive (1.0-inch) †
④	3.5-inch bay	Third-height	Optional hard drive (1.0-inch)
⑤	3.5-inch bay	Third-height	Standard hard drive

* You may install either a third-height or half-height drive into a half-height bay.

† Use a drive adapter to mount a high-density diskette drive into a 5.25-inch bay.

NOTE: Compaq does not support mixing Ultra ATA and SCSI hard drives in the same system. If you are replacing a hard drive in bay 4 or 5, install the same type drive as you remove. If you are replacing the Ultra ATA hard drive in bay 4 or 5 with a SCSI hard drive, you will need a SCSI device option kit and the SCSI controller option kit. The controller option kit contains the SCSI controller and cable that supports multiple SCSI devices. See "Installing Optional SCSI Devices" later in this chapter for more information.

IMPORTANT: You must install guide screws to ensure that the drives line up correctly in the drive cage. Compaq has provided extra guide screws, installed in the front of the workstation chassis behind the front bezel. Some options use 5.25 M3 metric screws, and some use HD 6-32. The Compaq-supplied metric screws are black.

NOTE: For optimal performance, connect hard drives to the primary controller. Connect expansion devices, such as IDE CD-ROM, tape, and diskette drives, to the secondary controller.

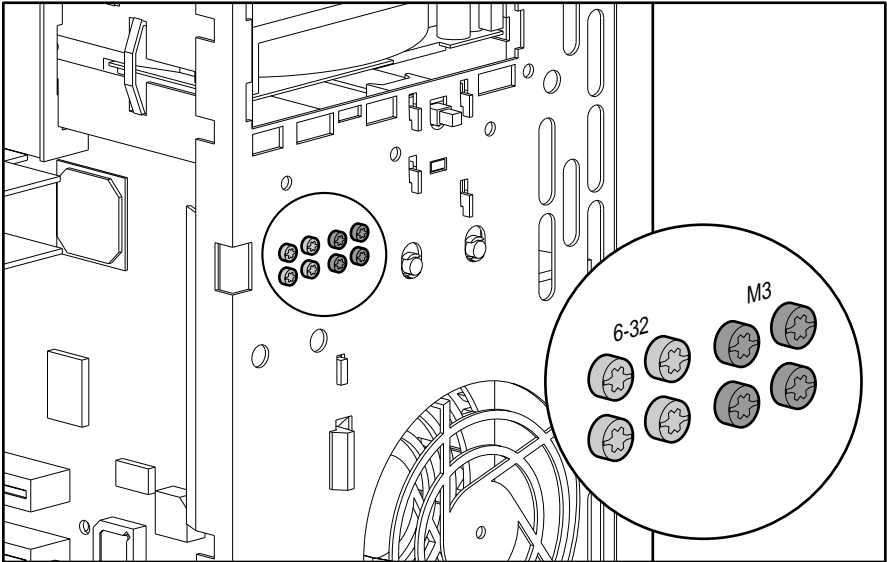


Figure 3-9. Identifying the metric (M3) screws

3.5-Inch Hard Drive

To remove a 3.5-inch hard drive:

1. Perform the steps in the “Service Preparations” section as previously shown.



CAUTION: Before removing the workstation access panel, ensure that the workstation is turned off, all cables are disconnected from the back of the workstation, and the power cord is disconnected from the grounded AC outlet.

2. Remove the workstation access panel.
3. Remove the front bezel.
4. Disconnect the power **1** and data **2** cables from the back of the hard drive.

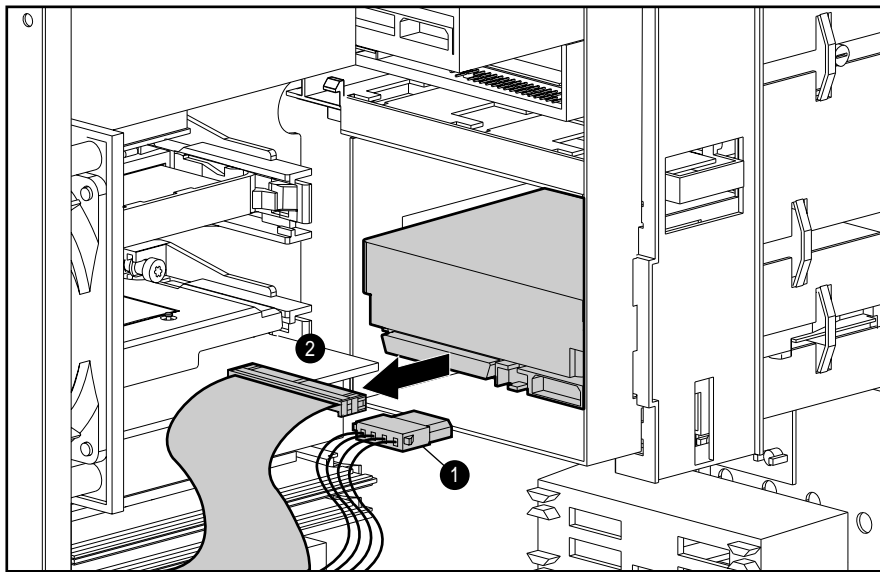


Figure 3-10. Disconnecting the hard drive cables

5. Raise the drivelock to unlock the hard drive.

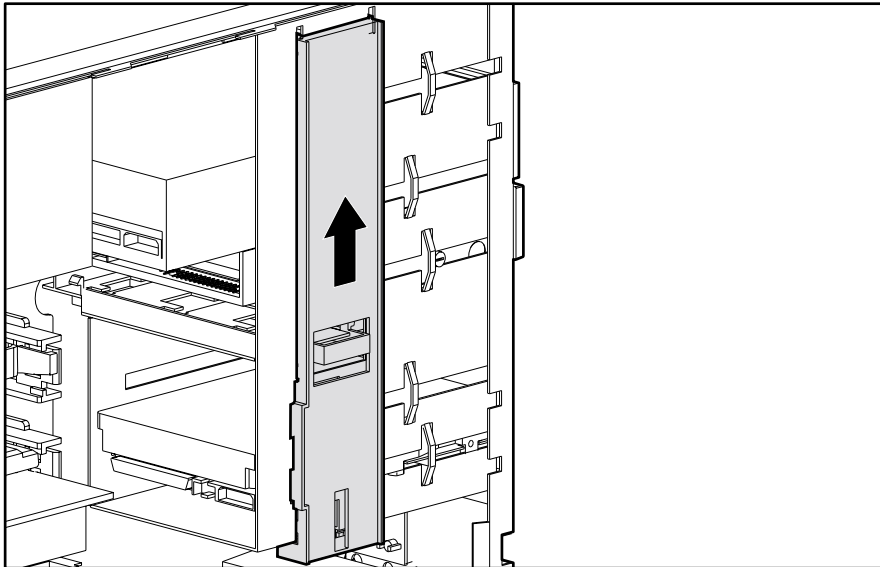


Figure 3-11. Releasing the hard drive by raising the drivelock

6. Hold the drivelock up while you push the drive from the rear and remove it from the front of the drive bay ①.

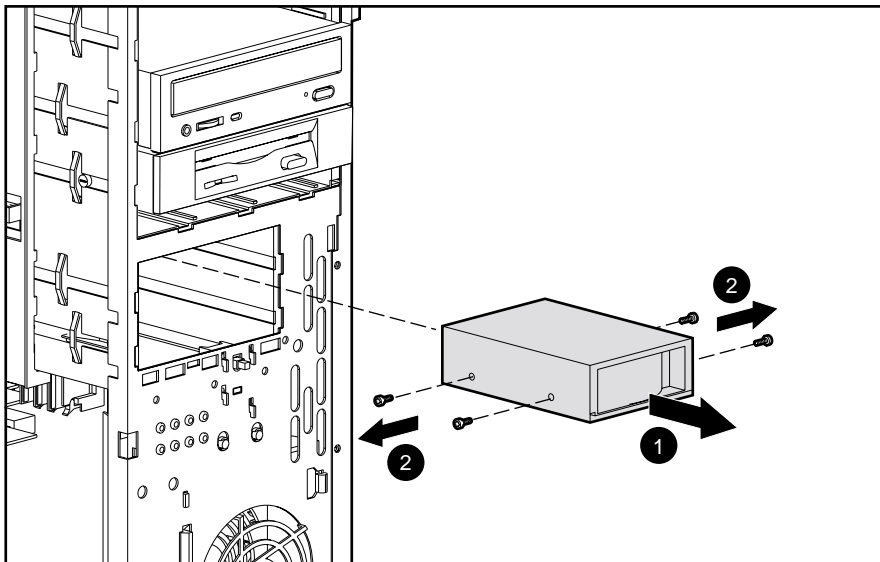


Figure 3-12. Removing a 3.5-inch hard drive

7. Remove the two guide screws from each side of the drive ②.

To replace the 3.5-inch hard drive:

1. Install two guide screws on each side of the replacement drive, making sure the guide screws line up with the guide slots.
2. Slide the hard drive into the drive bay until it snaps into place.

IMPORTANT: When installing a second Ultra ATA hard drive on the primary controller, you must use an 80-conductor Ultra ATA cable for optimal performance. This cable is included in the hard drive option kit.

3.5-Inch Drive with 5.25-Inch Drive Adapter

To remove a 3.5-inch drive with a 5.25-inch drive adapter (166923-001):

1. Perform the steps in the “Service Preparations” section as previously shown.



CAUTION: Before removing the workstation access panel, ensure that the workstation is turned off, all cables are disconnected from the back of the workstation, and the power cord is disconnected from the grounded AC outlet.

2. Remove the workstation access panel.
3. Remove the front bezel.
4. Disconnect the cables from the back of the drive.
5. Raise the drivelock to unlock the drive.

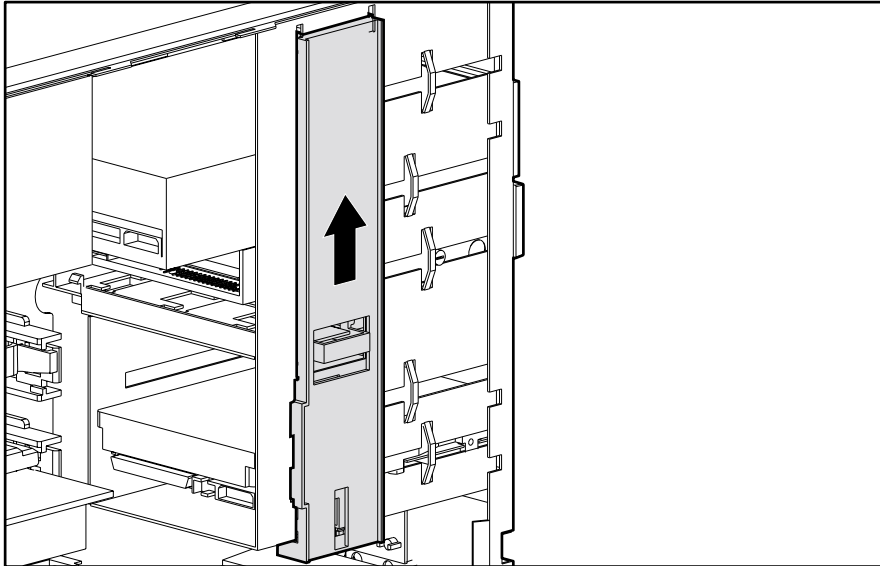


Figure 3-13. Releasing the hard drive by raising the drivelock

6. Hold the drivelock up while you push the drive from the rear and remove it from the front of the drive bay.

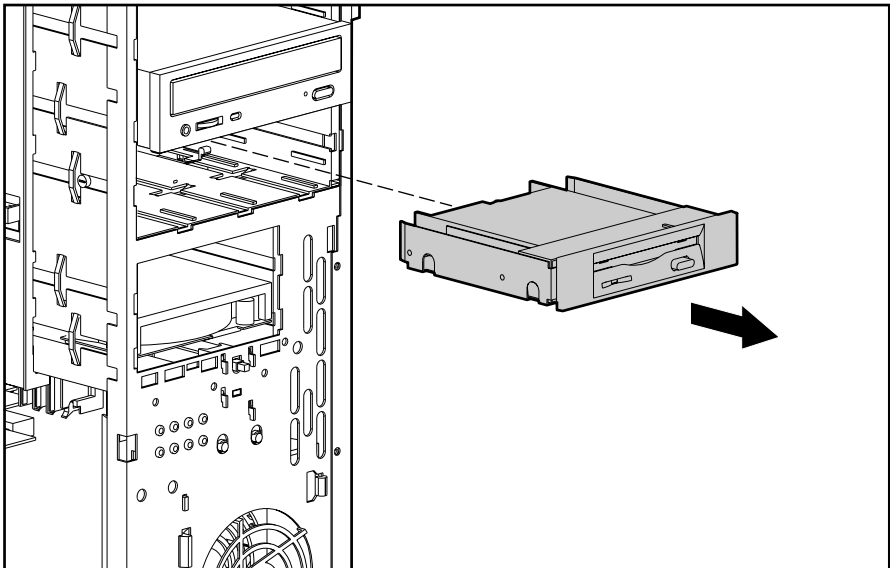


Figure 3-14. Removing a 3.5-inch drive from a 5.25-inch drive bay

7. To remove the bracket brace from the top of the drive adapter, squeeze in on both sides of the brace ①, then rotate the brace up and out ②.
8. Remove the drive bezel ③.
9. Remove the screws that secure the hard drive to the drive adapter ④.
10. Remove the hard drive from the drive adapter ⑤.

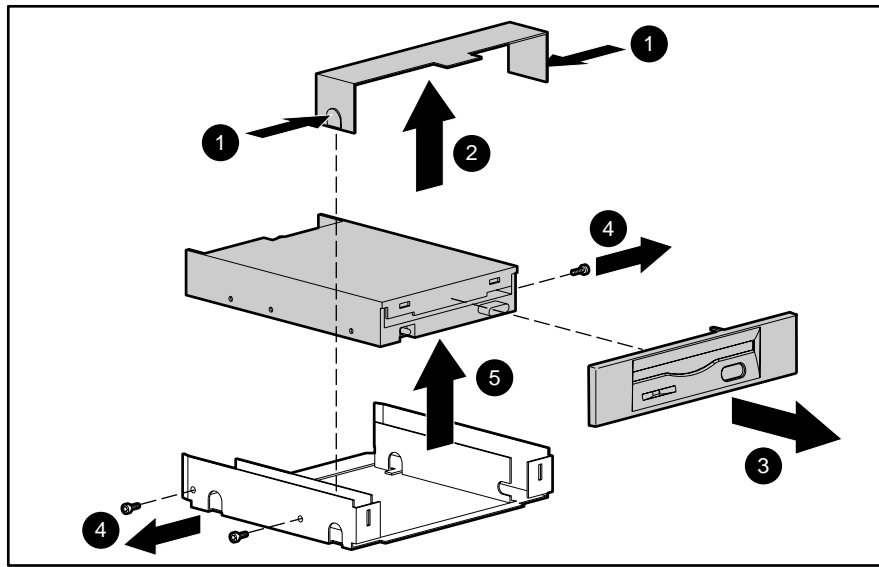


Figure 3-15. Removing a 3.5-inch drive from the 5.25-inch drive adapter

To replace the drive, reverse the above procedure.

IMPORTANT: The primary 3.5-inch diskette drive should only be installed into bay 3.

NOTE: If you are installing a second 3.5-inch diskette drive into bay 1 or 2 for the first time, you must use a special adapter bracket. (See Chapter 1 for the spare part number.)

If you are installing a 3.5-inch diskette drive into bay 3, you must use a special adapter bracket. (See Chapter 1 for the spare part number.)

5.25-Inch Drive

To remove a 5.25-inch drive:

1. Perform the steps in the “Service Preparations” section as previously shown.



CAUTION: Before removing the workstation access panel, ensure that the workstation is turned off, all cables are disconnected from the back of the workstation, and the power cord is disconnected from the grounded AC outlet.

2. Remove the workstation access panel.
3. Remove the front bezel.
4. Disconnect the power **1**, data **2**, and audio **3** cables from the back of the hard drive.

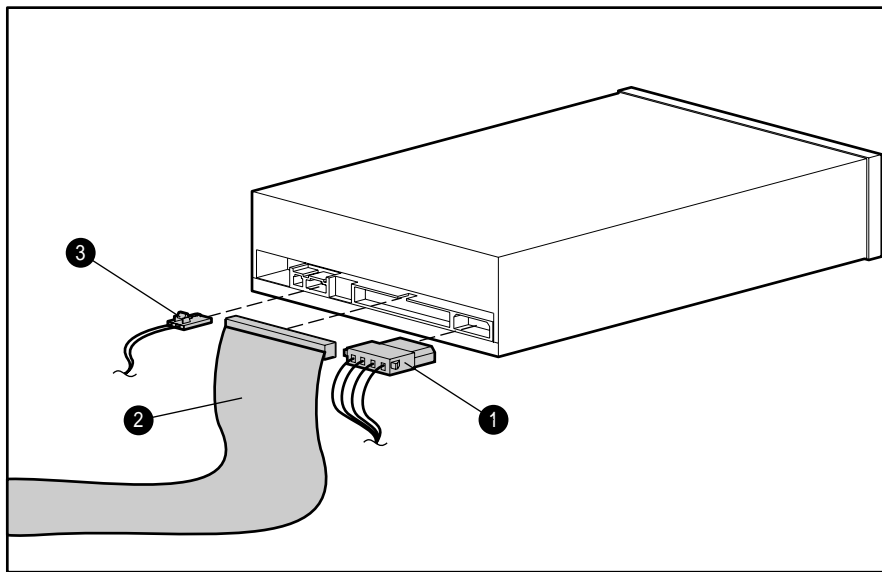


Figure 3-16. Disconnecting the cables

5. Raise the drivelock to unlock the drive.

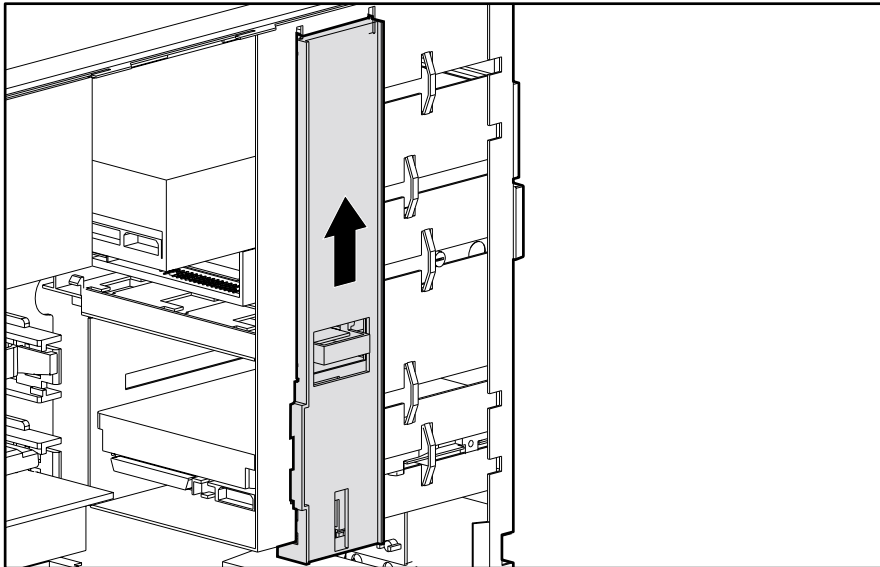


Figure 3-17. Releasing the hard drive by raising the drivelock

6. Hold the drivelock in its elevated position while you push the hard drive from the rear and remove it from the front of the drive bay.

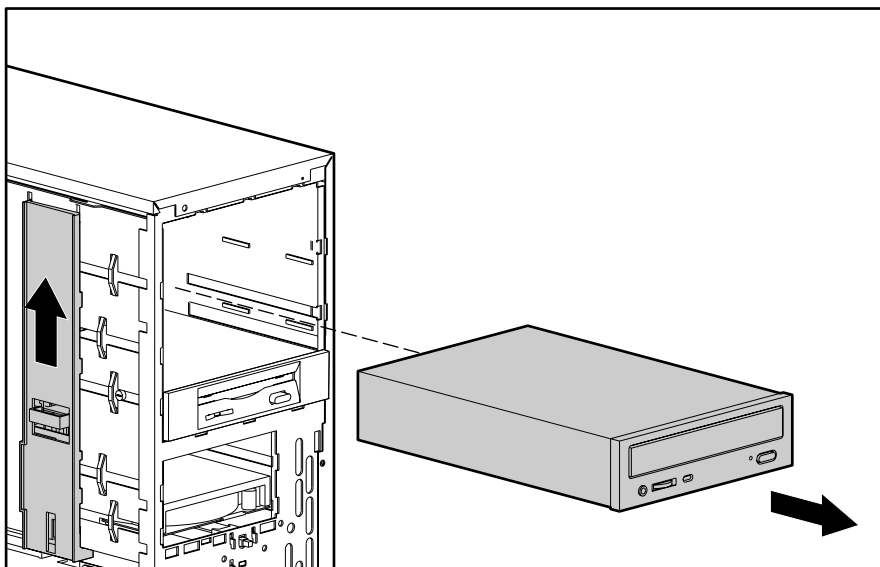


Figure 3-18. Removing a 5.25-inch drive

To replace the hard drive:

1. Install two M3 guide screws (Figure 3-9) into the bottom holes on each side of the replacement drive, making sure the guide screws line up with the guide slots.
2. Slide the drive into the drive bay until it snaps into place.

Installing Optional SCSI Devices

Select models of the Compaq Professional Workstation AP550 have a preinstalled internal SCSI hard drive. You can install additional SCSI devices using the external SCSI connector located on the rear panel of the workstation.

Important Guidelines for Installing Optional SCSI Devices

If you are installing additional SCSI devices, you **MUST** adhere to the following guidelines:

Table 3-2
Installing Optional SCSI Devices

Guidelines	Comment
A narrow SCSI controller allows you to daisy-chain up to seven additional SCSI devices.	Counting the controller, that amounts to eight total SCSI devices
A single Ultra SCSI, Ultra-Wide SCSI, or Wide-Ultra SCSI controller allows you to daisy-chain up to 15 additional SCSI devices.	Counting the controller, that amounts to 16 total SCSI devices.
The SCSI controller requires a unique SCSI ID (0-7 or 8-15) for each SCSI device installed. The controller identifies 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 communication between the controller and the device.
SCSI ID 0 is reserved for the primary hard drive. SCSI ID 7 is reserved for the controller.	SCSI IDs 1 through 6 and 8 through 15 are available for all other SCSI devices.
If only one SCSI hard drive is used, install it in the lowest-numbered bay (bay 1).	
<p>Every SCSI chain or circuit must be terminated (closed) at both ends. Termination can be accomplished in one of several ways:</p> <ul style="list-style-type: none"> ■ 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 its termination enabled into the last connector. ■ Connect an external SCSI device with its termination enabled to the external SCSI connector on the rear panel of the computer. 	Some system boards have both ends of the SCSI cable connected to, and terminated by, the system board.

continued

Table 3-2
Installing Optional SCSI Devices *continued*

Guidelines	Comment
Turn on all external SCSI device before turning on the power to the workstation.	This enables the system board controller to recognize the external SCSI device.
All SCSI hard drives must be either internal or external, but never both.	The system accommodates a combination of other external and internal SCSI devices, such as tape and CD-ROM drives.
Do not mix Wide-Ultra and narrow SCSI devices on the same SCSI chain or the same controller.	Wide-Ultra can only be mixed with Wide-Ultra SCSI devices. Narrow can only be mixed with narrow SCSI devices.
Do not mix Wide-Ultra2 and Ultra3 with other types of SCSI devices.	Wide-Ultra2 and Ultra3 SCSI devices can only be mixed with each other and can coexist in any combination.
If two controllers are installed, each may use SCSI devices having widths and speeds different from the other.	If a 68-pin data cable is used on a controller having a 50-pin SCSI devices, use an internal cable adapter (Compaq number 199618-001) or an external cable adapter (Compaq number 270187-B21).



CAUTION: Do not route cables near the intake to the power supply. Cables routed in this manner may block airflow to the power supply, causing it to overheat.

Using the Multi-Mode (SCSI) Cable

The workstation ships standard with a three-device multi-mode (SCSI) cable that supports both low voltage differential (LVD) and single ended (SE) devices and has a terminator ❶ on one end. The cable end connects to the internal LVD/SE connector on the system board, with the remaining three connectors connecting to the devices in the drive bays.

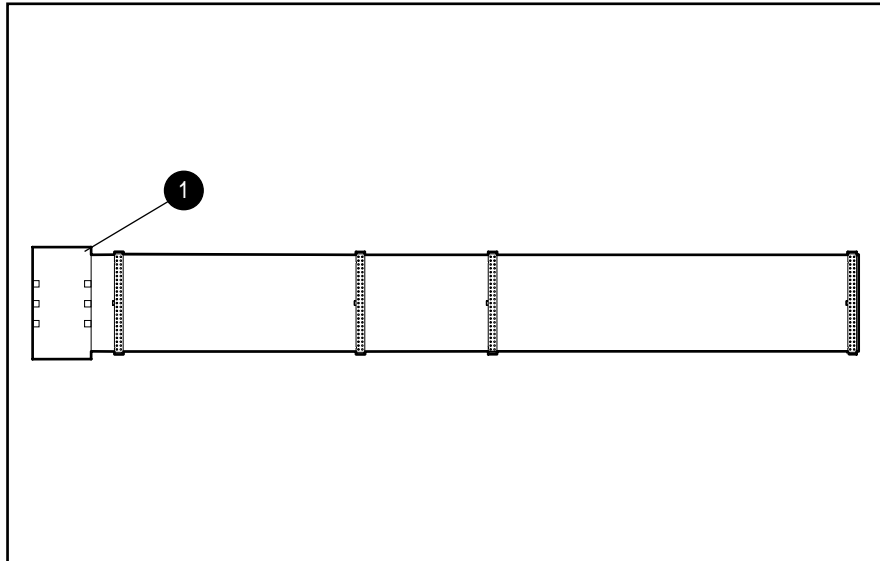


Figure 3-19. Multi-mode cable (SCSI) with terminator

NOTE: The multi-mode cable included with your workstation may differ from the one pictured.

For additional information about installing optional SCSI devices, refer to the documentation included with the device option kit.

Drivelock

The workstation chassis drivelocks secure the drives in both the minitower and desktop configurations.

To remove the drivelocks:

1. Perform the steps in the “Service Preparations” section as previously shown.



CAUTION: Before removing the workstation access panel, ensure that the workstation is turned off, all cables are disconnected from the back of the workstation, and the power cord is disconnected from the grounded AC outlet.

2. Remove the workstation access panel.
3. Remove the front bezel.
4. Remove all drives from the computer.
5. Lift the side of each drivelock nearest you and push it toward the front of the drive cage ❶, then snap the tabs out of the holes in the drive cage ❷.



CAUTION: The spring under the drivelock may pop out unexpectedly.

6. Remove the drivelock from the drive cage.
7. Remove the spring from the drivelock ❸.

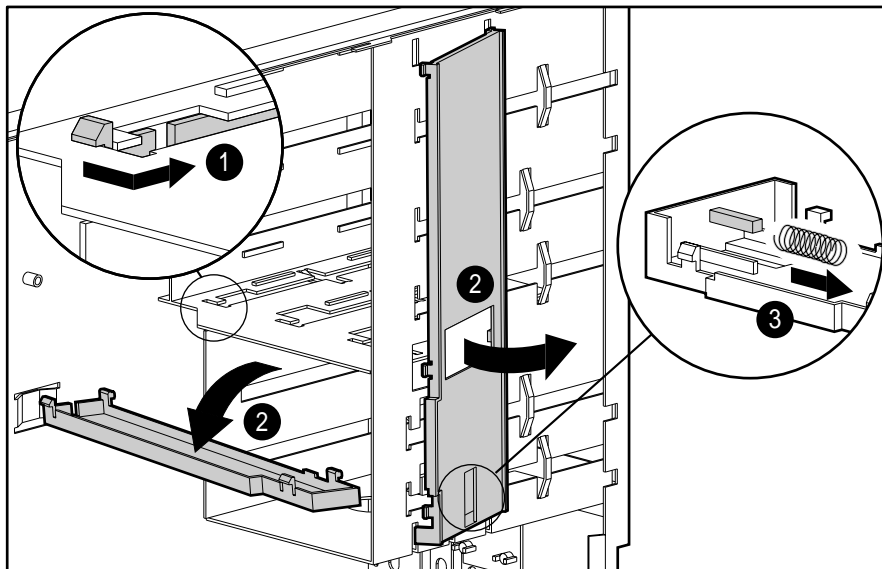


Figure 3-20. Removing the drivelock

To reinstall the drivelocks:

1. Insert the left side of the drivelock (with the rounded tabs) into the slots on the drive cage ❶.
2. Place the washer on the middle tab on the underside of the drivelock.
3. Compress the spring ❷, and then lower the drivelock onto the drive cage until it snaps into place ❸.

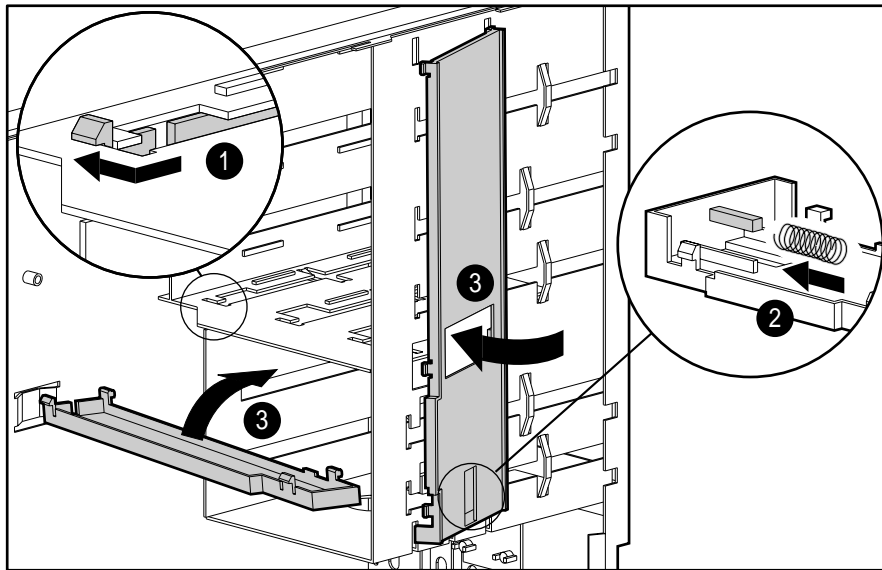


Figure 3-21. Reinstalling the drivelock

Expansion Boards

The following illustration identifies the physical location of expansion slots. All connectors populate full-length boards. See the corresponding table for component names.

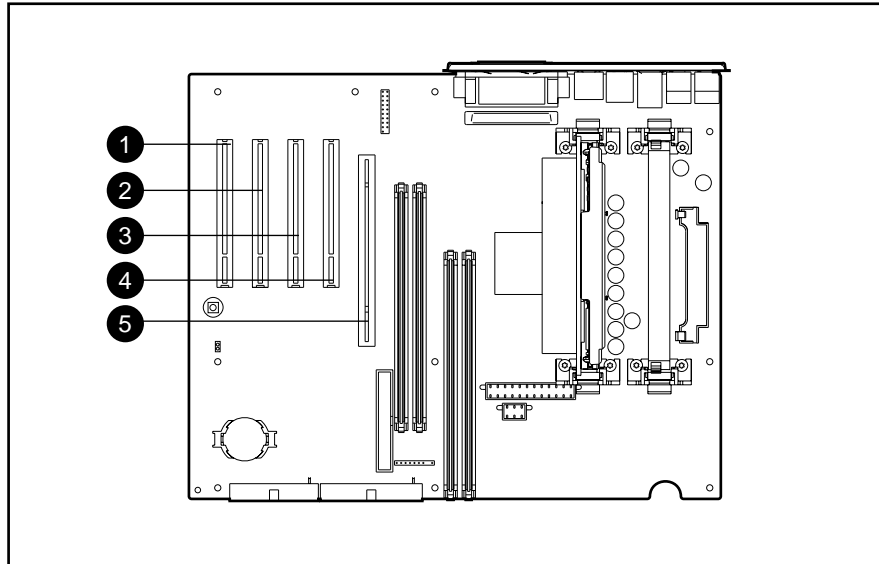


Figure 3-22. Overview of the expansion board slots

Table 3-3
Expansion Board Slots

Reference	Description
①	PCI expansion board slot
②	PCI expansion board slot
③	PCI expansion board slot
④	PCI expansion board slot
⑤	Accelerated Graphics Port (AGP) 4X Pro slot

Removing an Expansion Board

To remove an expansion board:

1. Perform the steps in the “Service Preparations” section as previously shown.



CAUTION: Before removing the workstation access panel, ensure that the workstation is turned off, all cables are disconnected from the back of the workstation, and the power cord is disconnected from the grounded AC outlet.

2. Remove the workstation access panel.
3. Disconnect any cables from the expansion board.
4. Remove the expansion board retaining screw.
5. Hold the board at each end and carefully rock it back and forth until the connectors pull free from the slot. Be sure not to scrape the board against other components.

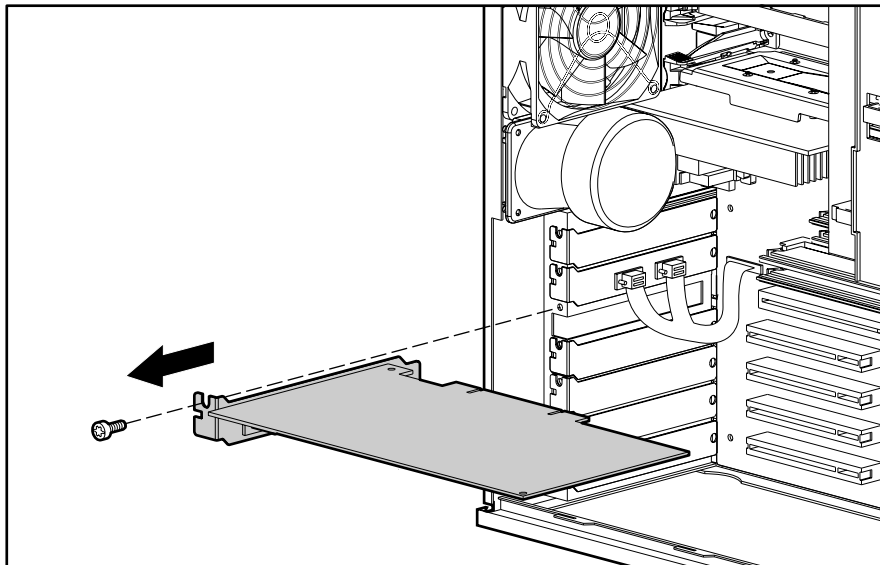


Figure 3-23. Removing an expansion board

6. Store the board in antistatic packaging.
7. Install an expansion slot cover to close the open slot.
8. Replace the workstation access panel.
9. Plug the network cable back into the system. Plug the power cord back into the grounded AC outlet, and reconnect external devices.

Installing an Expansion Board

If the expansion board comes with jumper or switch settings, be sure to follow the setting instructions that have been provided with the board.

To install a PCI expansion board:

1. Turn off the workstation and disconnect the power cord from the grounded AC outlet and the back of the workstation. Disconnect the network cable and any external devices from the system.
2. Remove the workstation access panel and locate the correct vacant slot in the workstation chassis.
3. Remove the screw securing the expansion slot cover, and then remove the slot cover as illustrated.

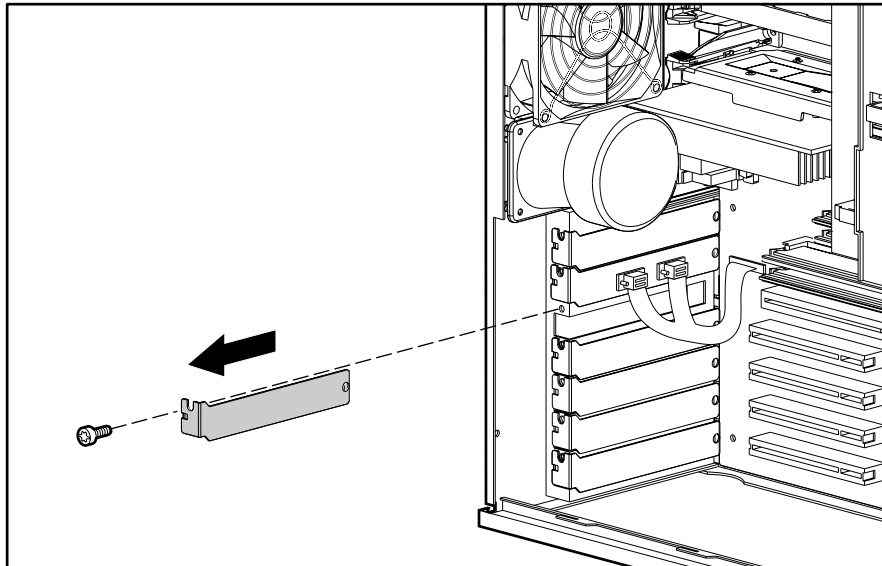


Figure 3-24. Removing the screw and expansion slot cover

To replace an expansion slot cover, reverse the above procedure.

Refer to the following illustration to install a PCI expansion board.

1. Slide the expansion board into the expansion slot and press it firmly into place.

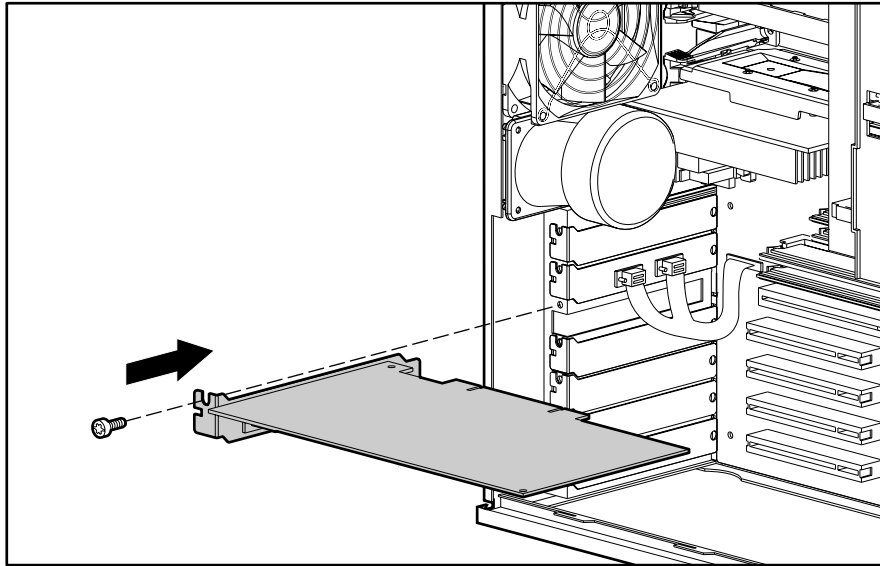


Figure 3-25. Installing an expansion board

IMPORTANT: When you install an expansion board, press firmly on the board so that the whole connector seats properly in the expansion board slot.

NOTE: If you are installing a full-length PCI expansion board, make sure the board is engaged with the card guide.

2. Replace the screw at the side of the expansion slot.
3. Replace the workstation access panel.
4. Connect external cables to the installed board, if needed.
5. Plug the network cable back into the system. Plug the power cord back into the grounded AC outlet. Reconnect external devices.

Serial Port Cover Connector

To remove the cover plate for serial ports Com1 and Com2 (158274-001):

1. Perform the steps in the “Service Preparations” section as previously shown.



CAUTION: Before removing the workstation access panel, ensure that the workstation is turned off, all cables are disconnected from the back of the workstation, and the power cord is disconnected from the grounded AC outlet.

2. Remove the workstation access panel.
3. Rotate the workstation to the desktop position.
4. Unplug the serial port cover connector from the system board.

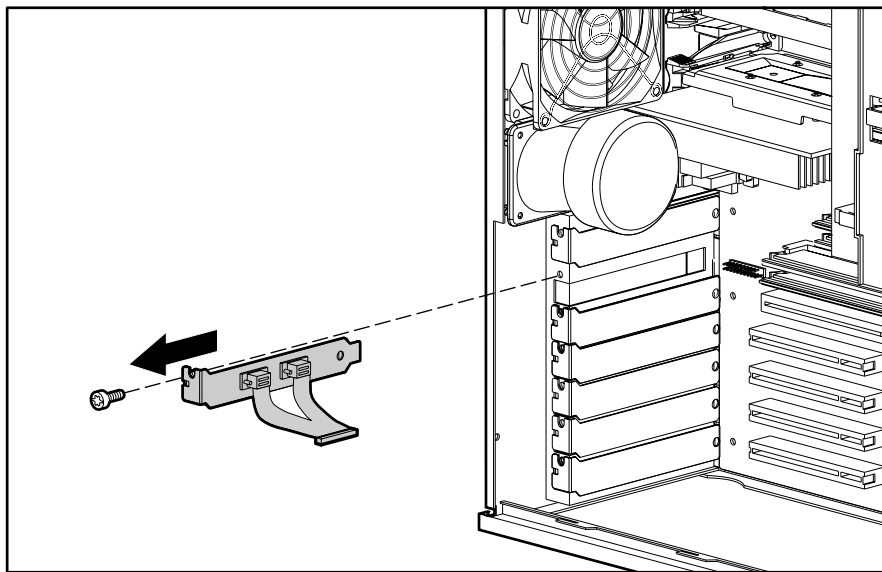


Figure 3-26. Removing the serial port cover connector

5. Remove the screw holding the serial port cover connector to the chassis, and lift the plate out of the chassis.

To replace the serial port cover connector, reverse the above procedure.

NOTE: The connector is keyed; therefore, locate the key pin header on the system board when reattaching the serial port cable.

Card Guide

To remove the card guide:

1. Perform the steps in the “Service Preparations” section as previously shown.



CAUTION: Before removing the workstation access panel, ensure that the workstation is turned off, all cables are disconnected from the back of the workstation, and the power cord is disconnected from the grounded AC outlet.

2. Remove the workstation access panel.
3. Remove any full-length expansion boards.
4. Push down on the two tabs on the top of the card guide ❶.
5. While holding the tabs down, remove the card guide from the chassis ❷.

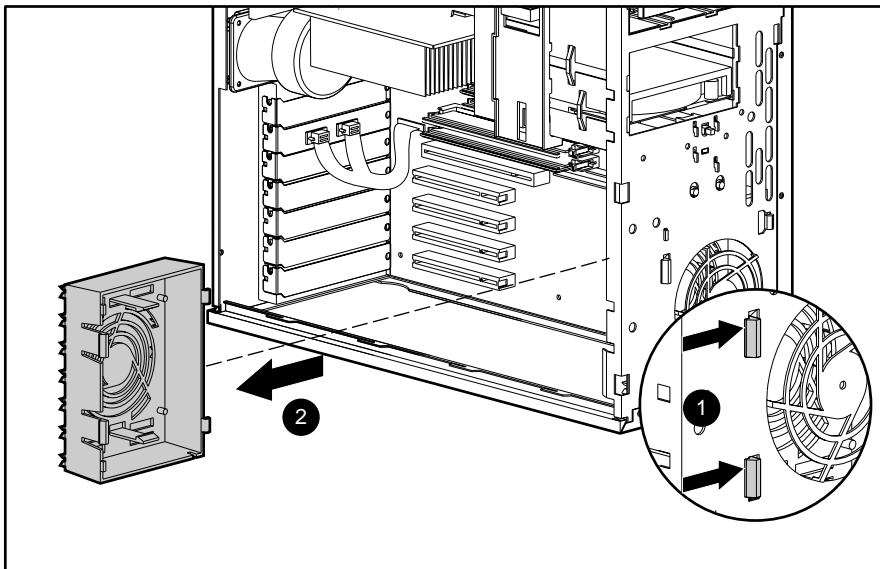


Figure 3-27. Removing the card guide

To replace the card guide, reverse the above procedure.

Memory Modules

Overview

The Compaq Professional Workstation AP550 supports the following memory modules:

- **RIMMs**—The workstation supports 600-MHz and 800-MHz Error Checking and Correcting (ECC) Direct Rambus Inline Memory Modules (RIMMs). Additional RIMMs are available to upgrade the memory. A maximum of 32-count Direct RDRAMs is supported. The workstation memory includes Dual Direct RDRAM channels with 32-line cache to store prefetched information.

NOTE: 600-MHz represents the total data transfer rate with a 300-MHz bus. 800-MHz represents the total data transfer rate with a 400-MHz bus.

The workstation has four RIMM sockets on the system board (two per memory channel) to support a maximum of 2-gigabyte of memory with 256-megabit Direct RDRAM technology. RIMM modules must be installed in pairs across both channels, for example, one module in socket XMM1 and the other module in socket XMM3. Each pair of memory modules must be of the same type, speed, and size. This information can be found on the label affixed to the RIMM. Continuity RIMMs (CRIMMs) must populate empty RIMM slots. If CRIMMs are not installed in the empty RIMM sockets, the system will not boot.

- **DIMMs**—Some workstation models come with a synchronous dynamic random access memory (SDRAM) expansion board installed that supports at least 64-megabyte of Error Checking and Correcting (ECC). The SDRAM expansion board allows the use of up to four dual inline memory modules in a RIMM-based system.

RIMM Slot Locations and Configurations

Your workstation supports four RIMM sockets on two Dual Direct RDRAM channels. Both channels support 32-line cache, which stores prefetched information. A maximum of 32 Direct RDRAM devices is supported per channel.

The four RIMM sockets are numbered XMM1 and XMM2 (Channel A) and XMM3 and XMM4 (Channel B).

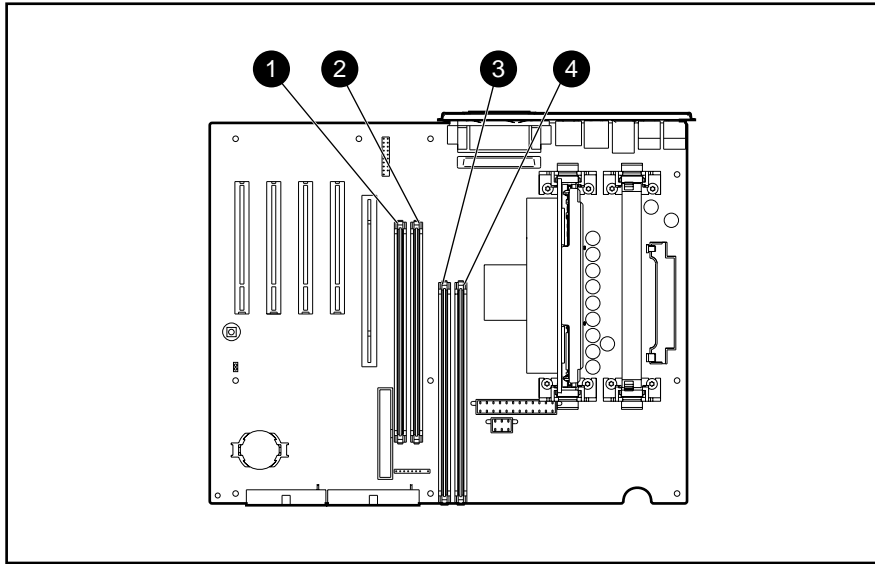


Figure 3-28. RIMM sockets must be populated in pairs

Table 3-4
RIMM Slot Locations

Identifier	Component	Memory Channel
①	RIMM Slot XMM2	Channel A
②	RIMM Slot XMM1	Channel A
③	RIMM Slot XMM4	Channel B
④	RIMM Slot XMM3	Channel B

Table 3-5
RIMM Installation Configurations

RIMM Pairs	Memory Channel A		Memory Channel B	
	RIMM Slot XMM1	RIMM Slot XMM2	RIMM Slot XMM3	RIMM Slot XMM4
Pair 1	RIMM	CRIMM	RIMM	CRIMM
Pair 2	RIMM	RIMM	RIMM	RIMM

NOTE: CRIMMs (Continuity RIMMs) must be installed in unpopulated RIMM slots.

Removing and Installing RIMMs

Important Guideline for RIMM Installation

When installing RIMMs, you **MUST** follow these guidelines:

Table 3-6
RIMM Guidelines

Guideline	Comment
Use only 64-, 128-, or 256-MB, 600-MHz or 800-MHz Error Checking and Correcting (ECC) RIMMs.	DO NOT INSTALL RIMMS THAT DO NOT SUPPORT ERROR CHECKING AND CORRECTING (ECC).
Do not mix 600- with 800-MHz RIMMs.	Each RIMM pair must be the same type, size, and speed.
Do not exceed 32-count Direct RDRAM devices on each Direct Rambus channel.	A factory label on the RIMM indicates the type, size, speed, and number of RDRAMS contained on the RIMM.
Install RIMMs correctly.	Be sure to match the two <i>key slots</i> on the RIMM with the tab on the RIMM socket. Push the RIMM down into the RIMM socket, ensuring that it is fully inserted and properly seated.
Populate unused RIMM sockets with a Continuity RIMM (CRIMM).	If CRIMMs are not in the empty RIMM sockets, the system will not boot.
Install RIMM modules in pairs across both channels.	RIMM sockets must be populated in the following order: XMM1 and XMM3 then XMM2 and XMM4.
Do not mix RIMMs and DIMMs on the same system board.	The system will not boot if RIMMs and DIMMs are mixed on the same board.



CAUTION: The above guidelines must be followed when installing RIMM modules; otherwise, the workstation will not function.



CAUTION: RIMM sockets have gold metal contacts. When upgrading memory, it is important to use RIMMs with gold metal contacts (not tin-lead) to prevent corrosion and/or oxidation resulting from having incompatible metals in contact with each other.



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

NOTE: The workstation will support up to 2-gigabyte of memory with 256-megabit DRAM technology.

RIMM Removal

To remove a RIMM memory module:

IMPORTANT: Before installing additional RIMMs, read the previous section, “Important Guidelines for RIMM Installation.”

1. Perform the steps in the “Service Preparations” section as previously shown.



CAUTION: Before removing the workstation access panel, ensure that the workstation is turned off, all cables are disconnected from the back of the workstation, and the power cord is disconnected from the grounded AC outlet.

2. Remove the workstation access panel.



WARNING: RIMMs can reach a temperature of 212°F (100°C) in a matter of minutes. Caution should be exercised whenever removing or replacing these components.

3. Press outward on both latches of the RIMM at the same time ❶. This releases the module and pushes it partially out of the socket.
4. Lift the module from the socket ❷.

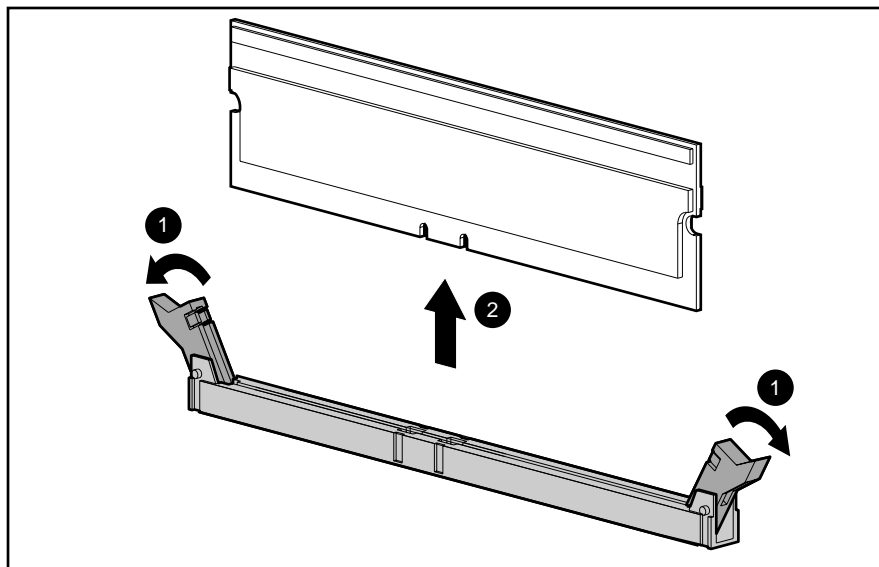


Figure 3-29. Removing a memory module

NOTE: The system recognizes memory upgrades and automatically reconfigures the workstation.

RIMM Installation

To install a RIMM memory module:

1. Perform the steps in the “Service Preparations” section as previously shown.



CAUTION: Before removing the workstation access panel, ensure that the workstation is turned off, all cables are disconnected from the back of the workstation, and the power cord is disconnected from the grounded AC outlet.

2. Remove the workstation access panel.



WARNING: RIMMs can reach a temperature of 212° F (100° C) in a matter of minutes. Caution should be exercised whenever removing or replacing these components.



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

3. A RIMM can be installed only one way. Be sure to match the two *key slots* on the RIMM with the tab on the RIMM socket. Push the RIMM down into the RIMM socket, ensuring that it is fully inserted and properly seated.

IMPORTANT: Do not combine different Direct Rambus speeds and capacities. Continuity RIMMs (CRIMMs) must be installed in all unpopulated RIMM slots.

4. Press both latches inward to secure the module in the socket.

DIMM Location and Configurations

SDRAM Expansion Boards

DIMM-based workstation models come with a synchronous dynamic random access memory (SDRAM) expansion boards installed that supports at least 64-megabyte of Error Checking and Correcting (ECC) Dual Inline Memory Modules (DIMMs).

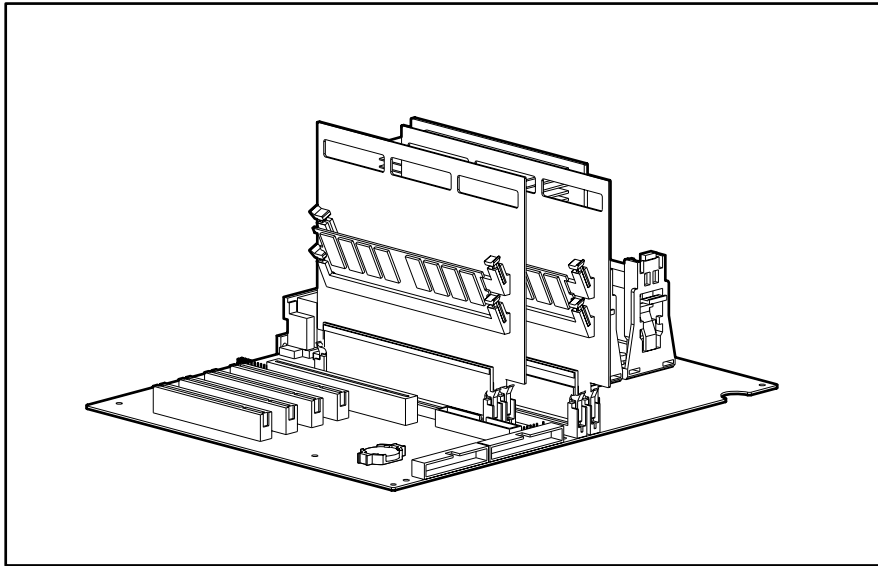


Figure 3-30. Overview of two SDRAM expansion boards installed in alternating RIMM sockets containing one DIMM on each board

The following configuration guidelines must be followed when replacing SDRAM expansion boards.

Table 3-7
SDRAM Expansion Boards Configurations

Memory Channel	RIMM Slot XMM1	RIMM Slot XMM2	RIMM Slot XMM3	RIMM Slot XMM4
Channel A	SDRAM	CRIMM		
Channel B			SDRAM	CRIMM

NOTE: CRIMMs must populate Empty RIMM slots on a system board.

Table 3-8
DIMM Configurations on SDRAM Expansion Board

DIMM Pair Installation	SDRAM Expansion Board 1 (RIMM Socket XMM1)		SDRAM Expansion Board 2 (RIMM Socket XMM3)	
	Upper DIMM Slot	Lower DIMM Slot	Upper DIMM Slot	Lower DIMM Slot
Pair 1		DIMM		DIMM
Pair 2	DIMM	DIMM	DIMM	DIMM

Removing and Installing DIMMs

Important Guidelines for DIMM Installation

When installing DIMMs, you **MUST** follow these guidelines:

Table 3-9
DIMM Guidelines

Guideline	Comment
Use only 64-, 128-, 256-, or 512-MB, Registered 100-MHz Error Checking and Correcting (ECC) DIMMs.	DO NOT INSTALL DIMMs THAT DO NOT SUPPORT ERROR CHECKING AND CORRECTING (ECC).
SDRAM expansion boards must be installed in pairs, populating the RIMM sockets in the following order: XMM1 and XMM3.	Only two SDRAM expansion boards are supported.
Each SDRAM expansion board supports up to two DIMMs.	Total system support is up to four DIMMs providing up to 2-GB total memory when four 512-MB DIMMs are installed.
A SDRAM expansion board can only be installed one way.	Be sure to match the two <i>key slots</i> on the SDRAM expansion board with the tab on the RIMM socket. Push the SDRAM expansion board down into the RIMM socket, ensuring that it is fully inserted and properly seated.

continued

Table 3-9
DIMM Guidelines *continued*

Guideline	Comment
DIMMs must be installed in pairs, alternating between the two SDRAM expansion boards.	Compaq recommends populating the lower DIMM slot on each SDRAM board first, then populating the upper DIMM slots to upgrade memory.
RIMMs and DIMMs can not be mixed on the same system board.	The system will not boot if RIMMs and DIMMs are mixed on the same board.
CRIMMs (Continuity RIMM) must populate the empty RIMM sockets (XMM2 and XMM4).	If CRIMMs are not installed in the empty RIMM sockets, the system will not boot.
When replacing the workstation access panel, the stabilizer card (attached to the access panel) must engage the SDRAM expansion boards to balance the boards.	



CAUTION: The above guidelines must be followed when installing SDRAM expansion boards, or the workstation will not function.



CAUTION: RIMM sockets have gold metal contacts. When upgrading memory, it is important to use SDRAM expansion boards with gold metal contacts (not tin-lead) to prevent corrosion and/or oxidation resulting from having incompatible metals in contact with each other.



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

DIMM Removal

To remove a DIMM memory module:

1. Perform the steps in the “Service Preparations” section as previously shown.



CAUTION: Before removing the workstation access panel, ensure that the workstation is turned off, all cables are disconnected from the back of the workstation, and the power cord is disconnected from the grounded AC outlet.

2. Lay the chassis on its side and remove the workstation access panel.



WARNING: DIMMs can reach a temperature of 212° F (100° C) in a matter of minutes. Caution should be exercised whenever removing or replacing these components.

3. Press outward on both latches of the RIMM at the same time ❶. This releases the SDRAM expansion board and pushes it partially out of the socket.
4. Lift the expansion board from the socket ❷.

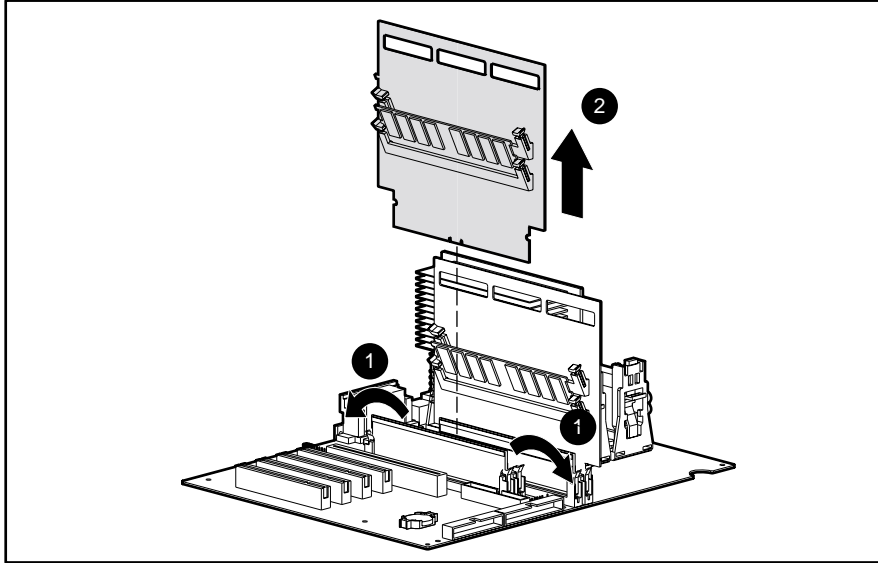


Figure 3-31. Removing a SDRAM expansion board

5. Remove the DIMM module from the SDRAM expansion board by pressing outward on the latches that hold the DIMM to the expansion board.

DIMM Installation

To install a DIMM memory module:

IMPORTANT: Before installing a SDRAM expansion board, read the previous section, “Important Guidelines for DIMM Installation.”

1. Perform the steps in the “Service Preparations” section as previously shown.



CAUTION: Before removing the workstation access panel, ensure that the workstation is turned off, all cables are disconnected from the back of the workstation, and the power cord is disconnected from the grounded AC outlet.

2. Remove the workstation access panel.



WARNING: DIMMs can reach a temperature of 212° F (100° C) in a matter of minutes. Caution should be exercised whenever removing or replacing these components.



CAUTION: When handling a SDRAM expansion board, be careful not to touch any of the contacts. Doing so may damage the module.

3. Insert the DIMM at a 25-degree angle ❶ into the slot on the SDRAM expansion board, ensuring that it is fully inserted and properly seated.
4. Press both latches inward ❷ to secure the DIMM in the SDRAM expansion board.

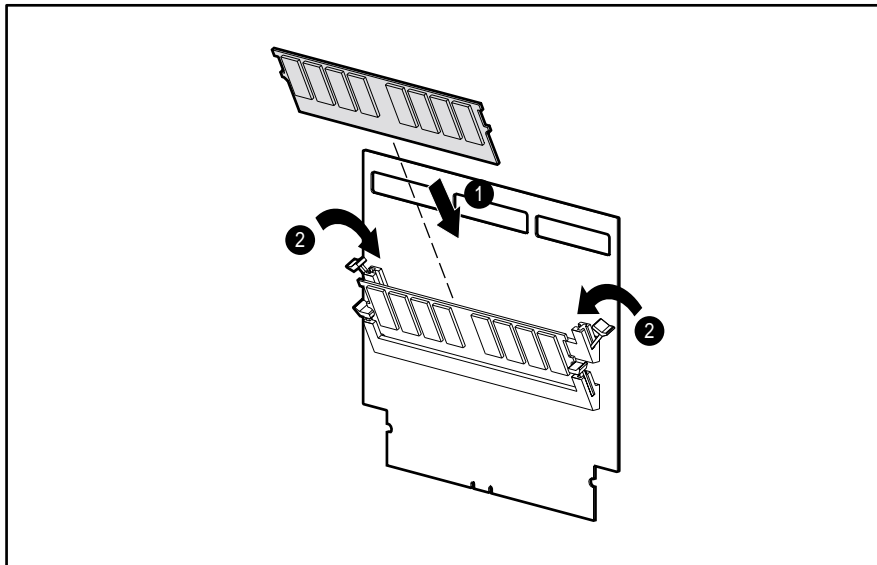


Figure 3-32. Inserting a DIMM to a SDRAM expansion board

5. Install the SDRAM expansion board in the appropriate RIMM socket on the system board. Follow the correct configuration guidelines in Table 3-8.

NOTE: The SDRAM expansion board with an attached DIMM can be installed only one way. Be sure to match the two *key slots* on the SDRAM expansion board with the tab on the RIMM socket. Push the SDRAM expansion board down into the RIMM socket, ensuring that it is fully inserted and properly seated.

IMPORTANT: Do not combine different Direct Rambus speeds and capacities. Continuity RIMMs (CRIMMs) must be installed in all unpopulated RIMM slots.

6. Press both latches inward to secure the SDRAM expansion board in the socket.

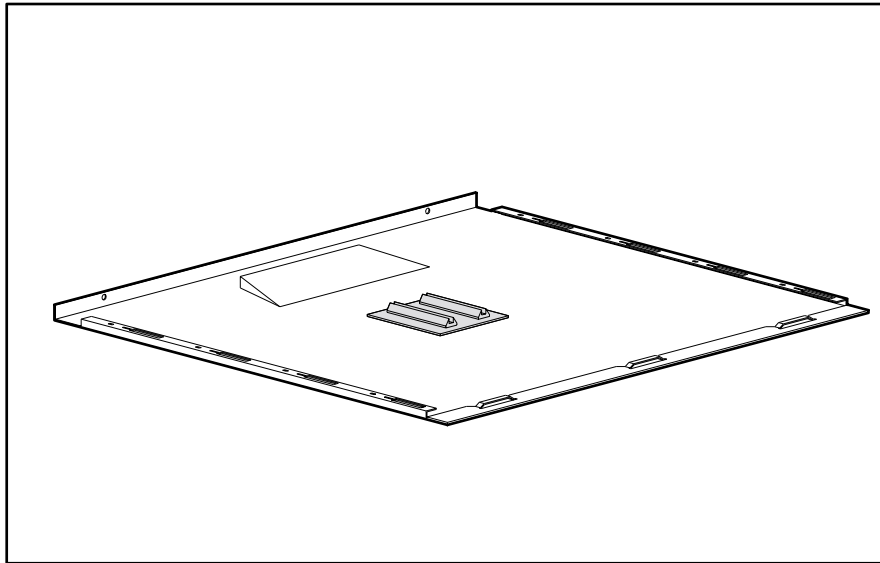


Figure 3-33. Side access panel with stabilizer card

7. When attaching the workstation access panel, assure the SDRAM expansion board stabilizer card (attached to the side access panel) engages with the SDRAM expansion boards, holding the boards in an upright position.

NOTE: The system recognizes memory upgrades and automatically reconfigures the workstation.

Processor

Removing a Processor



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

To remove the processor:

1. Perform the steps in the “Service Preparations” section as previously shown.



CAUTION: Before removing the workstation access panel, ensure that the workstation is turned off, all cables are disconnected from the back of the workstation, and the power cord is disconnected from the grounded AC outlet.

2. Remove the workstation access panel.



CAUTION: If two processors are installed and the primary processor needs replacing, the secondary processor **must** be removed before removing the primary processor. Failure to do so may cause damage to the primary processor.

3. Pull out the retaining tabs on each side of the processor ❶, and then lift the processor out of the socket ❷.

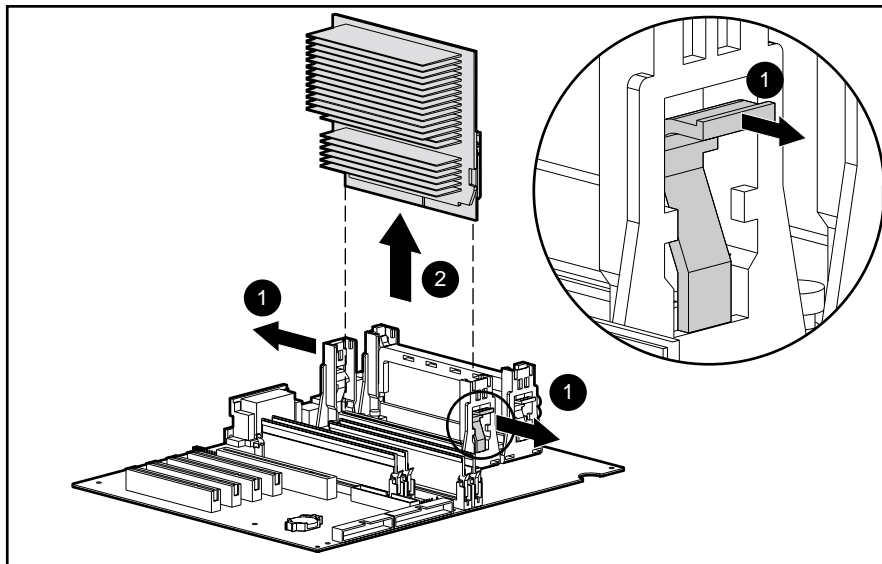


Figure 3-34. Removing the processor from the system board

To install a new processor, reverse the above procedure.

NOTE: Before installing a processor, be sure the release latches are in the locked (out) position. This will cause the latches to click into place when the processor is properly seated.

Installing an Additional Pentium III Processor

You can upgrade the workstation to a multiprocessor system. When you install a second processor, it must be the same speed, cache size, and type as the existing processor. For comprehensive instructions on installing a second processor, refer to the installation card provided in the Processor Options Kit.



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



CAUTION: Installing the processor incorrectly may cause damage to the system board. Compaq recommends that you have a Compaq authorized reseller or service provider install the processor. If you plan to install a processor yourself, carefully read all the instructions before you begin.

IMPORTANT: An empty processor slot must contain a terminator board.

To install a second Pentium III processor:

1. Turn off the workstation and disconnect the power cord from the grounded AC outlet and the back of the workstation.
2. Remove the side workstation access panel.
3. Firmly push the processor power module down into processor power module socket.

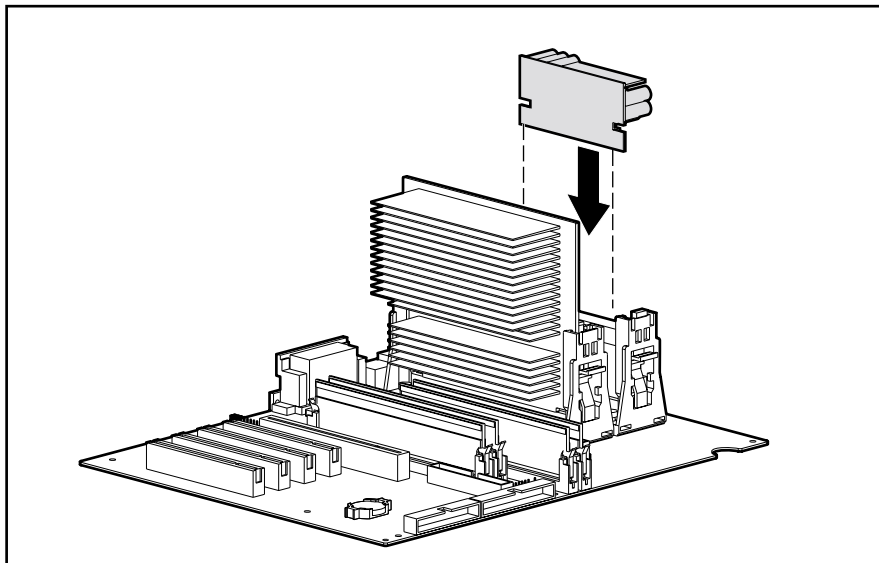


Figure 3-35. Installing the processor power module for the second processor

4. Assure the latches on the processor power module socket are closed.

5. Pull out the retaining tabs on each side of the terminator board ❶, and then lift the terminator board out of the socket ❷.

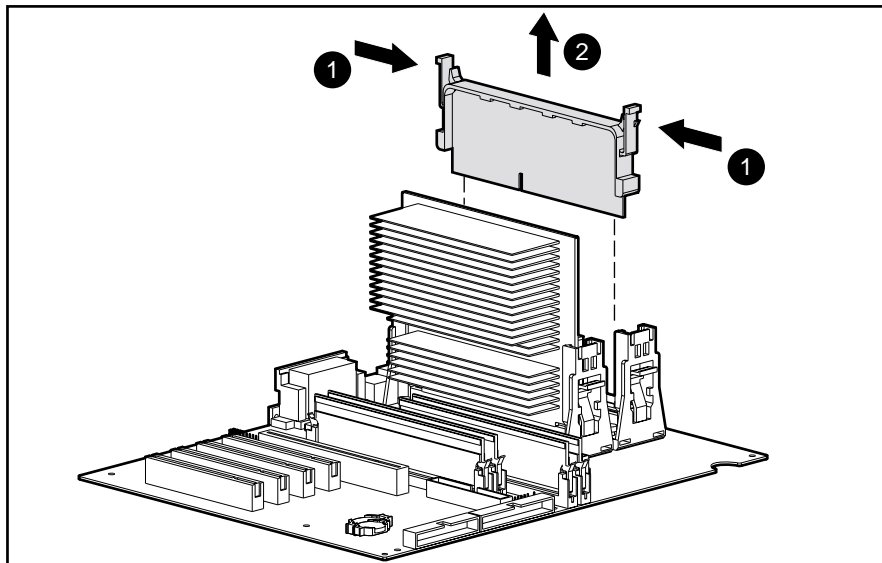


Figure 3-36. Removing the terminator board from the secondary processor slot

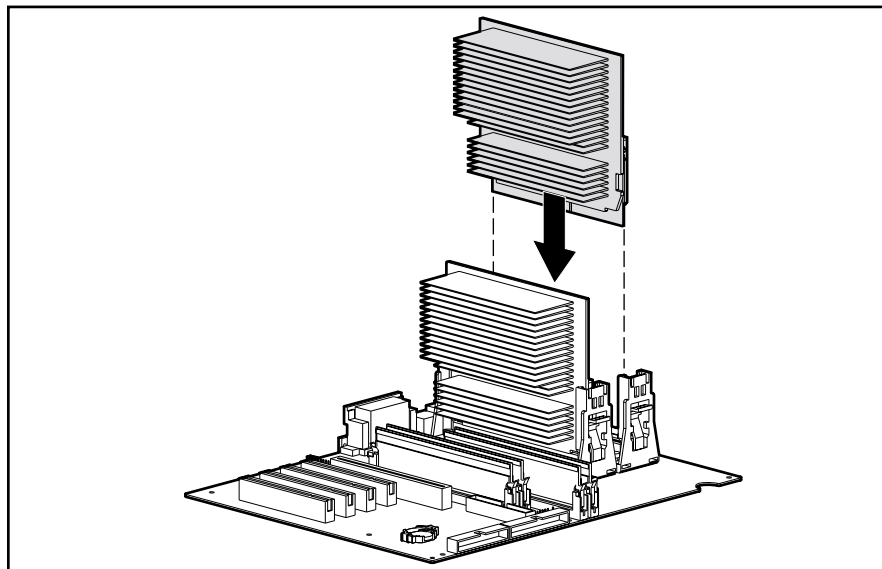


Figure 3-37. Installing a second processor/heatsink assembly

6. Push the processor/heatsink into the secondary processor slot until it locks firmly into place.

IMPORTANT: Do not mix processors. The second processor must be the same speed, cache size, and type as the existing processor.

Reassemble the workstation, and connect the power cord to the grounded AC outlet and to the workstation.

IMPORTANT: Be sure to tighten both thumbscrews when replacing the workstation access panel.

Removing the Heatsink from the 733-MHz Processor




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

To remove the heatsink from the 733-MHz processor (163363-001):

1. Perform the steps in the “Service Preparations” section as previously shown.



CAUTION: Before removing the workstation access panel, ensure that the workstation is turned off, all cables are disconnected from the back of the workstation, and the power cord is disconnected from the grounded AC outlet.

2. Remove the workstation side access panel.
3. Push the retaining tabs on each side of the processor outward and then lift the processor out of the socket.
4. Slide the metal clip on the back of the processor to the left  and remove the clip.

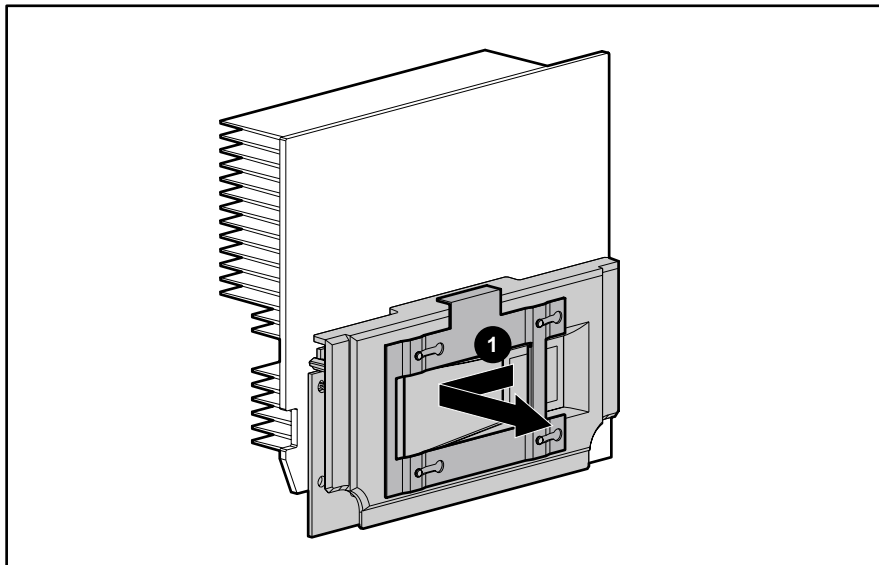


Figure 3-38. Removing the metal clip from the back of the processor clip

5. Lift the processor off the pins on the back of the heatsink to remove it from the heatsink ②.

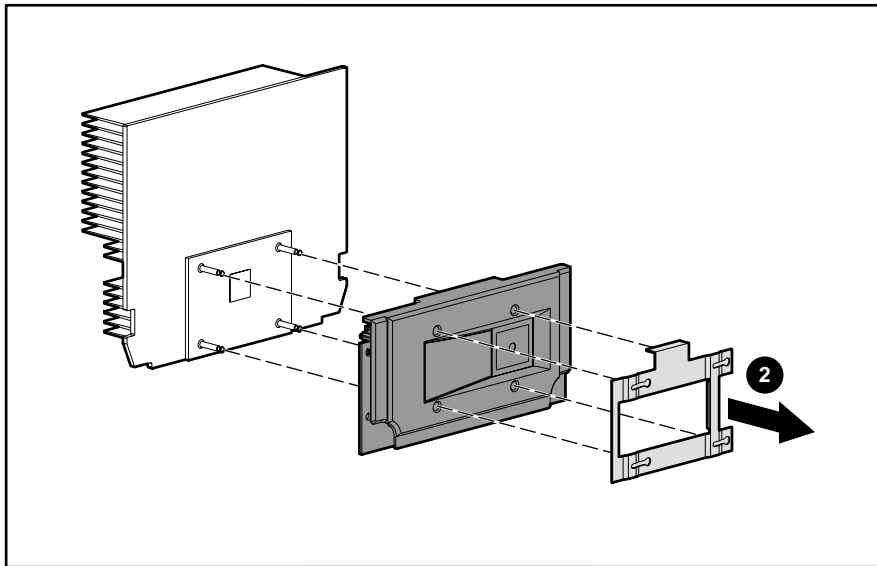


Figure 3-39. Removing the metal clip and processor from the heatsink

To install a new processor/heatsink, reverse the above procedure.

NOTE: Before installing a processor, be sure the release latches are in the locked (out) position. This will cause the latches to click into place when the processor is properly seated.

Processor Guide Rails (URM)



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

To remove the processor guide rails:

1. Perform the steps in the “Service Preparations” section as previously shown.



CAUTION: Before removing the workstation access panel, ensure that the workstation is turned off, all cables are disconnected from the back of the workstation, and the power cord is disconnected from the grounded AC outlet.

2. Remove the workstation access panel.
3. Remove the graphics board.
4. Remove the speaker.
5. Remove the processor.
6. Unscrew the clay nuts ❶ that secure the processor guide rails to the system board using a T15 torx drive.
7. Remove the guide rails ❷.

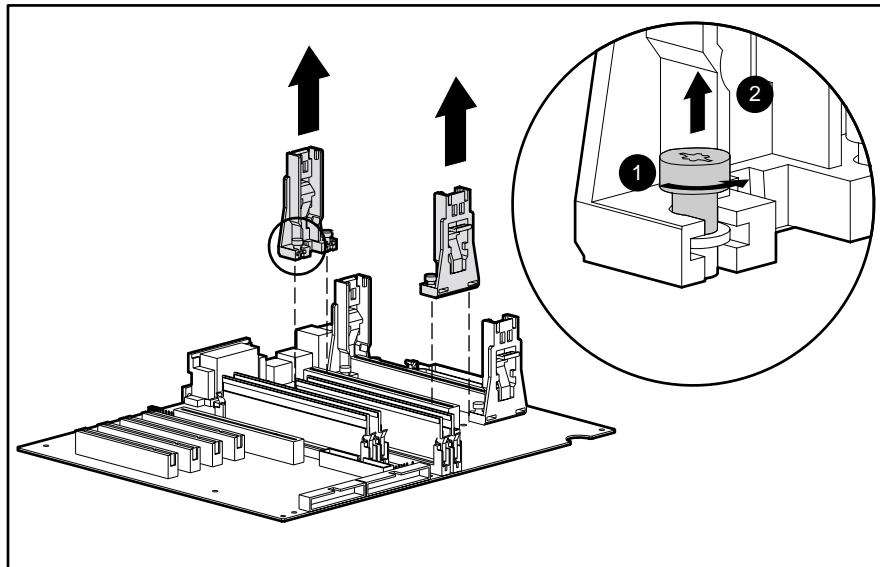


Figure 3-40. Removing the processor guide rails from the system board

To replace the processor guide rails:

1. Align the clay nuts with the threaded studs protruding through the system board.
2. Tighten the clay nuts using a T15 torx drive.

Speaker

To remove the speaker (158267-001):

1. Perform the steps in the “Service Preparations” section as previously shown.



CAUTION: Before removing the workstation access panel, ensure that the workstation is turned off, all cables are disconnected from the back of the workstation, and the power cord is disconnected from the grounded AC outlet.

2. Remove the workstation access panel.
3. Disconnect the speaker cable from the system board.
4. Remove the four screws that secure the speaker to the side of the drive cage ❶, and then remove the speaker ❷.

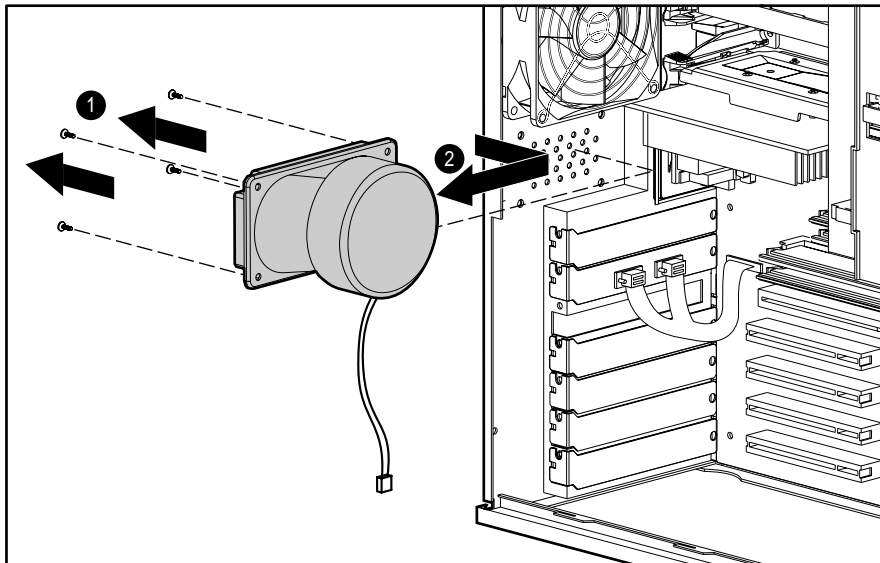


Figure 3-41. Removing the speaker

To reinstall the speaker, reverse the above procedure.

System Board Fan

To remove the system board fan (158275-001):

1. Perform the steps in the “Service Preparations” section as previously shown.



CAUTION: Before removing the workstation access panel, ensure that the workstation is turned off, all cables are disconnected from the back of the workstation, and the power cord is disconnected from the grounded AC outlet.

2. Remove the workstation access panel.
3. Unplug the fan from the system board.
4. Remove the four screws that hold the fan to the chassis **1** and lift the fan out of the unit **2**.
5. Remove the four push lock fasteners **3** from the fan assembly.

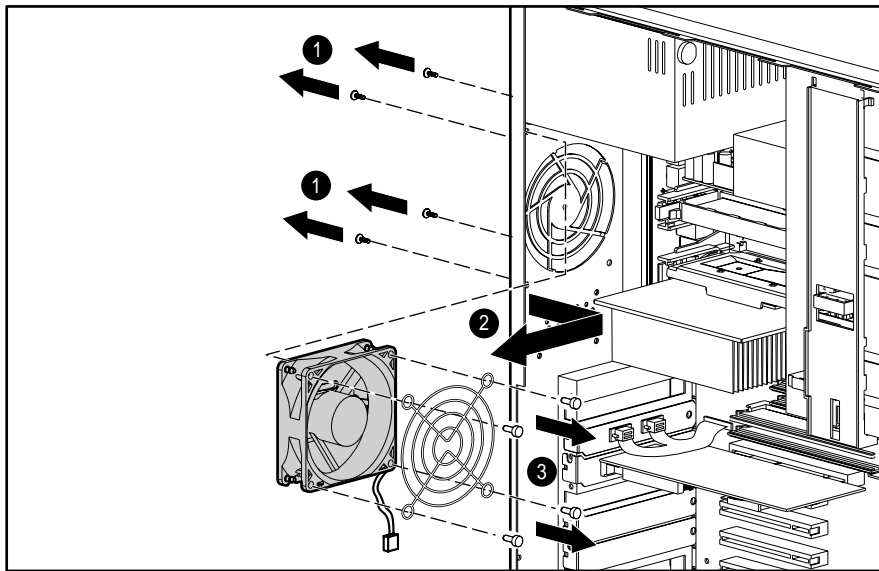


Figure 3-42. Removing the system board fan

To replace the fan, reverse the above procedure, assuring that the fan will push air over the system board.

Power Supply

To remove the power supply (128399-001):

1. Perform the steps in the “Service Preparations” section as previously shown.



CAUTION: Before removing the workstation access panel, ensure that the workstation is turned off, all cables are disconnected from the back of the workstation, and the power cord is disconnected from the grounded AC outlet.

2. Remove the workstation access panel.
3. Disconnect all power cables from the mass storage devices and the system board.

4. Remove the four external screws that secure the power supply to the back of the chassis ❶.

NOTE: The internal screw that secures the power supply to the side of the chassis may not need to be removed, only loosened.

5. Slide the power supply toward the front of the computer, then lift up, and remove it from the chassis ❷.

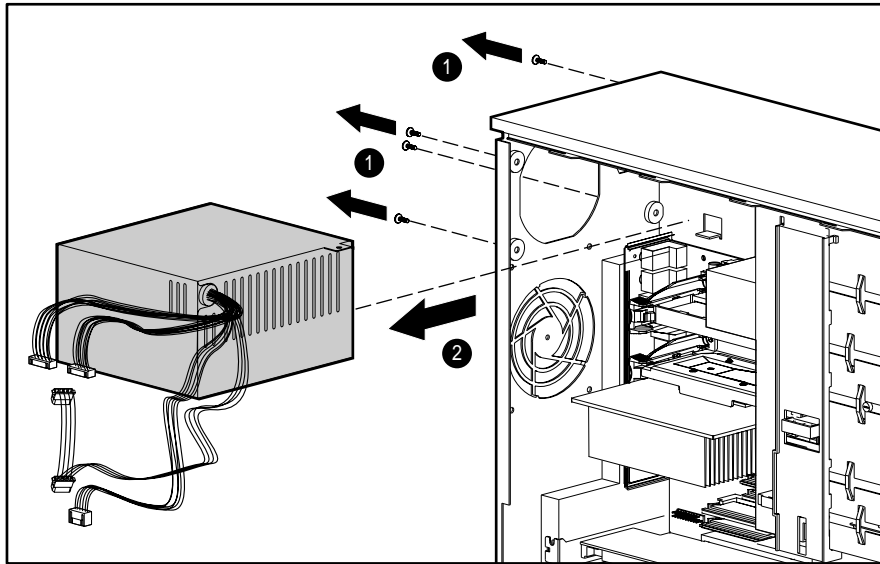


Figure 3-43. Removing the power supply

To replace the power supply, reverse the preceding procedure.



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



WARNING: Only qualified personnel should perform this procedure. 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.



CAUTION: Damage to the system board could result if the power cables are not properly reconnected.

Power Switch



CAUTION: The power switch should not be removed from the switch holder. Doing so may damage the switch components.

To remove the power switch and switch holder (166925-001):

1. Perform the steps in the “Service Preparations” section as previously shown.



CAUTION: Before removing the workstation access panel, ensure that the workstation is turned off, all cables are disconnected from the back of the workstation, and the power cord is disconnected from the grounded AC outlet.

2. Remove the workstation access panel.
3. Disconnect the power/LED cable from the system board ❶.
4. Push the release tab toward the drive bays ❷, and then remove the power switch from the chassis ❸.

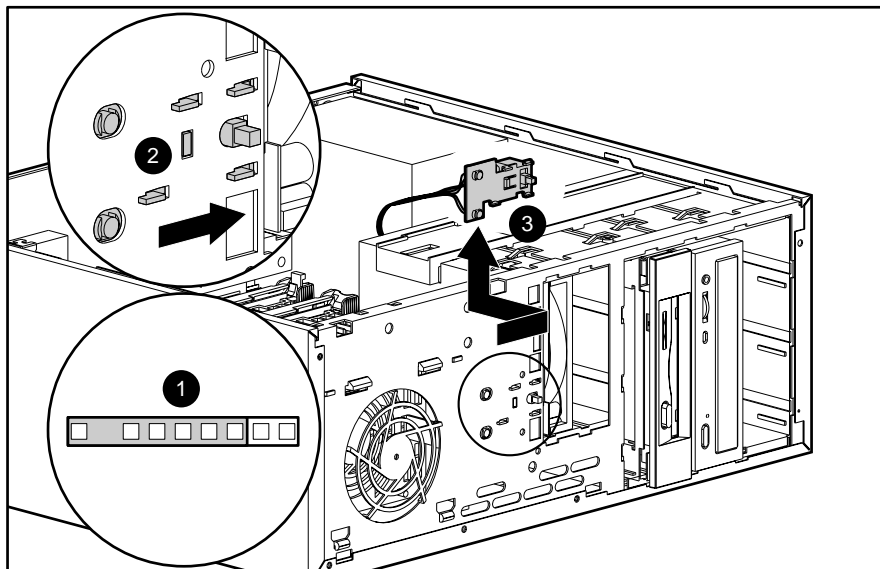


Figure 3-44. Disconnecting and removing the power switch and switch holder

To reinstall the power switch, reverse the above procedure, pushing the power switch until it snaps into place.

System Board



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

To remove and replace the system board (158272-001):

1. Perform the steps in the “Service Preparations” section as previously shown.



CAUTION: Before removing the workstation access panel, ensure that the workstation is turned off, all cables are disconnected from the back of the workstation, and the power cord is disconnected from the grounded AC outlet.

2. Remove the workstation access panel.
3. With the workstation in the desktop position, remove the speaker.
4. Remove all expansion boards.
5. Disconnect all cables that are attached to the system board.
6. Remove the processor, processor guide rails, and the RIMMs or SDRAM expansion boards.
7. Remove the Terminator Board (if installed).

8. Remove the retaining screws that secure the system board to the chassis ❶.
9. Slide the board 1/2-inch toward the front of the chassis to clear the I/O panel connectors ❷.
10. Tilt the rear of the board up ❸, then lift the board up and out of the chassis ❹.

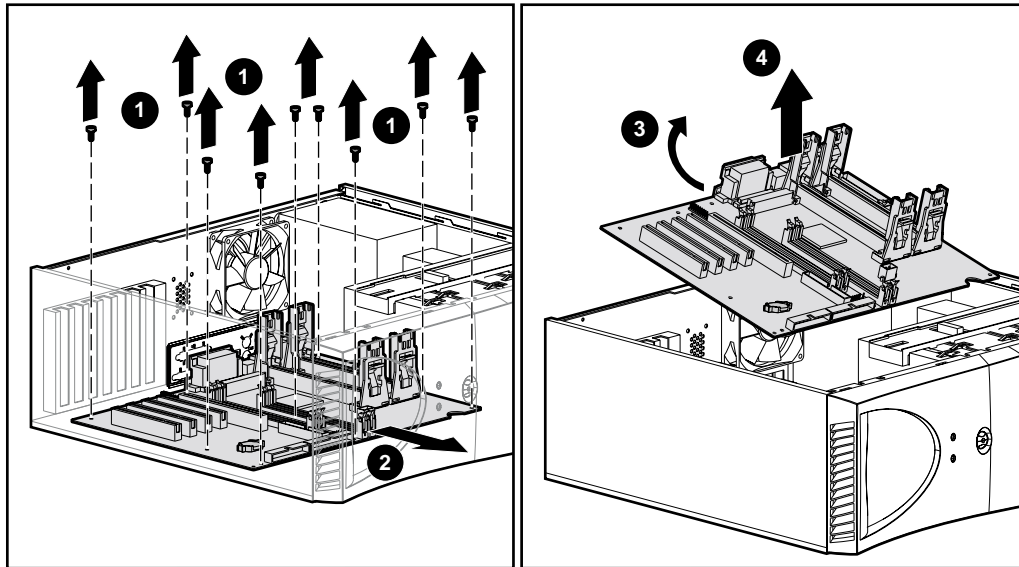


Figure 3-45. Removing the system board from the chassis

To install a new system board, reverse the above procedure.



CAUTION: Damage to the system board could result if all the power cables are not properly reconnected to the system board.

NOTE: When installing the system board, properly align the board in the chassis by inserting the screw nearest the power supply first.

I/O Panel

To remove the I/O panel:

1. Perform the steps in the “Service Preparations” section as previously shown.



CAUTION: Before removing the workstation access panel, ensure that the workstation is turned off, all cables are disconnected from the back of the workstation, and the power cord is disconnected from the grounded AC outlet.

2. Remove the workstation access panel.
3. Remove all expansion boards.
4. Remove the speaker.
5. Remove the power supply.
6. Disconnect all cables that are attached to the system board.
7. Remove the system board.
8. Remove the I/O panel from the back of the chassis.

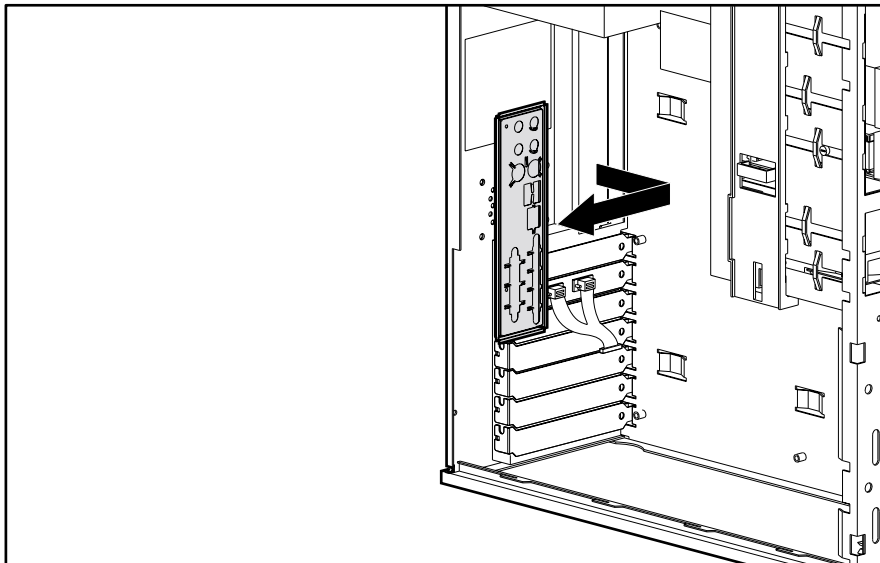


Figure 3-46. Removing the I/O panel

To replace the I/O panel, reverse the above procedure.



CAUTION: Damage to the system board could result if all the power cables are not properly reconnected to the system board.

Lithium Battery

NOTE: When replacing a battery, use a CR2032 or equivalent 3-volt lithium coin cell battery.



WARNING: The system board contains a lithium-ion battery pack. There is a risk of fire and chemical burn if the battery pack is handled improperly. Do not disassemble, crush, puncture, short external contacts, dispose of in water or fire, or expose it to temperatures higher than 140°F (60°C).



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

NOTE: It is important to make a diagnostics diskette **before** you install a new battery. Instructions for creating and using the Compaq Diagnostic Diskette are located on the Compaq website: www.compaq.com

To replace the lithium battery (153099-001):

1. Perform the steps in the “Service Preparations” section as previously shown.



CAUTION: Before removing the workstation access panel, ensure that the workstation is turned off, all cables are disconnected from the back of the workstation, and the power cord is disconnected from the grounded AC outlet.

2. Remove the workstation access panel.
3. Locate the battery on the system board.

NOTE: If you have expansion boards installed, you may need to remove them to gain access to the battery.

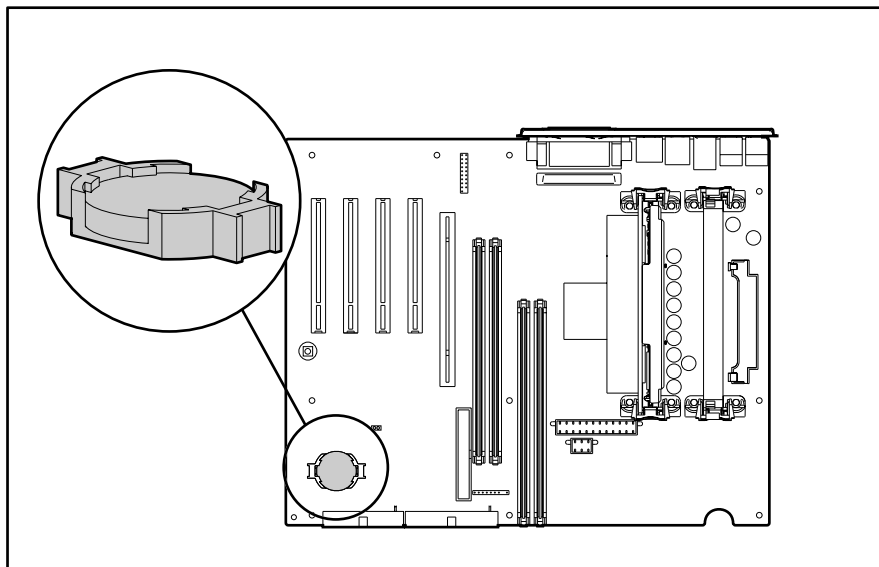


Figure 3-47. Locating the battery on the system board

4. Lift the battery out of the holder.

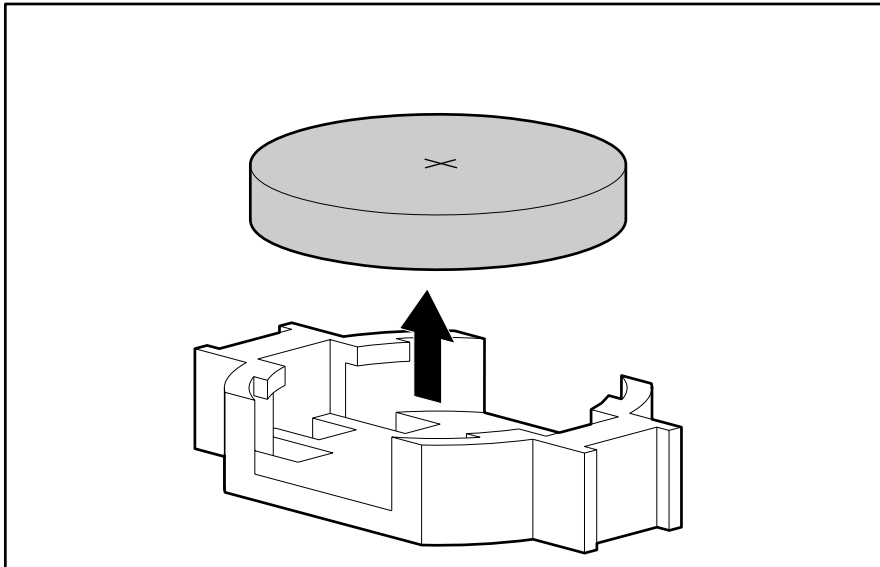


Figure 3-48. Removing the battery

To replace the battery, slide the replacement battery into position with the positive side up.

IMPORTANT: Positive polarity should be positioned up.

NOTE: The battery holder automatically secures the battery in the proper position.

Converting a Minitower to a Desktop Configuration

To convert a minitower to a desktop configuration:

1. Perform the steps in the “Service Preparations” section as previously shown.



CAUTION: Before removing the workstation access panel, ensure that the workstation is turned off, all cables are disconnected from the back of the workstation, and the power cord is disconnected from the grounded AC outlet.

2. Remove the workstation access panel.
3. Remove the front bezel.
4. Disconnect all power and data cables from the hard drives in the 5.25-inch drive bays.
5. Remove the drives from the 5.25-inch drive bays by lifting the drivelock.

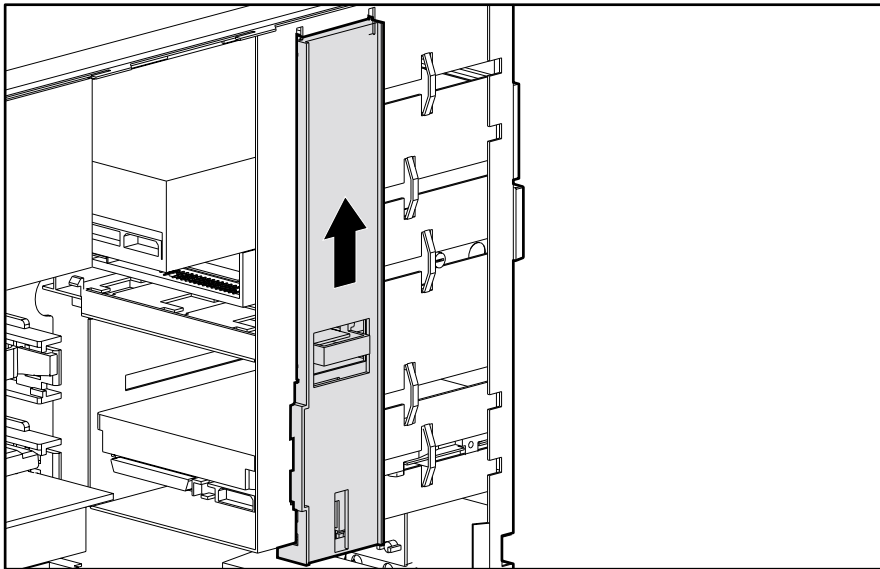


Figure 3-49. Releasing the drives by lifting the drivelock

6. Push the drives from the rear and remove them from the front of the drive bay.



CAUTION: When removing the drives, do not pull the drives from the front of the drive bay. To prevent damage to the drive bezel, push the drives from the rear to remove from the drive bay. The use of unnecessary force may result in damage to the drives.

7. Rotate the drives counterclockwise 90 degrees, then reinstall them into the drive bays.

When the drives are properly inserted, the drivelock will secure them.

IMPORTANT: The diskette drive should always be placed in the bay nearest the top of the chassis in the desktop configuration for proper drive clearance and access.

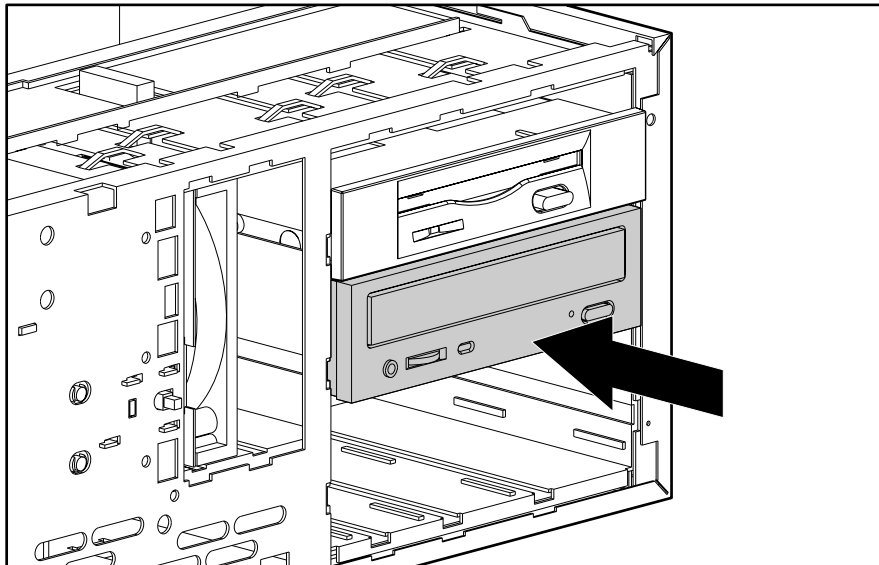


Figure 3-50. Installing a drive in the desktop configuration

8. Reconnect the power and data cables to the drives.

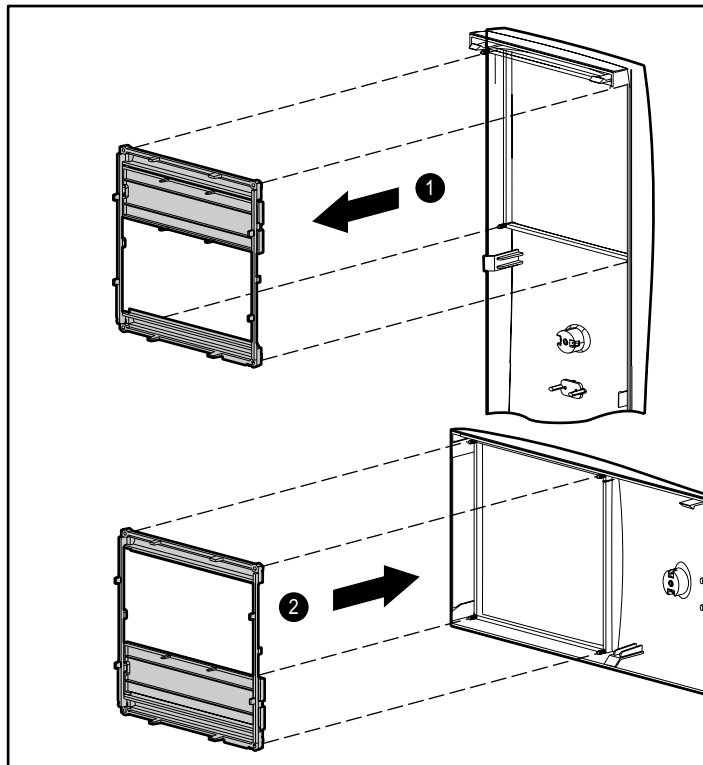


Figure 3-51. Rotating the bezel blanks when converting a minitower ❶ to a desktop ❷

9. Gently pull the subpanel, with the bezel blank secured, away from the front bezel, remove, and rotate the bezel blank.



CAUTION: Hold the subpanel straight when you pull it away from the front bezel. Pulling the subpanel away at an angle could damage the pins that align it within the front bezel.

10. Replace the subpanel and front bezel, ensuring the subpanel and front bezel align properly with the alignment tabs.



CAUTION: When replacing the subpanel, be sure the aligning pins and any remaining bezel blanks are in the proper orientation to prevent damage to the alignment pins. See Figure 3-7 for the subpanel keyed-alignment positions.

11. Reassemble the workstation.

NOTE: When switching from minitower to desktop orientation, the bezel blank should be switched out with the replacement provided to ensure that the Compaq logo is properly oriented.

Converting a Desktop to a Minitower Configuration

To convert a desktop to a minitower configuration:

1. Perform the steps in the “Service Preparations” section as previously shown.



CAUTION: Before removing the workstation access panel, ensure that the workstation is turned off, all cables are disconnected from the back of the workstation, and the power cord is disconnected from the grounded AC outlet

2. Remove the workstation access panel.
3. Remove the front bezel.
4. Disconnect the power and data cables from each drive in the 5.25-inch drive bays.
5. Remove each drive from the 5.25-inch drive bays by pressing the drivelock release button.

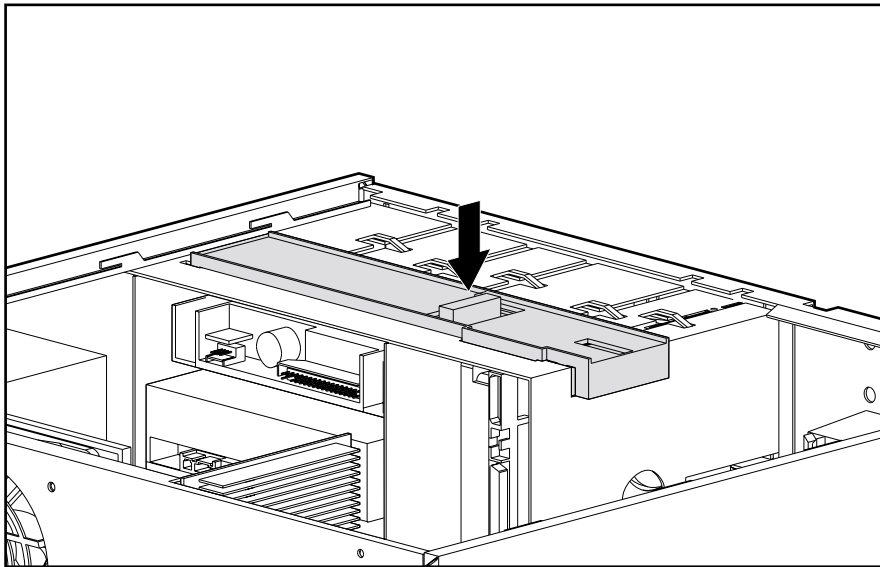


Figure 3-52. Releasing the drives with the drivelock release button

6. Push the drives from the rear to remove them from the front of the drive bay.



CAUTION: When removing a drive, do not pull on the front of the drive. To prevent damage to the drive bezel, push the drive from the rear to remove from the drive bay. The use of unnecessary force may result in damage to the drive.

7. Rotate each drive clockwise 90 degrees, then reinstall it into the drive bay.

When the drives are properly inserted, the drivelock will secure them.

IMPORTANT: For proper placement within the chassis, the diskette drive should always be placed in bay three, the bay nearest the internal 3.5-inch drives.

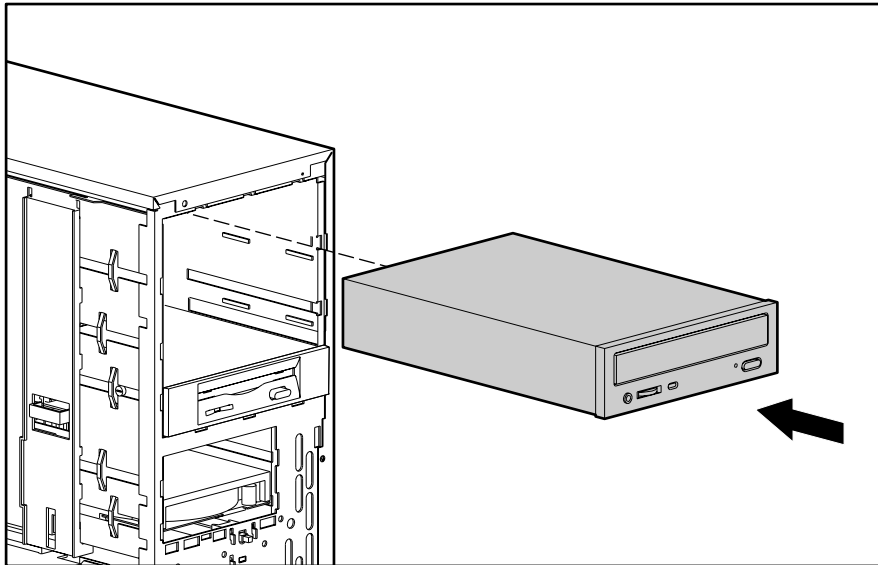


Figure 3-53. Installing a drive in the minitower configuration

8. Reconnect the power and data cables to each drive.

9. Gently pull the subpanel, with the bezel blank secured, away from the front bezel and rotate the bezel blank clockwise 90 degrees.



CAUTION: Hold the subpanel straight when you pull it away from the front bezel. Pulling the subpanel away at an angle could damage the pin alignment.

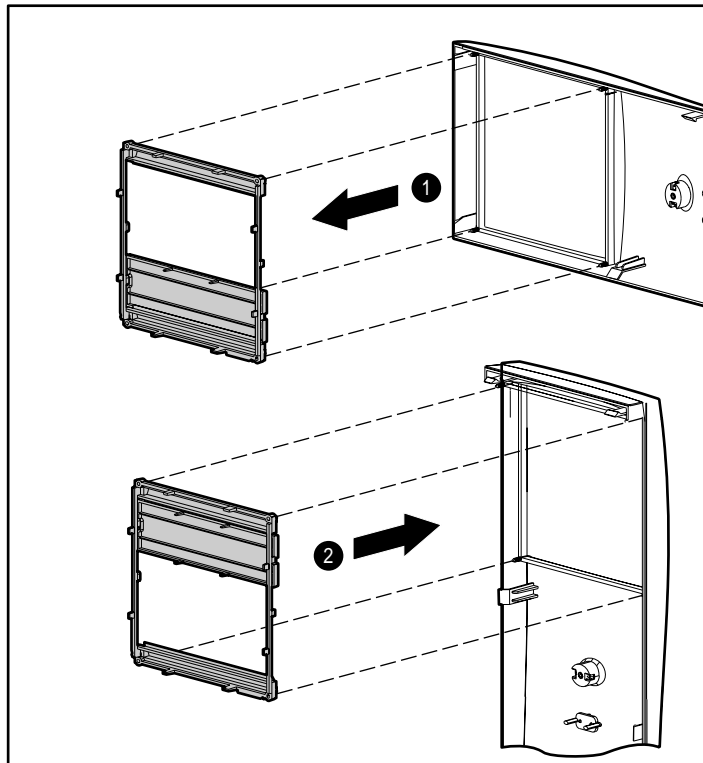


Figure 3-54. Rotating the bezel blanks when converting a desktop ❶ to a minitower ❷

10. Replace the subpanel and front bezel, ensuring the subpanel and front bezel align properly with the alignment tabs.



CAUTION: When replacing the subpanel, be sure the aligning pins and any remaining bezel blanks are in the proper orientation to prevent damage to the alignment pins. See Figure 3-7 for the subpanel keyed-alignment positions.

11. Reassemble the workstation.

NOTE: When switching from desktop to minitower orientation, the bezel blank should be switched out with the replacement provided to ensure that the Compaq logo is properly oriented.

Chapter 4

Diagnostic Tools

Overview

This chapter provides information on the following topics to assist you when servicing the Compaq Professional Workstation AP550:

- Power-On Self-Test (POST)
- Troubleshooting Minor Problems
- Computer Setup and Diagnostics Utilities
- Clearing Configuration Memory
- Diagnostic Utilities
- Error Codes
- ROMPaq
- Fault Management
- Compaq Insight Manager
- Compaq Management Agents for Workstations
- Compaq Restore CD
- Compaq Diagnostics for Windows NT

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

Power-On Self-Test (POST)

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

- Keyboard
- RIMMs
- Graphics controller
- Diskette drives
- IDE/CD-ROM drive
- Hard drives
- Processor
- Controllers

POST also detects the type of SCSI mass storage devices that are installed in the workstation.

NOTE: If the Power-On Password is set, a key icon (□—P) appears on the screen while POST is running. You will need to enter the password before continuing. See Chapter 5 for information on deleting or bypassing the Power-On Password.

If POST finds an error in the system, an audible and/or visual message occurs. For explanations of the error codes and a recommended course of action, see Table 4-1.

POST Messages

An error message results if the POST encounters a problem. This test runs when the system is turned on, checking assemblies within the workstation and reporting any errors found.



CAUTION: RIMMs can reach a temperature of 212°F (100°C) in a matter of minutes. Caution should be excised whenever removing or replacing these components.

NOTE: See Chapter 2 for more information on preparing the workstation for service.

Table 4-1
POST Error Messages

Error Code	Audible Beeps L=Long S=Short	Probable Source of Problem	Recommended Action
101-ROM Error		System ROM checksum	Contact your Compaq authorized service provider
101-Option ROM Checksum Error		Option ROM checksum	Contact your Compaq authorized service provider
102-System Board Failure		DMA, timers, and so forth	Contact your Compaq authorized service provider
103-System Board Failure		Hardware component.	Replace the Expansion Cage System Board. Run the Computer Setup utility.
150-SafePost Active		An add-in card in the system appeared not to work correctly.	Reboot the system. If add-in card requires an unusual amount of setup time, SafePost can be disabled in Computer Setup. Otherwise, remove the add-in card.

continued

Table 4-1
POST Error Messages *continued*

Error Code	Audible Beeps		Probable Source of Problem	Recommended Action
	L=Long	S=Short		
162-System Options Error	2	S	No diskette drive or mismatch in drive type.	Run Computer Setup or Windows NT utilities.
162-System Options Not Set	2	S	Configuration incorrect. RTC (real-time clock) battery may need to be replaced. Battery life is approximately 5 years. CMOS jumper may not be properly installed. System configuration has changed since last boot.	Run Computer Setup or Windows NT Workstation utilities. First, reset the date and time under Control Panel. If the problem persists, replace the RTC battery. See Chapter 3, "Removal and Replacement Procedures" for instructions. Clear the configuration memory. Press F1 and save changes. If problem persists, replace the CMOS backup battery.
163-Time & Date Not Set	2	S	Invalid time or date in configuration memory. RTC (real-time clock) battery may need to be replaced. Battery life is approximately 5 years. CMOS jumper may not be properly installed.	Set the date and time under Control Panel. Run Computer Setup or Windows NT Workstation utilities. If the problem persists, replace the RTC battery. See Chapter 3, "Removal and Replacement Procedures" for instructions. Clear the configuration memory.
164-Memory Size Error	2	S	Memory configuration incorrect.	Be sure each memory module is installed properly. Run Computer Setup or Windows NT Workstation utilities.
201-Memory Error	None		RAM failure.	Be sure each memory module is installed properly. Replace the RIMMs.
202-Memory Type Mismatch	None		Invalid memory configuration.	Run Computer Setup or Windows NT utilities. Replace the RIMMs.

continued

Table 4-1
POST Error Messages *continued*

Error Code	Audible Beeps		Probable Source of Problem	Recommended Action
	L=Long	S=Short		
207-ECC Corrected Single Bit Errors in Memory Module Socket(s)	2S		A memory error on one of the installed RIMMs has been detected and corrected with the system's ECC logic. The workstation will continue to operate correctly despite this error.	Run diagnostics to get more information. Replace the RIMMs if error persists.
212-Failed Processor	1L		Processor has failed to initialize.	Replace the processor and/or the processor power module.
213-Incompatible Memory Module in Memory Module Socket(s)			Memory configuration is not supported by system firmware.	Remove any newly installed RIMM(s).
214-Memory Device Failure. Error Code: XX Memory Module Sockets(s): XX			A specific error has occurred in a RDRAM device installed in the identified socket.	Remove the RIMM device.
301-Keyboard Error	None		Keyboard failure.	Check to see if a key is stuck. Reconnect the keyboard with the computer turned off. Replace the keyboard if necessary.
303-Keyboard Controller Error	None		I/O board keyboard controller.	Reconnect the keyboard with computer turned off. Replace the system board.
304-Keyboard or System Unit Error	None		Keyboard failure.	Reconnect the keyboard with the computer turned off. Replace the keyboard. Replace the system board.
404-Parallel Port Address Conflict Detected	2S		Both external and internal ports are assigned to parallel port X.	Run Computer Setup or Windows NT utilities.
601-Diskette Controller Error	None		Diskette controller circuitry or floppy drive circuitry is incorrect.	Run Computer Setup. Check and/or replace cables. Replace the diskette drive. Replace the system board.

continued

Table 4-1
POST Error Messages *continued*

Error Code	Audible Beeps L=Long S=Short	Probable Source of Problem	Recommended Action
605-Diskette Drive Type Error	2S	Mismatch in drive type.	Run Computer Setup or Windows NT utilities.
912-The computer cover has been removed since last system startup		The machine cover has been removed. Please ensure that any system access was authorized.	This error is strictly informational and will be reset upon the next cold boot.
1611-Fan failure detected.		Chassis fan not connected to the system board.	Reattach chassis fan to the system board.
1720-SMART Hard Drive detects imminent failure.		IDE hard drive(s).	Contact your Compaq authorized service provider.
1721-SMART SCSI Hard Drive Detects Imminent Failure		SCSI hard drive(s)	Contact your Compaq authorized service provider
1771-Primary Disk Port Address Assignment Conflict		IDE configuration	Run Computer Setup
1772-Secondary Disk Port Address Assignment Conflict		IDE configuration	Run Computer Setup
1780-Disk 0 Failure		IDE hard drive failure	Contact your Compaq authorized service provider
1781-Disk 1 Failure		IDE hard drive failure	Contact your Compaq authorized service provider
1782-Disk Controller Failure		IDE circuitry failure	Contact your Compaq authorized service provider

continued

Table 4-1
POST Error Messages *continued*

Error Code	Audible Beeps		Probable Source of Problem	Recommended Action
	L=Long	S=Short		
1790-Disk 0 Failure (Secondary)	None		IDE Hard drive failure.	Contact your Compaq authorized service provider.
1791-Disk 1 Failure (Secondary)	None		IDE Hard drive failure.	Contact your Compaq authorized service provider.
1792-Secondary Disk Controller Failure	None		IDE circuitry failure.	Contact your Compaq authorized service provider.
1793-Secondary Controller or Disk Failure	None		CD-ROM interface.	Run the Diagnostics utility.
XX000Y ZZ Parity Check 2	None		Parity RAM failure.	Run the Setup and Diagnostics utilities.
Fixed Disk Parameter Table or BIOS Error System Halted	3L		Configuration or hardware failure.	Run the Setup and Diagnostics utilities.
Invalid Electronic Serial Number	None		Electronic serial number has become corrupted.	Run Computer Setup and Diagnostics utility.

continued

Table 4-1
POST Error Messages *continued*

Error Code	Audible Beeps L=Long S=Short	Probable Source of Problem	Recommended Action
Audible	1L, 3S	System ROM is bad; System is running in Failsafe boot block mode.	Reflash the ROM using a ROMPaq diskette.
1800-Temperature alert		The system is too hot.	Turn off the workstation and let it cool off. If the condition persists, run Diagnostics to get more information and contact your Compaq authorized service provider.
1801-Microcode Patch Error		Missing or invalid Processor Microcode Patch.	Please contact Compaq Computer Corporation or Compaq website at www.compaq.com for a new ROM BIOS to support the processor stepping.
(RESUME = F1 KEY)	None	As indicated to continue.	Press F1
* L = Long, S = Short			

Troubleshooting Minor Problems

If minor hardware or software problems occur, refer to the following list for possible solutions before running any of the diagnostic utilities:

- Verify that the workstation is connected to a working grounded AC outlet.
- Is the workstation turned on and the power light illuminated?
- Check all cable connections. Be sure the connectors are seated properly.
- 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.
- 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 power-up?
- Was a bootable compact disc in the CD-ROM drive at power-up?
- Check all switch and jumper settings.
- Are RIMMs and DIMMs mixed on the same system board? The system will not boot if there is a mixture of RIMMs and DIMMs on the system board.
- Are CRIMMs installed in the unpopulated RIMM slots? If not, the system will not boot.
- In addition to the above checklist, see the next few sections for other possible solutions to:
 - Power problems
 - Diskette drive problems
 - Display problems
 - Printer problems
 - Hard drive problems
 - Hardware installation problems
 - DVD-ROM and IDE CD-ROM drive problems
 - Memory problems
 - SCSI problems
 - Network problems
 - Audio hardware conflicts

Power Problems

Table 4-2
Solutions for Power Problems

Problem	Possible Solution
Computer will not turn on.	Be sure the workstation is connected to a grounded AC outlet. Be sure cables from the workstation's power supply are plugged in properly. A PCI board that has been installed is not seated properly or is defective. Be sure that the board is fully inserted, or remove the PCI board that was just installed.
Computer does not automatically display the date and time.	The real-time clock (RTC) battery may need to be replaced.
Computer powered off automatically.	The unit temperature may have been exceeded. Check the fan for function and blockage.
Insufficient power to the components.	Both power supply cables may not be connected to the system board.



CAUTION: If both power cables are not properly connected to the system board, damage to the system board could result.

Diskette Drive Problems

Table 4-3
Solutions for Diskette Drive Problems

Problem	Possible Solution
Diskette drive light stays on.	<p>Diskette could be installed incorrectly. Remove the diskette and reinsert.</p> <p>Software program may be damaged. Check the program diskettes.</p> <p>Drive button is not pushed in. Push in drive button.</p> <p>Drive cable is not properly connected. Reconnect drive cable.</p>
Diskette drive cannot write to a diskette.	<p>Diskette is not formatted. Format the diskette.</p> <p>Diskette is write-protected. Either use another diskette that is not write-protected or disable the write protection on the diskette.</p> <p>Writing to the wrong drive. Check the drive letter in the path statement.</p> <p>Not enough space is left on the diskette. Use another diskette to write the information.</p> <p>Diskette write control is disabled. Check the security feature settings.</p>
Diskette drive cannot read a diskette.	<p>Diskette is not formatted. Format the diskette.</p> <p>Using the wrong diskette type for the drive type. Use a diskette that is compatible with the drive.</p> <p>Reading the wrong drive. Check the drive letter in the path statement.</p> <p>Diskette drive has been disabled. Run Computer Setup and enable the diskette drive.</p>
A problem has occurred with a disk transaction.	The directory structure is bad or there is a problem with a file.
Non-system disk message.	Remove the diskette from the drive.
Drive not found.	Check the cables for loose connections.

Display Problems

Table 4-4
Solutions for Display Problems

Problem	Possible Solution
Screen is blank.	<p>Monitor is not turned on and the monitor light is not on. Turn on the monitor and check that the monitor light is on.</p> <p>Screen save has been initiated. Press any key or move the mouse to light the screen. Wait a few seconds for the screen to become active.</p> <p>Check the cable connection from the monitor to the workstation and check the grounded AC outlet.</p> <p>The brightness needs adjusting. Adjust the brightness control.</p> <p>The energy saver feature has been enabled. Press any key or type the password. Wait a few seconds for the screen to become active.</p> <p>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. If there is a sync switch, set it to External.</p> <p>If a fixed-sync monitor is used, be sure that the monitor can accept the same sweep rate as the resolution chosen.</p> <p>Check that the graphics adapter is fully and properly inserted in the PCI or AGP Pro slot.</p>
Graphics colors are wrong.	<p>If the BNC cable is used, make sure that the Red, Green, and Blue BNC cables are connected to the corresponding monitor connectors.</p> <p>Be sure the monitor's RGB inputs are set to 75 ohms.</p>
Characters are dim.	<p>Adjust the monitor's brightness and contrast controls.</p> <p>Check that the video cable is securely connected to the video card and monitor.</p> <p>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.</p>
Monitor does not function properly when used with the energy saver features.	<p>A monitor without the energy saver feature is being used with energy saver features enabled.</p> <p>Disable the monitor energy saver feature.</p>
Blurry display or requested resolution cannot be set.	<p>If the graphics controller was upgraded, the correct display drivers may not be loaded.</p> <p>Install the correct display drivers on the diskette included in the upgrade kit.</p>

continued

Table 4-4
Solutions for Display Problems *continued*

Problem	Possible Solution
The picture is broken up; it rolls, jitters, or blinks.	Be sure the monitor cable is securely connected to the computer. In a 2-monitor system or if another monitor is in close proximity, the monitors may interfere with each other's magnetic field. Move them farther apart.
Screen goes blank.	A screen blanking utility may be installed or energy saver features are enabled. Press any key or type password. Wait a few seconds for the screen to become active.
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 airflow.
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 key light should not be on when using the arrow keys.

Printer Problems

Table 4-5
Solutions for Printer Problems

Problem	Possible Solution
Printer will not print.	Printer is not turned on and online. Turn the printer on and be sure it is online. The correct printer drivers for the application are not installed. Install the correct printer drivers for the application. If the workstation is on a network, the printer may not be connected to the network. Make the proper network connections to the printer.
Printer will not turn on.	The cables may not be connected properly. Reconnect all cables and check the power cord and grounded AC outlet.
Prints garbled information.	The correct printer drivers for the application are not installed. Install the correct printer driver for the application. The cables may not be connected properly. Reconnect all cables.
Printer is offline.	The printer may be out of paper. Check the paper tray and refill it if it is empty. Select online.

Hard Drive 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.

Table 4-6
Solutions for Hard Drive Problems

Problem	Possible Solution
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. When using Windows NT Workstation 4.0, run Disk Administrator. At the Start menu, highlight Programs and select Administrative Tools.
Drive not found.	Cable could be loose. Check cable connections. Check SCSI IDs to make sure they are not duplicated.
Nonsystem disk message.	The system is trying to start from a diskette that is not bootable. Remove the diskette from the diskette drive. 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 workstation. Diskette boot has been disabled in Computer Setup. Run Computer Setup and enable diskette boot.

Hardware Installation Problems

Table 4-7
Solutions for Hardware Installation Problems

Problem	Possible Solution
A new device is not recognized as part of the computer system.	<p>The Computer Setup utility has not been run to configure the new device. Run the Computer Setup or the SCSI software utility.</p> <p>When the system advised you of changes to the configuration, you did not accept them. Restart the workstation and follow the instructions for accepting the changes.</p> <p>The system may not have automatically recognized the new device. Run Computer Setup and identify the new device.</p> <p>A Plug-and-Play board may not automatically configure when added if the default configuration conflicts with other devices. Use Computer Setup to deselect the automatic settings for the board and choose a basic configuration that does not cause a resource conflict.</p> <p>The cables for the new external device are loose or the power cables are unplugged. Check all cables.</p> <p>The power switch for the new external device is not turned on. Turn off the workstation, turn on the external device, then turn on the workstation to integrate the new device.</p> <p>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.</p>
Installed third-party hard drive adapter (SCSI and so on) is not participating in the Hard Drive Ordering option provided in F10 setup and/or is always coming up as the boot device regardless of the Hard Drive Ordering information.	The third-party adapter is either not supporting BIOS Boot Specification or the Boot Connection Vector option. A solution is not available.
Insufficient power to the components.	Assure both power supply cables are connected to the system board.

DVD-ROM and CD-ROM Drive (IDE) Problems

Table 4-8
DVD-ROM and CD-ROM Drive (IDE) Problems

Problem	Possible Solution
Cannot read compact disc.	CD is not properly seated in the drive. Eject the CD, correctly seat it in the drive, then reload. CD has been loaded upside down. Eject the CD, turn it over, then reload.
System will not boot from CD-ROM drive.	The CD-ROM boot is not enabled through the Computer Setup utility. Run the Computer Setup utility and set the drive priorities. Be sure that drive cabling and jumpers are set correctly.
Cannot eject compact disc.	CD is not properly seated in the drive. Turn off the workstation, 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 workstation. Verify that the drive cable is connected properly.

Memory Problems

Table 4-9
Memory Problems

Problem	Possible Solution
Out of memory error.	Run Performance Monitor. Click <i>Start, Programs, Administrative Tools</i> . The workstation has run out of memory to run the application. Check the application documentation to determine memory requirements.
Memory count during POST is wrong.	The RIMMs may not be installed correctly. Verify that the RIMMs have been installed correctly in the RIMM sockets then run the Computer Setup utility.
Insufficient memory error during operation.	The system has run out of memory for the application. Check memory requirements for the application or install additional memory.
Unit is powered on but no video is being displayed to the screen and the power LED is blinking red.	The memory configuration (RIMMs or SDRAM board) is not installed correctly preventing the unit from booting. See the "Memory Modules" section in Chapter 3 for memory installation and removal guidelines.

SCSI Problems

Table 4-10
SCSI Problems

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

Network Problems

The process of debugging network cabling is not discussed.

Table 4-11
Network Problems

Problem	Cause	Solution
System does not detect a network controller.	<ol style="list-style-type: none"> 1. Possible driver problem. 2. Controller is disabled in setup. 3. Possible failed network controller. 	<ol style="list-style-type: none"> 1. Load latest version of the Compaq Restore CD. 2. Run Computer Setup and enable the controller. 3. Replace the system board.
System Setup utility reports unprogrammed EPROM.	<ol style="list-style-type: none"> 1. The network controller is defective. 2. Network drivers are not loaded. 	<ol style="list-style-type: none"> 1. Replace the controller or the system board. 2. Boot the workstation without the network drivers, using a system boot diskette, and reconfigure the network controller.
Diagnostics reports a failure.	<ol style="list-style-type: none"> 1. The cable is not securely connected. 2. The cable is attached to the incorrect connector. 3. There is a problem with the cable or a device at the other end of the cable. 4. The network controller is defective. 5. Network controller interrupt or memory overlaps the interrupt or memory of an expansion board. 	<ol style="list-style-type: none"> 1. Be sure the cable is securely attached to the network connector and that the other end of the cable is securely attached to the correct device. 2. Be sure that the cable is attached to the correct connector. 3. Be sure that the cable and device at the other end are operating correctly. 4. Replace the controller or the system board. 5. Run Computer Setup and modify the network controller memory value.

continued

Table 4-11
Network Problems *continued*

Problem	Cause	Solution
Diagnostics passes, but the system does not communicate with the network.	<ol style="list-style-type: none"> 1. Network drivers are not loaded, or driver parameters do not match current configuration. 2. The network controller is not configured for the workstation. 3. The network controller interrupt or memory overlaps the interrupt or memory of an expansion board. 	<ol style="list-style-type: none"> 1. Be sure the network drivers are loaded and that the driver parameters match the configuration of the network controller. 2. Select the Network icon in the Control Panel. Reconfigure the driver if necessary, using the Network Setup found in the Control Center. 3. Run Computer Setup and modify the network controller memory value.
Network controller stopped working when an expansion board was installed.	<ol style="list-style-type: none"> 1. Network drivers are not loaded or driver parameters do not match the current configuration. 2. The cable is not securely connected. 3. The network controller interrupt or memory overlaps the interrupt or memory of another expansion board. 4. The network controller requires drivers. 5. The files containing the network drivers are corrupted. 	<ol style="list-style-type: none"> 1. Be sure 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. 2. Be sure the cable is securely attached to the network connector and the other end of the cable is securely attached to the correct device. 3. Run Computer Setup and modify the network controller memory value. 4. Verify that the drivers were not accidentally deleted when the drivers for a new expansion board were installed. 5. Reinstall the network drivers using the Compaq Restore CD, then run Computer Setup.

continued

Table 4-11
Network Problems *continued*

Problem	Cause	Solution
Network controller stopped working without apparent cause.	1. The files containing the network drivers are corrupted.	1. Reinstall the network drivers, the Compaq Restore CD, then run Computer Setup.
	2. The cable is not securely connected.	2. Be sure the cable is securely attached to the network connector and the other end of the cable is securely attached to the correct device.
	3. The network controller is defective.	3. Replace the network controller or the system board.

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 and Channel 0 or 3

If you are unsure of the settings of the peripheral boards, you can isolate the source of the problem by temporarily removing all boards and then reinstalling each board, one at a time, until the board that is causing the conflict is found.

Computer Setup and Diagnostics Utilities

The Computer Setup and Diagnostics utilities provide information you will need about the workstation.

- Computer Setup
- Diagnostics
 - Creating a Diagnostics Diskette
 - Running Computer Checkup (TEST)
 - Running View System Information (INSPECT)
 - Running Diagnostic Utilities for Error Codes

Explanations and procedures for each utility are included in this chapter.

The Setup and Diagnostics utilities should be run in the following instances:

- When a system configuration error is detected during the Power-On Self-Test (POST)
- To change the factory default settings for some of the workstation features
- To change the system configuration, which is sometimes necessary upon adding or removing optional hardware
- To set system configuration features

Accessing the Computer Setup Menu

NOTE: Computer Setup is built into the reprogrammable system ROM on the Compaq Professional Workstation AP550 and is shipped in English only. Computer Setup is also available in 12 additional languages that can be accessed from the Computer Setup utility menu.

1. Turn on or restart the workstation.

NOTE: Do not restart the workstation while in Windows NT Workstation. Instead, exit Windows NT Workstation by clicking Start, Shut Down, Restart the computer.

2. When the **F10 = Setup** message appears in the lower-right corner of the screen, press **F10**.

NOTE: You have approximately 30 seconds to press **F10**. If you do not press **F10** during this time, you must restart the workstation again to access the utility.

NOTE: The **F12** key initiates Network Service Boot for Remote System Installation.

The Computer Setup menu appears with the following menu headings: File, Storage, Security, Power, and Advanced. See the Computer Setup table (Table 4-12) for a description of the features available in Computer Setup.

3. Press the arrow keys or the **Tab** key to select the option you want, and then press **Enter**. (To return to the main menu, press **Esc**.)
4. To apply and save changes, select File, then Save Changes and Exit. If you selected an option that automatically restarted the workstation, changes were applied at that time. If you have made changes that you do not want applied, select Ignore Changes and Exit. If you have already applied changes you now want to eliminate, select Set Defaults and Exit. This option will restore the original system defaults.

IMPORTANT: Be sure to configure new options and drivers in the operating system after they have been configured by the Setup utility.

Table 4-12
Computer Setup

Task	Computer Setup Selection
View the product name, type/speed/stepping for both processors, CPU serial number, system ROM date, system board revision, installed memory size, and asset tracking number.	Select File, then select System Information.
Set the system time and date.	Select File, then select Set Time and Date.
View the currently installed drive A: (preinstalled diskette drive) and drive B: devices and set resources for diskette drives.	Select Storage, then select Diskette Drives.
Enable/disable diskette booting and diskette writing. NOTE: After saving changes to Removable Media, the workstation will restart. Turn the workstation off, then on, manually.	Select Storage, then select Removable Media.
View information regarding IDE devices connected to the system. NOTE: ATAPI devices (CD-ROM, tape) are listed as ATAPI devices.	Select Storage, then select IDE Devices.
Set hard drive to Ultra-DMA (Ultra-ATA), EDMA, or PIO mode operation.	Select Storage for the IDE Drive Timing.
Specify the order of the hard drive between embedded, SCSI, IDE, and installed third-party hard drive controllers.*	Select Storage, then select Hard Drive Order.
Enable/disable IDE drive translation.	Select Storage for the IDE Drive Translation.
Specify the boot order of installed peripheral devices (diskette drive, hard drive, CD-ROM device, or embedded NIC).	Select Storage, then select Boot Order.
Set the energy saver mode to Advanced, Disabled, or Minimal.	Select Power, then select Energy Saver.
Enable/disable timeouts or manually select timeout values. NOTE: This selection appears only if energy saver mode is set to Advanced.	Select Power, then select Timeouts.

* The third-party adapter must have its own option ROM and it supports Boot Connection Vectors (BCV) through the BIOS Boot Specification requirements.

continued

Table 4-12
Computer Setup *continued*

Task	Computer Setup Selection
Set the power button configuration (on/off or suspend/wakeup) and enable/disable power LED blink-in-suspend mode. NOTE: This selection does not appear if the energy saver mode is disabled.	Select Power, then select Energy Saver Options.
Enable the Power-On Password.	Select Security, then select Power-On Password.
Enable/disable network server mode. NOTE: This selection appears only if a Power-On Password is set.	Select Security, then select Password Options.
Enable the Setup (administrator) Password.	Select Security, then select Setup Password.
Enable/disable serial, parallel, and USB ports and audio security.	Select Security, then select Device Security.
Set the Asset Tag.	Select Security, then select System IDs.
Set the keyboard locale setting (for example, English or German) for the System ID entry. Also allows setting of Chassis serial number if current number is invalid.	Select Security, then select System IDs.
Set the POST mode (QuickBoot) and enable/disable POST messages.	Select Advanced, then select Power-On Self Test.
Set resources for onboard system devices (serial port, parallel port, and so forth).	Select Advanced, then select Onboard Devices.
View the currently installed PCI devices and their IRQ settings and/or reconfigure IRQ settings for these devices or disable them entirely. NOTE: This option will not appear if there are non-PnP devices currently installed.	Select Advanced, then select PCI devices.
View the current settings of Plug and Play (PnP) devices and set resources for installed boards.	Select Advanced, then select PCI PnP Devices.
Enable/disable PCI bus mastering, PCI reset on warm boot, and PCI VGA palette snooping.	Select Advanced, then select Bus Options.
Set the printer mode (flexible/standard).	Select Advanced, then select Device Options.
Set the Num Lock state at power-on.	Select Advanced, then select Device Options.
Specify which VGA controller is the primary (or boot) VGA controller. NOTE: This selection appears only if there are multiple PCI graphics controllers in your system.	Select Advanced, then select PCI VGA Configuration.

continued

Table 4-12
Computer Setup *continued*

Task	Computer Setup Selection
Save the system configuration to a blank 1.44-MB diskette.	Select File, then select Save to Floppy.
Restore the system configuration from a diskette.	Select File, then select Restore from Floppy.
Restore factory default settings and exit Computer Setup.	Select File, then select Set Defaults and Exit.
Exit Computer Setup without applying or saving any changes.	Select File, then select Ignore Changes and Exit.
Save changes to the system configuration and exit Computer Setup.	Select File, then select Save Changes and Exit.

Clearing Configuration Memory

The Workstation Configuration Memory Operating System (CMOS) may occasionally be corrupted. When this occurs, it is usually due to software or hardware that is not functioning accurately, or due to the addition or removal of expansion boards. If the workstation's configuration memory becomes corrupted, it is necessary to clear the configuration memory.

1. Turn off the workstation and any external devices, and disconnect the power cord from the grounded AC outlet.
2. Disconnect the keyboard, monitor, network cable, and any other external devices connected to the workstation.



WARNING: To reduce the risk of personal injury from electrical shock and/or hot surfaces, be sure to disconnect the power cord from the wall outlet, and allow the internal system components to cool before touching



CAUTION: When the unit is plugged in, the power supply always has 5 volts applied to the system board even when the unit is turned off. Failure to disconnect the power cord can result in damage to the system.



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

3. Remove the workstation access panel.

4. Locate the SW50 Clear CMOS switch on the system board.

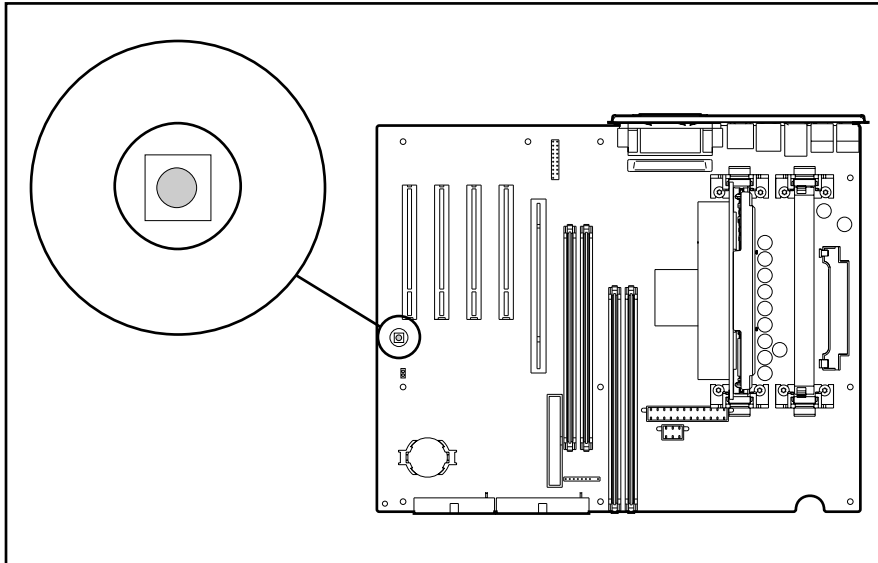


Figure 4-1. Locating the SW50 Clear CMOS switch on the system board

5. Press the SW50 Clear CMOS switch to clear the workstation CMOS.
6. Replace the workstation access panel.
7. Reconnect the network cable and external devices.
8. Plug in the workstation and turn on the power.

NOTE: When the SW50 Clear CMOS switch is pressed, your passwords will become invalid because the passwords are stored in the configuration memory. You will need to reset your passwords and any special system setups.

Diagnostics Utilities

You must create a diagnostics diskette as soon as you begin to use the workstation. This is a bootable diskette that allows you to test and inspect the hardware outside the operating system environmentally running the Computer Checkup (TEST) or View System Information (INSPECT) diagnostic programs.

Another Compaq diagnostics tool is Diagnostics for Windows NT, which runs under Windows NT Workstation. For information on how to use Diagnostics for Windows NT, see “Compaq Diagnostics for Windows NT” later in this chapter.

Creating a Diagnostics Diskette

Instructions for creating and using the Compaq Diagnostic Diskette are located on the Compaq website:

www.compaq.com

Running Computer Checkup (TEST)

NOTE: Computer Checkup (TEST) will detect Compaq hardware. Devices from other manufacturers may not be detected.

TEST is the primary diagnostics utility. TEST confirms whether or not the various workstation devices are recognized by the system and whether or not they are functioning properly. Use TEST in the following instances:

- **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 an error log.
- **Prompted Diagnostics**—Allows maximum control over the device testing process. You can choose attended or unattended testing, stop on errors, or print or file an error log.

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

- CPU (main system)
- Memory
- Keyboard
- Pointing device interface
- Parallel interfaces
- Graphics controllers
- Diskette drives
- Fixed disks
- Serial interfaces
- Installed Compaq devices (tape drive, SCSI device, or network status)

NOTE: You must create a diagnostics diskette **before** you can run TEST. Instructions for creating and using the Compaq Diagnostic Diskette are located on the Compaq website: www.compaq.com

To run TEST:

1. Restart the workstation from the diagnostics diskette you have created.
2. Press **Enter** to bypass the welcome screen.
3. Select Computer Checkup (TEST), then press **Enter**.
4. Select the option to view the device list. A list of installed hardware devices is displayed.
5. Verify that TEST has correctly detected the devices installed. 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.

NOTE: This utility may not detect non-Compaq devices.

6. Select one of the following from the TEST option menu:
 - Quick Check Diagnostics
 - Automatic Diagnostics
 - Prompted Diagnostics



CAUTION: If attended testing is selected, the test itself may result in data loss.

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

7. 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.
8. To exit TEST, press **Esc** until you see the Exit option, then press **Enter**.

Running View System Information (INSPECT)

NOTE: View System Information (INSPECT) will detect Compaq hardware. Devices from other manufacturers may not be detected.

The View System Information (INSPECT) utility provides information about the system after 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, CD-ROM, and hard drives
- Active printer and communication interfaces
- Keyboard
- Graphics
- Windows files
- Network status
- Miscellaneous

NOTE: You must create a diagnostics diskette **before** you can run INSPECT. Instructions for creating and using the Compaq Diagnostic Diskette are located on the Compaq website: www.compaq.com

NOTE: Categories or items of information displayed by View System Information (INSPECT) are similar to, but may vary slightly from, those available in Compaq Diagnostics for Windows NT.

To run INSPECT:

1. Restart the workstation from the diagnostics diskette.
2. Press **Enter** to bypass the welcome screen.
3. Select View System Information (INSPECT), then press **Enter**.
4. Select one of the available options:
 - Print the inspect status.
 - Save the inspect status to a file.
 - Add comments to a parameter status.
 - Exit the utility.

Running Diagnostic Utilities for Error Codes

Diagnostics utilities error codes help identify possibly defective subassemblies.

The following tables list possible error codes, descriptions of each error condition, and actions required to resolve the error condition. See Chapter 3, Removal and Replacement Procedures, for assistance in the removal and replacement of a particular subassembly.

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


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

1. Ensure proper ventilation. The workstation should have a 3-inch clearance at the rear of the chassis.
2. Turn off the workstation and peripheral devices.



CAUTION: Be sure 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.

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. Delete the Power-On Password, if set.

If a key icon () appears on the screen when POST completes, the Power-On Password is set. If this occurs, you must enter the password to continue. To delete the password, type the current password, then press **Enter**. If you do not have access to the password, you must disable it through the SW50 switch on the system board.
5. Install loop-back and terminating plugs for complete testing.
6. Run the Diagnostics diskette.

Error Codes

Microprocessor

Table 4-13
Microprocessor Test Error Codes

Error Code	Description	Recommended Action
101-xx	CPU test failed.	Replace the system board and retest.
102-xx	Coprocessor error.	Run Computer Checkup or Computer Setup and retest. 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.	Replace the system board and retest.
113-01	Protected mode test failed.	Replace the system board and retest.
114-01	Speaker test failed.	1. Verify that the speaker is connected. 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 Diagnostics utility. 5. Replace the system board and retest.

Memory

Table 4-14
Memory Test Error Codes

Error Code	Description	Recommended Action
200-xx	Memory machine ID test failed.	Reinsert RIMM 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 pair of RIMMs at a time until the error message stops. 2. Replace other removed RIMMs one pair 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.	

Keyboard

Do not hold down a key during the boot-up sequence. Holding down any key during the boot-up sequence causes the Basic Input Output System (BIOS) to beep, as a warning of possible keyboard problems. Wait until after the system has booted, then press the **Num Lock** key. If the Num Lock light on the keyboard toggles on and off with each press of the **Num Lock** key, then the keyboard is functioning properly.

Table 4-15
Keyboard Test Error Coded

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

Printer

**Table 4-16
Parallel Printer Test Error Codes**

Error Code	Description	Recommended Action
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.

Diskette Drive

**Table 4-17
Diskette Drive Test Error Codes**

Error Code	Description	Recommended Action
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.

Serial Port

**Table 4-18
Serial Test Error Codes**

Error Code	Description	Recommended Action
1101-xx	Serial port test failed	<ol style="list-style-type: none"> 1. Run Computer Setup or Windows NT utilities. 2. Replace the system board and retest

Modem

**Table 4-19
Modem Communications Test Error Codes**

Error Code	Description	Recommended Action
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.	<ol style="list-style-type: none"> 1. Disconnect from the telephone line and retest.
1203-xx	Modem external termination test failed.	<ol style="list-style-type: none"> 2. Check the telephone number.
1204-xx	Modem auto originate test failed.	<ol style="list-style-type: none"> 3. Check the modem line.
1205-xx	Modem auto answer test failed.	<ol style="list-style-type: none"> 4. Replace the modem and retest.
1210-xx	Modem direct connect test failed.	

Pointing Device

**Table 4-20
Pointing Device Test Error Codes**

Error Code	Description	Recommended Action
8601-xx	Mouse test failed.	The following steps apply to 8601-xx and 8602-xx error codes:
8602-xx	Interface test failed.	<ol style="list-style-type: none"> 1. Replace with a working pointing device and retest. 2. Replace the system board and retest.

DVD-ROM and CD-ROM Drive (IDE)

Table 4-21
DVD-ROM and CD-ROM Drive (IDE)

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

Tape Drive

Table 4-22
Tape Drive Test Error Codes

Error Code	Description	Recommended Action
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 and terminations on the tape drive. 3. Check and/or replace the signal cable and retest. 4. Replace the tape drive and retest. 5. 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.	

Video

**Table 4-23
Video Test Error Codes**

Error Code	Description	Recommended Action
501-xx	Graphics 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 graphics controller and retest.
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.	The following error codes apply to error codes 2402-xx through 2409-xx: 1. Run the Diagnostics utilities. 2. Replace the monitor and retest. 3. Replace the graphics controller and retest.
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.	

continued

Table 4-23
Video Test Error Codes *continued*

Error Code	Description	Recommended Action
2410-xx	Video 640 × 200 mode test failed.	The following error codes apply to error codes 2410-xx through 2456-xx:
2411-xx	Video screen memory page test failed.	1. Run the Diagnostics utilities.
2412-xx	Video gray scale test failed.	2. Replace the monitor and retest.
2414-xx	Video white screen test failed.	3. Replace the graphics controller and retest.
2416-xx	Video noise pattern test failed.	
2418-xx	ECG/VGC memory test failed.	
2419-xx	ECG/VGC ROM checksum test failed.	
2421-xx	ECG/VGC 640 × 200 graphics mode test failed.	
2422-xx	ECG/VGC 640 × 350 16 color set test failed.	
2423-xx	ECG/VGC 640 × 350 64 color set test failed.	
2424-xx	ECG/VGC monochrome text mode test failed.	
2425-xx	ECG/VGC monochrome graphics mode test failed.	
2431-xx	640 × 480 graphics test failed.	
2432-xx	320 × 200 graphics (256-color mode) test failed.	
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 Bit BLT test failed.	The following steps apply to error codes 2458-xx through 2480-xx:
2468-xx	Advanced VGA DAC test failed.	1. Replace the graphics controller and retest.
2477-xx	Advanced VGA data path test failed.	2. Replace the system board and retest.
2478-xx	Advanced VGA Bit BLT test failed.	
2480-xx	Advanced VGA Linedraw test failed.	

Audio

**Table 4-24
Audio Test Error Codes**

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

Network Interface

**Table 4-25
Network Interface Test Error Codes**

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

SCSI Error Codes

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

- Hard drives
- CD-ROM drives
- Tape 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 Table 4-26, Table 4-27, and Table 4-28.

- AA (Table 4-26) identifies the drive type being tested.
- BB (Table 4-27) identifies the type of test.
- CC (Table 4-28) identifies the exact error received.

For example, if you received a diagnostic error code of 6523-05, you would look at:

- Table 4-26 to identify the meaning of the first two numbers, 65. This indicates a hard drive problem.
- Table 4-27 to identify the meaning of the second two numbers, 23. This refers to a random read.
- Table 4-28 to identify the meaning of the last two numbers, 05. This indicates a seek failure.

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.

Table 4-26
SCSI Device Names

Error Code	Device
65XX-XX	Hard Drive
66XX-XX	CD-ROM Drive
67XX-XX	Tape Drive

Table 4-27
SCSI Test Names

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

Table 4-28
SCSI Test Error Codes

Error Code	Description	Recommended Action
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	<ol style="list-style-type: none"> 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	<ol style="list-style-type: none"> 1. Back up data and perform Surface Analysis to reallocate defect. 2. Replace drive.

continued

Table 4-28
SCSI Test Error Codes *continued*

Error Code	Description	Recommended Action
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.
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.

continued

Table 4-28
SCSI Test Error Codes *continued*

Error Code	Description	Recommended Action
XXXX-90	Fan failure	<ol style="list-style-type: none"> 1. Ensure that fan(s) is connected. 2. Replace nonfunctional fan(s).
XXXX-91	Over Temperature	<ol style="list-style-type: none"> 1. Ensure proper airflow. 2. Perform required maintenance and cleaning.
XXXX-99	Autoloader reported tapes not loaded properly	<ol style="list-style-type: none"> 1. Install tape(s) in autoloader tape drive according to test instructions. 2. Change autoloader magazine.

Upgrading the ROM

If the Compaq Professional Workstation AP550 does not have a Setup Password enabled, the ROM is not write-protected, and unauthorized updates can occur. If you need or want to upgrade your system ROM, you can:

- Order the Compaq Support Software CD Kit.
- Download the latest ROMPaq images from the Compaq website: www.compaq.com

IMPORTANT: To ensure maximum ROM protection, establish a Setup Password. A Setup Password prevents unauthorized ROM upgrades.

Local ROM Flash

To upgrade the ROM:

1. Insert the ROMPaq diskette in the diskette drive and turn on the workstation.



CAUTION: To guard against unauthorized updates of the Flash ROM or the System BIOS, the Setup Password **must** be set. See Chapter 5 for procedures on establishing a Setup Password.

2. If prompted, enter the Setup Password.

NOTE: If the Setup Password is entered correctly, the ROMPaq utility will take over and run the ROM upgrade. If the Setup Password is entered incorrectly, the procedure will terminate and no changes will be made to the ROM.

3. When the utility finishes upgrading the ROM, remove the diskette from the diskette drive, and restart the workstation.

IMPORTANT: Do not turn off the power to your workstation until the ROMPaq utility has completed the upgrade process.

Remote ROM Flash

The Compaq Professional Workstation AP550 offers Remote ROM upgrade capability. The following software is available for downloading from the Compaq website: www.compaq.com

- Remote Management Setup (allows upgrading of the system ROM remotely)
 - Remote ROM Flash
 - Remote Security Settings
 - Remote Wakeup
- ROM Image for Remote ROM Flash (included in the CAB file for flashing the ROM remotely)
- Remote Services Driver (provides support for remote ROM flash on the target unit)

NOTE: Use of Remote ROM Upgrade requires an established Setup Password.

FailSafe Boot Block ROM

The FailSafe Boot Block ROM allows for system recovery in the unlikely event of a system ROM upgrade failure, for example, if a power failure occurs during a system ROM upgrade. The Boot Block ROM checks to validate the system ROM each time power to the system is turned on.

- If the system ROM is valid, the system starts normally.
- If the system ROM fails the validation check, the FailSafe Boot Block ROM provides enough support to start the system from a ROMPaq diskette that will program the system ROM with a valid image. The Flash Recovery diskette is a SoftPaq downloadable from the Compaq website at: www.compaq.com

IMPORTANT: The workstation ships with the Diskette Boot feature enabled. If the Diskette Boot feature is disabled, the FailSafe Boot Block ROM will override the disabled feature to accommodate a system ROM recovery in the event a system ROM failure occurs.

Because there is no video or hard drive support from the Boot Block ROM, the keyboard lights communicate information. When the Boot Block detects an invalid system ROM, the system sounds a series of beeps (one long and three short) and flashes the three keyboard lights.

To recover the system after hearing the FailSafe Boot Block beeps:

1. Remove any diskettes from the diskette drive and turn off the power.
2. Insert the ROMPaq diskette into the diskette drive.
3. Turn on power to the system.

If a Setup Password has been established, the Caps Lock light will turn on.

4. Enter the Setup Password.

When the system successfully starts from the diskette and reprograms the ROM, the following three keyboard lights will turn on.

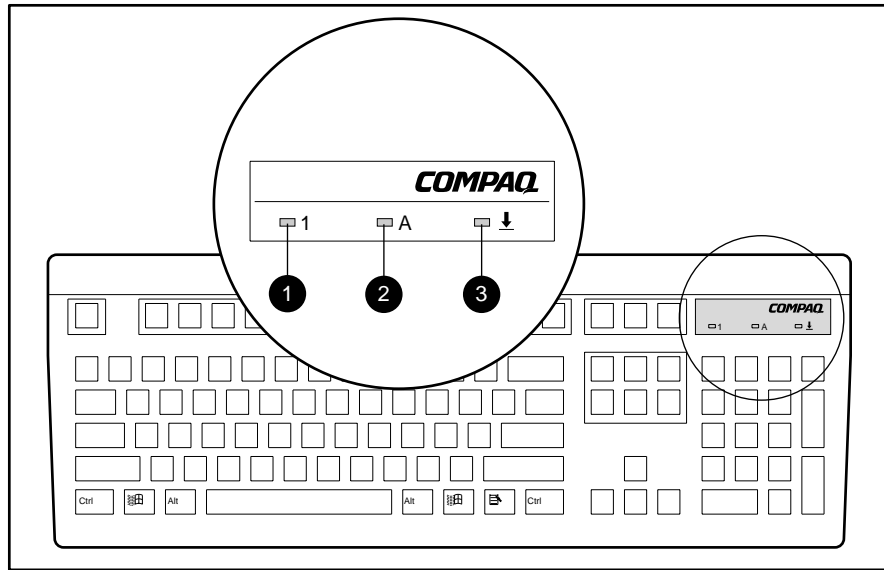


Figure 4-2. Identifying keyboard lights

The following table lists the various keyboard light combinations, as well as the meaning and action associated with each combination.

NOTE: Your keyboard may look different from the one pictured.

**Table 4-29
Keyboard Lights**

Num Lock ①	Caps Lock ②	Scroll Lock ③	Meaning and Required Action
OFF	ON	OFF	System requires Setup Password. Enter the Setup Password. The light remains turned on until you enter a valid Setup Password.
ON	OFF	OFF	System could not start from diskette because the Flash Recovery diskette is not present, is bad, or the drive is not ready. Insert a valid Flash Recovery diskette, turn the power off, then turn the power on.
OFF	OFF	ON	ROM upgrade failed. Try another ROMPaq diskette. If the light remains turned on, contact Compaq customer support.
ON	ON	ON	ROM upgrade successfully completed. Turn the power off and then back on to resume normal system operation.

Fault Management

Fault Management features combine innovative hardware and software technology to prevent the loss of critical data and minimize unplanned downtime.

When a fault occurs, the workstation displays a Local Alert message containing a description of the fault and any recommended actions. You can then view current system health by using Compaq Diagnostics for Windows NT. If the workstation is connected to a network managed by Compaq Insight Manager or other Simple Network Management Protocol (SNMP)-based management products (for example, HP OpenView or IBM Tivoli TME10 NetView), the workstation also sends a fault notice to the network management application.

SMART III Hard Drive Fault Prediction

SMART III extends SMART II capability. A SMART III hard drive will monitor and report on its own health, in addition to fixing problems **before** they become failures that result in data losses. The SMART III drive periodically executes read scans of the entire disk. These read scans take place during periods of inactivity. During the scan, the disk drive determines the “health” of each data sector and moves data from questionable areas of the disk to known good areas of the disk. To determine the “health” of the data during the scan, the drive uses sophisticated methods of Cyclic Redundancy Codes (CRC) and Error Checking and Correcting (ECC) codes to flag potentially bad areas of the disk. With today’s multi-gigabyte hard drives, there are areas of the disk that are not used (read or write) by applications for long periods of time. The SMART III technology patrols the entire disk so that when unused or infrequently used parts of the disk are called upon, the data will be available.

Ultra ATA Integrity Monitoring

Ultra ATA Integrity Monitoring monitors the reliability of data as it is transferred between an Ultra ATA hard drive and the system’s core logic. If the workstation detects an abnormal number of transmission errors, the screen displays a Local Alert message with recommended actions. If the workstation is on a network, an alert is also sent over the network to the system administrator.

Compaq Insight Manager

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

NOTE: Compaq Insight Manager requires the installation of Compaq Management Agents for Workstations on the Compaq Professional Workstation AP550. The Agents are preinstalled on the workstation and are provided on the Compaq Restore CD. Before installing the Compaq Management Agents for Workstations, be sure to install Simple Network Management Protocol (SNMP) service from the Microsoft Windows NT 4.0 CD and the TCP/IP protocol. Refer to the installation instructions in the Compaq Restore CD provided with the workstation. For more detailed instructions about setting up SNMP networking, refer to “Start Here” in the *Microsoft Windows NT Workstation Installation Guide* provided with your workstation.

Compaq Insight Manager provides the following features to help you support the Compaq Professional Workstation AP550:

- Remote alerts for Pentium Pro, Pentium II, Pentium III, and Pentium II Xeon processor prefailure; ECC RIMM memory single-bit error prefailure; and SCSI disk drive prefailure notification
- Alerts logged to the local Windows NT Event Log (logged by the Compaq Management Agents for Workstations)
- Asset and configuration information accessed by the Compaq Insight Manager console for remote tracking of workstation assets and configurations
- Print configuration (similar to INSPECT) reports at the Compaq Insight Manager console for remote workstations
- Environment alerts for workstations with a temperature out of the normal range

Compaq Management Agents for Workstations

The Compaq Management Agents for Workstations provides local alerting, Desktop Management Interface (DMI), Simple Network Management Protocol (SNMP), and DMI Web agents for Compaq Professional Workstations that support Intelligent Manageability running Windows NT.

Local alerting notifies the user if the system temperature has been exceeded under normal operating conditions or if an imminent drive failure has been detected. SNMP agents allow the system to be managed by SNMP-compliant management applications such as Compaq Insight Manager. DMI support allows the computer to be managed by DMI-compliant management applications. DMI Web agents allow the computer to be managed both locally and remotely by a Web browser (such as Internet Explorer 4.01 or later).

Compaq Restore CD

The Compaq Restore CD is a set of Compaq-specific drivers and Compaq value added software that enables the workstation to operate at optimum performance. Updates are available on the Compaq website at www.compaq.com and through a subscription to the Compaq Support Software CD Kit.

Updates for the restore CD are not available on the web or through subscription. It only ships with the unit. There is a Support Software CD that is available through paid subscription but it is a separate product.

The Compaq Restore CD performs a complete restore. That is, every time the Restore CD is used the system will be erased and then will restore the entire operation system, drivers, and Compaq value added software. The initial release of the Compaq Restore CD included with the workstation contains the following support software drivers:

- Network controller driver
- SCSI controller driver
- Graphics display driver
- Audio drivers

Compaq Diagnostics for Windows NT

To use Compaq Diagnostics for Windows NT:

1. Double-click the Compaq Diagnostics for Windows NT icon located in the Control Panel.

The screen displays an overview of the computer hardware and software.

2. For specific hardware and software information, select a category from the Category menu or from the toolbar. As you move your cursor over the toolbar icons, the corresponding category names appear near the cursor.
3. Click *More* in the Information Level box to display additional detailed information in a selected category.

Categories or items of information displayed by Compaq Diagnostics for Windows NT are similar to but may vary slightly from the information presented in the View System Information (INSPECT).

4. Review, print, and, if necessary, discuss this information with your authorized Compaq Reseller or service provider.
5. Click File, then select Print to print the information.
6. Select one of the following options:
 - Detailed Report (All Categories)
 - Summary Report (All Categories)
 - Current Category
7. Click OK to print the report you selected.
8. Click File, Exit to exit Compaq Diagnostics for Windows NT.

System Security

Security Features

The Compaq Professional Workstation AP550 is equipped with features that secure valuable components and system integrity. The following table identifies and explains the security features.

Table 5-1
Security Features

Feature	Purpose	How It Is Established
Setup Password	Allows configuration to be changed.	Computer Setup menu.
Power-On Password	Prevents use of the workstation when the workstation is restarted unless the Power-On password is entered.	Computer Setup menu.

continued

Table 5-1
Security Features *continued*

Feature	Purpose	How It Is Established
Serial or Parallel Interface Control	Prevents transfer of data through the integrated serial or parallel interface.	Computer Setup menu.
Removable Media Boot Control	Prevents booting from the removable media drives.	Computer Setup menu.
Removable Media Write Control	Prevents writing to the removable media drives.	Computer Setup menu.
Cable Lock Provision	Inhibits access to the interior of the workstation to prevent unwanted configuration changes or component removal. Can also be used to secure the workstation to a fixed object.	Install a padlock with the security bracket to inhibit access to the interior of the workstation; add a cable lock to secure the workstation to a fixed object.

IMPORTANT: Always set different passwords for the various types of passwords like the Power-On Password, the Setup Password, and the Windows NT password.

Setup Password

The Setup Password prevents unauthorized changes to the configuration of the workstation.

Establishing a Setup Password

1. Turn on the workstation.
2. When the **F10 = Setup** message appears in the lower-right corner of the screen, press **F10**.

NOTE: You have approximately 30 seconds to press **F10**. If you do not press **F10** while the message is displayed, you must restart the workstation again to access the utility.

3. From the main menu, select Security, then select Setup Password, and follow the instructions on the screen.
4. Save the configuration and exit the utility.
5. Restart the workstation.

Establishing a Power-On Password


1. Turn on the workstation.
2. When the **F10 = Setup** message appears in the lower-right corner of the screen, press **F10**.


NOTE: You have approximately 30 seconds to press **F10**. If you do not press **F10** while the message is displayed, you must restart the workstation to access the utility.

3. From the main menu, select Security, then Power-On Password and follow the instructions on the screen.
4. Save the configuration and exit the utility.
5. Restart the workstation.


Entering the Setup or Power-On Password

To enter the Setup or Power-On Password:

1. Turn on the workstation.
2. When the key icon () appears, type your current password carefully, then press **Enter**.

NOTE: 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 will be allowed to view the current computer settings, but you will not be able to edit or change the settings. If you only want to view the current computer settings, press **Enter**.


Changing a Setup or Power-On Password

1. Turn on the workstation.
2. To change the Setup Password, run Computer Setup.
3. To change the Power-On Password, when the key icon () appears, type your current password, then a slash (/) or alternate delimiter character, your new password, another slash(/) or alternate delimiter character, and your new password:
current password / new password / new password

NOTE: Type carefully; for security reasons, the characters you type do not appear on the screen. See the “National Keyboard Delimiter Characters” section in this chapter for information about the alternate delimiter characters.

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

Deleting a Setup or Power-On Password

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

NOTE: See the “National Keyboard Delimiter Characters” section in this chapter for information about alternate delimiter characters.

Clearing a Setup or Power-On Password

If you forget the Setup or Power-On Password, you cannot use the Computer Setup utility to change the configuration settings. You may view the current settings, but you may not change them unless you know the Setup or Power-On Password.

To clear the Setup or Power-On Password:

1. Turn off the workstation.



CAUTION: Before removing the workstation access panel, ensure that the workstation is turned off, all cables are disconnected from the back of the workstation, and the power cord is disconnected from the grounded AC outlet.

2. Remove the workstation access panel.
3. Remove the jumper at E49 Clear Password header (clears/disables the power on and setup password features) on the system board.

NOTE: Keep the jumper. If you want to reenble the power-on and setup password features, the jumper will have to be reinstalled on E49 Clear Password header.

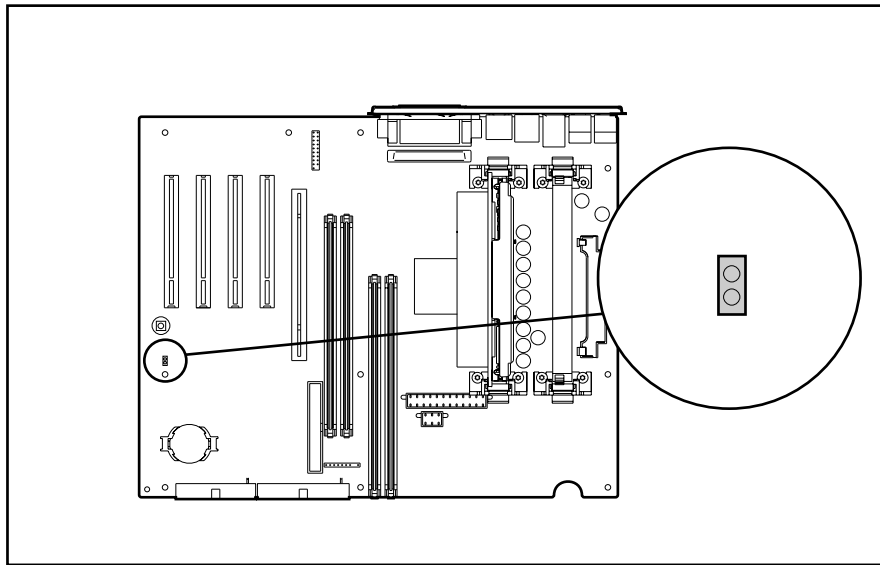


Figure 5-1. Locating the E49 Clear Password header (power on and password disabled)

IMPORTANT: To reenble the Power-On password feature, reinstall the jumper (password disabled jumper).

4. Reassemble and restart the workstation.
5. Turn on the workstation, your password will be cleared.
6. Establish a new Setup and Power-On Password, if desired.

IMPORTANT: Clearing the Power-On password will also clear the setup password. Be sure to reestablish your setup password after clearing the Power-On password.

Enabling a Setup or Power-On Password

To enable the Setup or Power-on Password features:

1. Turn off the workstation.



CAUTION: Before removing the workstation access panel, ensure that the workstation is turned off, all cables are disconnected from the back of the workstation, and the power cord is disconnected from the grounded AC outlet.

2. Remove the workstation access panel.
3. Install the jumper on the E49 Clear Password header on the system board.
4. Reassemble and restart the workstation.
5. Turn on the workstation, and establish a Setup or Power-on Password by following the instructions in the “Setup Password” section located in this chapter.

Windows NT Workstation Password

To establish a password in Windows NT Workstation:

1. Click Start, Programs, Administrative Tools.
2. Click User Manager, then follow the instructions to set a new password for “new user.”

National Keyboard Delimiter Characters

Each keyboard is designed to meet country-specific requirements. The syntax and keys you use for changing or deleting a password depend on the keyboard that came with the workstation. The following table identifies the correct delimiter character for each keyboard.

Table 5-2
National Keyboard Delimiter Characters

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

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

Advanced Security Management

You can access the following security features through the Computer Setup menu:

- Storage
 - Disable removable media boot ability
 - Disable removable media write ability
 - Disable serial port
 - Disable parallel port
- Security
 - QuickLock
 - Cable lock provision

Reenabling Diskette Boot or Diskette Write

The workstation ships with the Diskette Boot or Diskette Write features enabled. If a user has disabled the factory settings that permit the workstation to boot from a diskette or to prohibit a user from saving data to a diskette, you may need to reenable the features to service the workstation. To enable Diskette Boot or Diskette Write:

1. Turn on the workstation.
2. When the **F10 = Setup** message appears in the lower-right corner of the screen, press **F10**.

NOTE: You have approximately 30 seconds to press **F10**. If you do not press **F10** during this time, you must turn the workstation off, then on again to access the utility.

3. From the main menu, select Storage, then select Removable Media.
4. Press the up/down arrow keys to select the function you want to enable.
5. Press the left/right arrow keys to select Enable.
6. Save the configuration and exit the utility.
7. Restart the workstation.

IMPORTANT: If you disable the diskette drive, the FailSafe Boot Block ROM will ignore the disabled component to accommodate a system ROM recovery in the event a system ROM failure occurs.

Reenabling a Serial Port or Parallel Port

The workstation ships with the serial and parallel ports enabled. If a user has disabled either of these ports, you may need to re-enable them to service the workstation. To reenable the ports:

1. Turn on the workstation.
2. When the **F10 = Setup** message appears in the lower-right corner of the screen, press **F10**.

NOTE: You have approximately 30 seconds to press **F10**. If you do not press **F10** during this time, you must turn the workstation off, then on again to access the utility.

3. From the main menu, select Advanced, then select Onboard Devices.
4. Press the up/down arrow keys to select the Serial or Parallel port you want to reenable.
5. Press the left/right arrow keys to select the desired port resources.
6. Save the configuration and exit the utility.
7. Restart the workstation.

Cable Lock Provision

The workstation is equipped with a cable lock provision to secure the unit to a fixed object and/or inhibit access to the interior of the unit. If a cable lock or padlock is installed, you must remove it before servicing the workstation. See “Cable Lock” in Chapter 3, Removal and Replacement Procedures, for removal procedures.

Chapter **6**

Jumper and Switch Information

Overview

This chapter provides jumper and switch information for the system board and disk drives for the Compaq Professional Workstation AP550. The components on the system board, which is Pentium II-based, are illustrated in the following figure. See the corresponding table for component names.

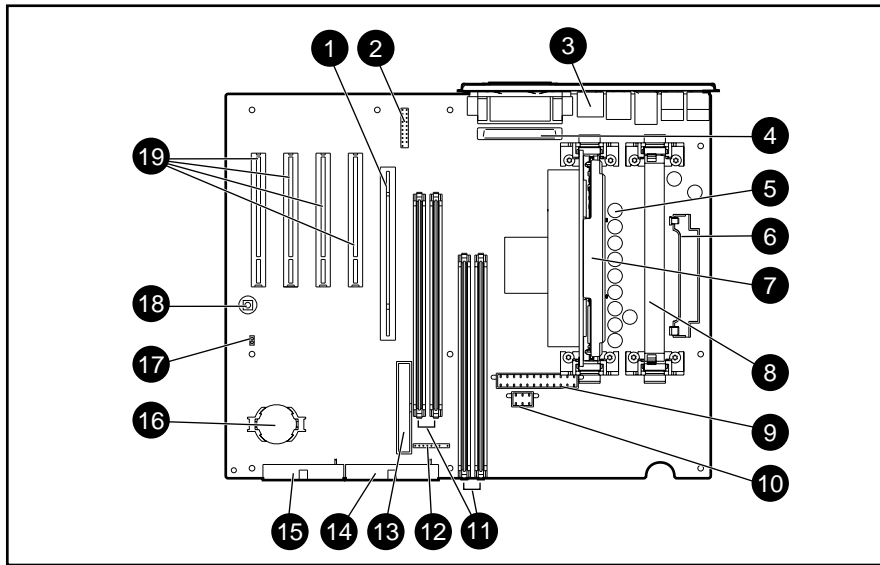


Figure 6-1. Overview of system board components

**Table 6-1
System Board Components**

Reference	Component
1	Accelerated Graphics Port (AGP) 4X Pro slot
2	Serial port cable connector
3	Wake-on-LAN connector (RJ45)
4	LVD/SE connector (SCSI)
5	Embedded processor power module connector (VRM)
6	Processor power module connector for secondary processor
7	Primary processor slot
8	Secondary processor slot (terminator board)
9	Power connector
10	Power connector
11	Direct Rambus RIMM sockets 1–4
12	Power switch and power LED connector
13	Secondary Ultra ATA/66 IDE connector
14	Primary Ultra ATA/66 IDE connector
15	Diskette drive connector
16	Battery
17	E49 Clear Password header (password disabled jumper)
18	SW50 Clear CMOS switch
19	PCI expansion slots

Mass Storage

The Compaq Professional Workstation AP550 supports Ultra3 SCSI, Wide Ultra2 SCSI, and Ultra ATA hard drives. The specifications included below are the standard hard drive configurations shipped with the workstation. For specifications on other hard drives, refer to the *Service Quick Reference Guide*.

9.1-GB Ultra3 SCSI Hard Drive

Drive Size: 9.1 GB

Model: DDRS-39130

SCSI ID Settings

SCSI ID	Bit 2	Bit 1	Bit 0
0	○ ○	○ ○	○ ○
1	○ ○	○ ○	■ ■
2	○ ○	■ ■	○ ○
3	○ ○	■ ■	■ ■
4	■ ■	○ ○	○ ○
5	■ ■	○ ○	■ ■
6	■ ■	■ ■	○ ○

Key ○ Jumper NOT Installed
 ■ Jumper Installed

Default Settings

Signal	Description	Jumper
S	Start Unit Command Enabled	○ ○
P	Parity Enabled	○ ○
W	Write Protect Disabled	n/a
X	Synch Data Transfer Enabled	n/a

Key ○ Jumper NOT Installed
 ■ Jumper Installed

NOTES:

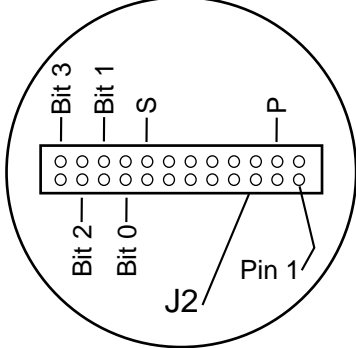
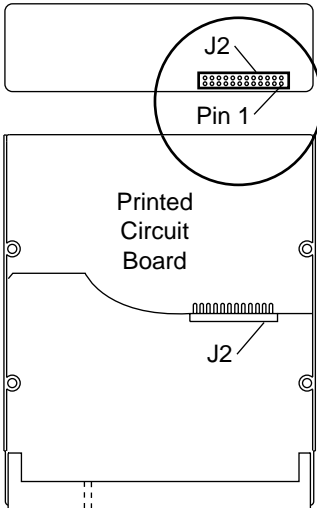
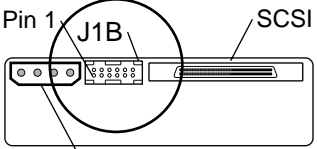
- All jumper and switch settings are shown in the factory default setting, including those not labeled.
- Termination is disabled/removed.

NOTE:
 This drive is intended for non-pluggable applications only. Migration to a Hot-Pluggable Drive Tray is not supported.

Figure 6-2. Locating the jumper positions for the 9.1-GB hard drive (DDRS-39130)

18-GB Ultra3 SCSI Hard Drive

Drive Size: 18-GB
Model: Ultra3 SCSI

SCSI ID Settings

SCSI ID	Bit 2	Bit 1	Bit 0
0	○	○	○
1	○	○	●
2	○	●	○
3	○	●	●
4	●	○	○
5	●	○	●
6	●	●	○

Key ○ Jumper NOT Installed
● Jumper Installed

Default Settings

Signal	Description	Jumper
S	Start Unit Command Enabled	○
P	Parity Enabled	○
W	Write Protect Disabled	n/a
X	Synch Data Transfer Enabled	n/a

Key ○ Jumper NOT Installed
● Jumper Installed

NOTES:

1. All jumper and switch settings are shown in the factory default setting, including those not labeled.
2. Termination is disabled/removed.

Figure 6-3. Locating the jumper positions for the 18-GB hard drive (Ultra3 SCSI)

NOTE:
This drive is intended for non-pluggable applications only. Migration to a Hot-Pluggable Drive Tray is not supported.

CD-ROM or DVD-ROM Drive

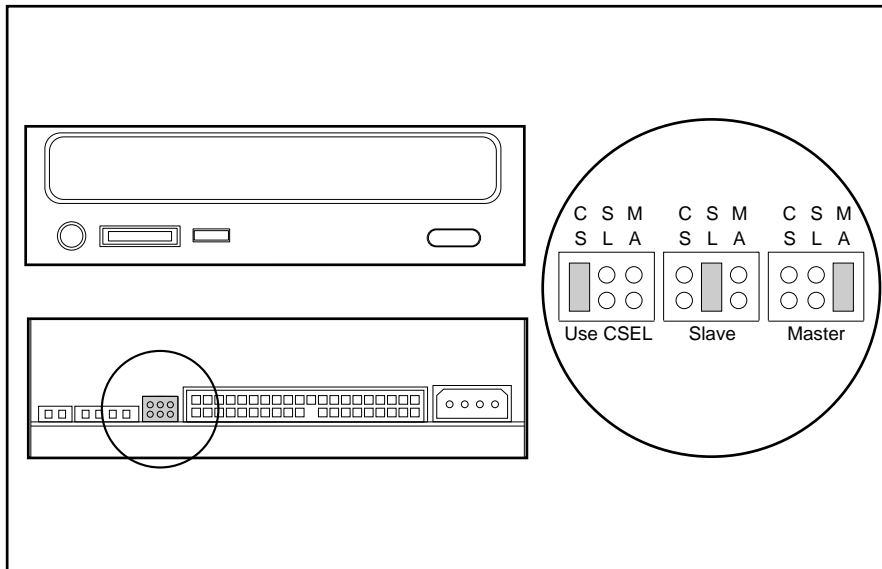
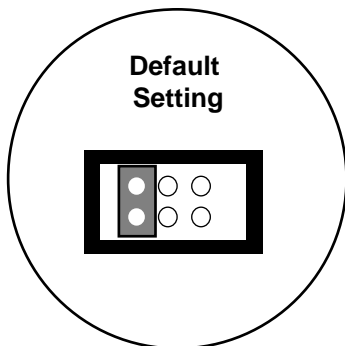


Figure 6-4. Locating the jumper positions for the 40X Max CD-ROM drive (IDE) or the DVD-ROM drive

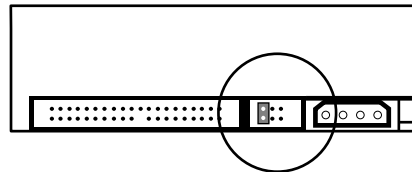
Zip Drive

The jumper positions for the 100- and 250-MB Zip drives are identical.

Drive Size: 100 MB **Model: Zip Drive**



Jumper Setting for Cable Select



Note: After changing the jumper settings, reboot the computer so the new address will be recognized.

IDE Settings

Configuration	Pin 1	Pin 2	Pin 3
Device 0 (Master)	○	○	●
Device 1 (Slave)	○	○	○
Cable Select (Default)	●	○	○

Key ○ Jumper NOT Installed
 ● Jumper Installed

Figure 6-5. Locating the jumper position for the 100- and 250-MB Zip drive

Physical and Operating Specifications

Overview

This chapter provides operating and performance specifications for the following Compaq Professional Workstation AP550 hardware:

- System unit
- Power supply
- Diskette drive
- Zip drive
- CD-ROM drive
- DVD-ROM drive
- Hard drives
- Audio system
- Keyboard
- Mouse (3-button)
- Graphics controller
- Network controller

System Unit

**Table 7-1
System Specifications**

Component	U. S.	Metric
Minitower Dimensions		
Height	17.65 inch	44.83 cm
Width	6.6 inch	16.76 cm
Depth	17.36 inch	44.09 cm
Desktop Dimensions		
Height	6.6 inch	16.76 cm
Width	17.65 inch	44.83 cm
Depth	17.36 inch	44.09 cm
Approximate Weight	26 lb	12kg
Power Supply	Low Range	High Range
Rated Input Voltage	100V to 120V	200V to 240V
Rated Input Frequency	50Hz to 60Hz	50Hz to 60 Hz
Environmental Requirements		
Temperature		
Operating	50° to 95°F	10° to 35°C
Shipping	4° to 140°F	-15° to 60°C
Humidity (noncondensing)		
Operating	20% to 80%	
Nonoperating	10% to 90%	
Maximum Altitude (unpressurized)		
Operating	10,000 ft	3048 m
Nonoperating	30,000 ft	9,144 m
Power Output	375-W	375-W
Rated Input Current (maximum) 145W 200W	8A	4A
Input Power	650W	650W
Heat Dissipation	2200	2200

Table 7-2
System Interrupts

Hardware IRQ	System Function
IRQ 0	System timer
IRQ 1	Keyboard
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	Assigned to ACPI unless ACPI is disabled in F10 setup.
IRQ 10	Unused
IRQ 11	PCI interrupts
IRQ 12	Mouse
IRQ 13	Non-catastrophic errors/CPU error
IRQ 14	IDE controller
IRQ 15	CD-ROM

Table 7-3
System Direct Memory Access (DMA)

Hardware DMA	System Function
DMA 0	Business Audio (default; alternate = DMA0, none)
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
DMA 5	Unused
DMA 6	Unused
DMA 7	Unused

Table 7-4
System I/O

I/O Address (Hex)	System Function (Shipping Configuration)
000 - 00F	DMA controller # 1
010 - 01F	Unused
020 - 021	Interrupt controller # 1
02E - 02F	Super I/O index/data registers
040 - 043	Counter/Timer
044-04D	Unused
04E - 04F	Super I/O index/data register alternate
050-05F	Unused
060	Keyboard controller
061	Port B
062 - 063	Unused
064	Keyboard controller
065 - 06F	Unused
070 - 071	NMI enable/real-time clock
072-077	CMOS storage
072 - 07F	Unused
080 - 08F	DMA page registers
090 - 091	Unused

continued

Table 7-4
System I/O *continued*

I/O Address (Hex)	System Function (Shipping Configuration)
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; alternate = 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
202 - 21F	Unused
220 - 22F	Business Audio (default; alternate = 230h, 240h, 250h)
230 - 277	Unused
238 - 2EF	Reserved serial port
278 - 27F	Reserved parallel port
280 - 2E7	Unused

continued

Table 7-4
System I/O *continued*

I/O Address (Hex)	System Function (Shipping Configuration)
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 - OPAL
38C - 397	Unused
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 7-5
System Memory Map**

Memory Address	Size	System Function
FFFFFFFFh to FFF80000h	512 KB	System ROM
FEEFFFFFFh to FEE00000h	1024 KB	Local APIC address range
FECFFFFFFh to FEC00000h	1024 KB	I/O APIC address range
FEBFFFFFFh to TOM (Top of Memory)	Depends on memory installed	PCI memory expansion board
TOM (Top of Memory) – 1 to TOM – 64 KB	64 KB (However, USB buffer not applicable to all system configurations.)	USB memory buffers
TOM (Top of Memory) – 64 KB – 1 to 01000000h	Depends on memory installed	HOST memory expansion
00FFFFFFh to 00100000h	15,360 KB	HOST memory expansion
000FFFFFFh to 000F0000h	64 KB	System ROM
000EFFFFFFh to 000E0000h	64 KB	Expansion system ROM
000DFFFFFFh to 000C0000h	128 KB	Option ROM
000BFFFFFFh to 000A0000h	128 KB	Video RAM
0009FFFFFFh to 00000000h	640 KB	Base memory

1 KB = 1024 bytes. Any memory above host memory is non-cacheable.

375-W Power Supply

Table 7-6
375-W Power Supply Specifications

Input specifications	Low Range	High Range
Rated input voltage	100 VAC to 120 VAC	200 VAC to 240 VAC
Rated input current	8 A	4 A
Rated input frequency	50 to 60 Hz	50 to 60 Hz
General specifications		
Input power	650W	650W
Holdup time	16 ms from zero crossing at 115 VAC	16 ms from zero crossing at 230 VAC
Full output rating	To 40°C and 5,000 ft To 32°C and 10,000 ft (derate linearly)	
Minimum load	1.5A on + 5V and +3.3V outputs; 0.2A on +12V	
Ambient temperature range		
Operating	50° to 104°F	10° to 40°C
Storage	-40° to 149°F	-40° to 65°C
Safety standard	UL 1950 3 rd edition; CSA 22.2 No. 950 3 rd edition, EN 60 950	
Input transient susceptibility		
Surge-tolerant power supply (superimposed on AC line)	2000V surge per IEC1000-4-5 with no abnormal operation	

Diskette Drive

Table 7-7
1.44-MB Diskette Drive

Size and Capacity	
Size (inch)	3.5
High density (MB)	1.44
Low density (KB)	720
Light	Green
Height	One-third
Bytes per sector	512
Sectors per track	
High density	18
Low density	9
Tracks per side	
High density	80
Low density	80
Read/write heads	2
Average access time (ms)	
Track-to-track (high/low)	3/6 ms
Average (high/low)	94/173 ms
Latency average (ms)	100 ms
Data Transfer Rate (Mbit/s)	
High/low (to/from media)	500/250 Kb/s

Zip Drive

Table 7-8
100-MB Zip Drive

Disk	
Data transfer rate	
Sustained	Up to 11.2 Mbits/sec
Burst	Up to 88.9 Mbits/sec
Seek time (includes settling time)*	
Minimum	4 ms
Average	29 ms
Maximum	55 ms
Latency (average rotational delay)	
Spindle speed	2941 rpm
Track-to-track access time**	5.0 ms
Average head switch time#	11.0 ms
Head reload time †	200.0 ms
Start-stop time (average) ‡	
Start	3 seconds
Stop	2 seconds

* Seek time does not include latency or head switch time. Average seek time is the average time of a random seek.

** Time from end of last sector on a track to start of next sequential sector on the next track.

Time to switch track following on one data surface and establish track following on other data surface. The average head/switch time is measured over 1,000 accesses (head switches occur for only one-half of random accesses).

† Time required for the head to establish track following from the parked position.

‡ Start time is time from disk insertion to time drive is ready to process commands. The typical spin up time for a cartridge that has spun down without ejecting is three seconds. If the drive has difficulty spinning up the motor or reading the z-tracks, it will automatically retry the operation. Software that is waiting for the drive to spin up should set timeouts to no less than 15 seconds to allow time for all retries. Stop time is the elapsed time between pushing the cartridge eject button and the time the solenoid releases the disk.

Table 7-9
100-MB Zip Drive Cartridge Characteristics

Disk	
Spares capacity	1.6 MB
Form factor width	98.0 mm (3.875 inch)
Weight	49.6 grams (1.75 oz)
Drop height/shock	3.0 meters
Insertion/removal cycles	2,000 minimum
Estimated shelf life	10 years

Table 7-10
250-MB Zip Drive

Disk	
Data transfer rate	
Maximum Sustained	
250-MB Cartridge	2.4 MB/sec
100-MB Cartridge	
Read	1.4 MB/sec
Write	0.25 MB/sec
Burst (both cartridges)	11.11 MB/sec
Seek time (includes settling time)*	
Minimum	4 ms
Average	29 ms
Maximum	56 ms
Latency (average rotational delay)	
Spindle speed	2941 rpm
Track-to-track access time**	5 ms
Average head switch time#	11 ms
Head reload time †	700 ms
Start-stop time (average) ‡	
Start	5 seconds
Stop	2 seconds

* Seek time does not include latency or head switch time. Average seek time is the average time of a random seek.

** Time from end of last sector on a track to start of next sequential sector on the next track.

Time to switch track following on one data surface and establish track following on other data surface. The average head/switch time is measured over 1,000 accesses (head switches occur for only one-half of random accesses).

† Time required for the head to establish track following from the parked position.

‡ Start time is time from disk insertion to time drive is ready to process commands. The typical spin up time for a cartridge that has spun down without ejecting is three seconds. If the drive has difficulty spinning up the motor or reading the z-tracks, it will automatically retry the operation. Software that is waiting for the drive to spin up should set timeouts to no less than 15 seconds to allow time for all retries. Stop time is the elapsed time between pushing the cartridge eject button and the time the solenoid releases the disk.

Table 7-11
250-MB Drive Zip Cartridge Characteristics

Disk	
Spares capacity	5.2 MB
Form factor width	98.0 mm (3.875 inch)
Weight (typical)	43 grams (1.5 oz)
Insertion/removal cycles	2,000 minimum
Estimated shelf life*	10 years
Environmental Limits	
Maximum operating temperature †	51.5°C
Operating humidity (noncondensing)	20 to 80% RH
Shipping temperature	-40° to 125°F (-40° to 51.5°C)

* Extrapolated from previous product data.

† Operating temperature limits shall not be exceeded inside the cartridge.

CD-ROM Drive

Table 7-12
40X Max Tray-Load CD-ROM Drive (IDE)

Disk	
Diameter	12 cm
Capacity	
Mode 1	540 MB
Mode 2	650 MB
Disk thickness	1.2 mm
Track pitch	1.6 μ m
Performance	
Access Time	
Random seek	<100 ms
Full stroke seek	<150 ms
Data transfer rate	
Sustained	150 KB/s
Burst	2550 to 6000 KB/s (17x to 40x variable)
Bus rate	4.0 MB/s
Cache/buffer	128 KB/s
Start-up time	
Single	<7 s
Multisession	<30 s
Stop-time	< 4 s
Error rates	
Soft error	10^{-9}
Hard error	10^{-12}
Seek error	10^{-6}
Dimensions	
Chassis	
Height	41.3 mm
Width	146.0 mm
Depth	203.0 mm
Weight	1200 g
Bezel	
Height	148.0 mm (+/- 0.5 mm)
Width	42.0 mm (+/- 0.5 mm)
Depth	5.0 mm (+/- 0.5 mm)

continued

Table 7-12
40X Max Tray-Load CD-ROM Drive (IDE) *continued*

Disk	
Audio interface	
Line out connector	
RMS output voltage	0.7 Vrms
S/N ratio	80 Db
Channel separation	65 dB
Noise	0.1%
Frequency response	20 to 20 kHz
Digital audio out connector	2-pin serial digital serial connector at the rear of the drive (Molex 70553 G or equivalent) with pin 1 as ground and pin 2 as digital data..
Electrical	
DC power requirements	
5 VDC +/-5%	100 mV ripple p-p
12 VDC +/-5%	200 mV ripple p-p
DC current	
5 VDC +/-5% (typical)	450 mA
5 VDC =/-5% (maximum)	1800 mA
12 VDC +/-5% (typical)	<600 mA
12 VDC =/-5% (maximum)	<1800 mA
Total drive power (stand by mode) < 1 W	

DVD-ROM Drive

Table 7-13
DVD-ROM Drive

Disk	
Applicable Disc Formats	DVD (Single and Double Layer) CD-ROM Mode 1 & 2 CD-DA CD-XA (Mode 2, Form 1 and 2) CD-I (Mode 2, Form 1 and 2) CD-I Ready, CD-Bridge, CD-R PhotoCD (Single and Multi Session)
Disc Diameter	12 cm, 8 cm
Capacity	4.70 Gbytes 8.54 Gbytes 9.40 Gbytes 550 Mbytes (Mode 1, 12 cm) 640 Mbytes (Mode 2, 12 cm) 180 Mbytes (8 cm)
Disc Thickness	1.2 mm (CD-ROM) 1.2 mm (DVD)
Track Pitch	1.6 um (CD-ROM) 0.74 um (DVD)
Block Size	Mode 0 2352 (bytes) Mode 1 2352, 2340, 2336, 2048 (bytes) Mode 2 2352, 2340, 2336, 2048 (bytes) DVD - 2048 (bytes)
Performance	
Access Time	DVD - < 180 ms, random (typical) < 300 ms, full stroke (typical) CD - < 120 ms, random (typical) < 200 ms, full stroke (typical)
Data Transfer Rate (1KB = 1024 Bytes)	150 KB/s (sustained, 1X CD-ROM mode) 1200 - 4800 KB/s (32X CAV CD-ROM mode) 2705 - 8115 KB/s (6X CAV DVD mode)

continued

Table 7-13
DVD-ROM Drive *continued*

Disk	
Bus Rate	16.6 Mbytes/s (burst) with DMA support
Cache/Buffer	256 KB (Minimum)
Start-Up Time	< 10 seconds (typical)
Stop Time	< 3 seconds (typical)
Error Rates	10 ⁻¹⁵ (soft error) 10 ⁻²⁰ (hard error) 10 ⁻⁶ (seek error)
Reliability	35,000 POH, 25% (MTBF) 30 minutes (MTTR) >20, 000 drawer in/out cycles >5 x 10 ⁶ full stroke seeks
Indicators	Busy LED (Amber or Green)
Audio Interface	
Line Out Connector:	
RMS Output Voltage	0.7 Vrms (typical)
S/N Ratio	85 dB (minimum)
Channel Separation	65 dB (minimum)
THD & Noise	0.1% @ 1 kHz
Frequency Response	20 to 20 kHz, ±2 dB
Electrical	
DC Input Power Requirements:	
5 VDC ± 5%,	100 mV ripple p-p
12 VDC ± 5%,	200 mV ripple p-p
DC Current:	
5 VDC	350 mA (typical) <800 mA (maximum) <100 mA (low power mode) <10mA (sleep mode)
12 VDC	<500 mA (hold) <1000 mA (seek, spin-up) 100 mA (low power mode) <1mA (sleep mode)

Hard Drives

Table 7-14
9.1-GB Ultra3 SCSI Hard Drive

Capacity	9.1 GB
Transfer rate	
Media	13.6 to 21.3 MB/s
Asynchronous	5.0 MB/s
Synchronous	Up to 40.0 MB/s
Seek time (typical)	
Single track	1.6 ms
Average	7.5 ms
Full stroke	15.0 ms
Disk rotation speed	7200 rpm
Cylinders	8419
Data heads/cylinder	10
Sectors/track	165 to 264 (8 zones)
Buffer size	384 KB
NOTE: Drive performance may vary slightly, depending upon the vendor.	

Table 7-15
18-GB Ultra3 SCSI Hard Drive

Capacity	18.2 GB
Transfer rate	
Media	151 to 257 Mbits/s
Asynchronous	6.0 MB/s
Synchronous	Up to 40.0 MB/s
Seek time (typical)	
Single track	0.8 ms
Average	6.9 ms
Full stroke	15.0 ms
Disk rotation speed	7200 rpm
Cylinders	133,816
Data heads/cylinder	8
Sectors/track	227 to 387 (16 zones)
Buffer size	2048 KB

NOTE: Drive performance may vary slightly, depending upon the vendor.

Table 7-16
10-GB Ultra ATA-66 IDE Hard Drive

Capacity	10 GB
Drive type	65 (soft)
Transfer rate	
Media	17 to 28 MB/s
Interface	66.6 MB/s
Seek time (typical)	
Single track	1.7 ms
Average	8.5 ms
Full stroke	15.0 ms
Disk rotation speed	7200 rpm
Cylinders	16383
Data heads (logical)	16
Sectors/track (logical)	63
Buffer size	1966 KB

NOTE: Drive performance may vary slightly, depending upon the vendor.

Audio System

Table 7-17
Audio System

Sampling rate	7 KHz to 48 KHz (adjustable)
Full scale input voltage (rms)	
Microphone-in	0.100
Line-in	2.15
Full scale output voltage (rms)	
Line output	1.4
Dynamic range (DR)	
Line input-to-line output	95 dB
Digital playback	90 dB
Digital record	86 dB
Total Harmonic Distortion + Noise	
Line input-to-line output	-72 dB
Digital playback	-67 dB
Digital record	-77 dB
Frequency response (-3 dB cutoffs)	
Line level (48 kHz)	20 Hz to 20,000 Hz
Speaker	110 Hz to 15,000 Hz
Crosstalk (dB)	
Line Out	70 dB
Impedance (nominal)	
Microphone-in	10-K ohm
Line-in	10-K ohms
Headphone-out	16 ohms (min.)
Line-out	800 ohms
Data types	
PCM	8-/16-bit (mono/stereo)
A-Law	8-/16-bit (mono/stereo)
μ -Law	8-/16-bit (mono/stereo)

Keyboard

Table 7-18
Compaq Enhanced Keyboard

	U.S.	Metric
Dimensions		
Height	1.3 inch	3.3 cm
Width	18.3 inch	46.5 cm
Depth	6.4 inch	16.1 cm
Weight	3.0 lb	1.4 kg

Mouse

Table 7-19
3-Button Mouse

	U.S.	Metric
Dimensions		
Height	1.42 in.	3.6 cm
Length	4.17 in.	10.7 cm
Width	2.87 in.	7.4 cm
Weight	5.20 oz	150 g
Base resolution	400 dpi	
Tracking speed (maximum)	10 in/sec	25 cm/sec
Temperature		
Operating	32°F to 104°F	0°C to 40°C
Storage	-4°F to 140°F	-20°C to 60°C
Lifetime		
Mechanical Switch	Exceeds 300 miles Exceeds 1 million operations	Exceeds 483 km Exceeds 1 million operations
Relative humidity	10% to 90%, noncondensing	
ESD	No soft errors through 8 kV; no hard errors through 10 kV; specific performance depends on host system.	

Graphics Controllers

Table 7-20
ELSA Synergy II AGP Graphics Controller Maximum Color Support

Resolutions	Colors 4-MB Standard	Colors 4-MB Standard with 4-MB Upgrade	Maximum Refresh Rate (Hz)
1920 x 1200	256	32,768	75
1920 x 1080	256	32,768	80
1600 x 1280	32,768	32,768	75/85
1600 x 1200	32,768	32,768	85
1600 x 1000	32,768	32,768	100
1536 x 1152	32,768	32,768	85
1280 x 1024	32,768	16.7M	100/80
1152 x 864	16.7M	16.7M	100
1024 x 768	16.7M	16.7M	100
800 x 600	16.7M	16.7M	100
640 x 480	16.7M	16.7M	100

Table 7-21
3Dlabs Oxygen GVX1 AGP Graphics Controller Color Support

Resolutions	Maximum Colors	Maximum Refresh Rate (Hz)
1920 x 1200	16.7M	76
1920 x 1080	16.7M	85
1600 x 1200	16.7M	85
1280 x 1024	16.7M	100
1152 x 864	16.7M	100
1024 x 768	16.7M	100
640 x 480	16.7M	100

Table 7-22
Matrox Productiva G100 Multi-Monitor Maximum Color Support

Resolutions	Maximum Colors	Maximum Refresh Rate (Hz)
640 x 480	16M	200
800 x 600	16M	200
1024 x 768	16M	140
1152 x 864	16M	120
1280 x 1024	16M	100
1600 x 1200	32k	85
1920 x 1080	64k	75
1920 x 1200	256	70
1800 x 1440	256	65

Table 7-23
Matrox G400 AGP Graphics Controller Maximum Color Support

Resolutions	Maximum Refresh Rate (Hz)	Memory	Interface	Output
2048 x 1536	70Hz	16-MB SGRAM (256 bit internal memory bus)	AGP 4x / 2x compatible	HD VGA connector

NOTE: This board is at full resolution at 32 bit color with maximum colors of 16.7 million. Memory expansion is not available.

Table 7-24
PowerStorm 600 AGP Graphics Controller

Resolution	Maximum Colors	Maximum Refresh Rate Supported by Drive (Hz)
1440 x 900	16.7M	85
1280 x 1024	16.7M	85
1280 x 960	16.7M	85
1152 x 864	16.7M	85
1024 x 768	16.7M	85
800 x 600	16.7M	75
640 x 480	16.7M	85

Network Controller

Table 7-25
Ethernet Network Interface Controller (NIC)

Physical connector	RJ-45
Operating environment	
Temperature	50° to 95°F 10° to 35°C
Humidity	10% to 90%, noncondensing
Electrical bus	32-bit PCI bus

RJ-45 Network Cable Specifications

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.

Chapter **8**

External Connectors

Overview

This chapter provides an overview of the external connectors, including pin assignments for the Compaq Professional Workstation AP550.

Physical Location

The following illustration identifies the physical location of each connector. See the corresponding table for connector names.

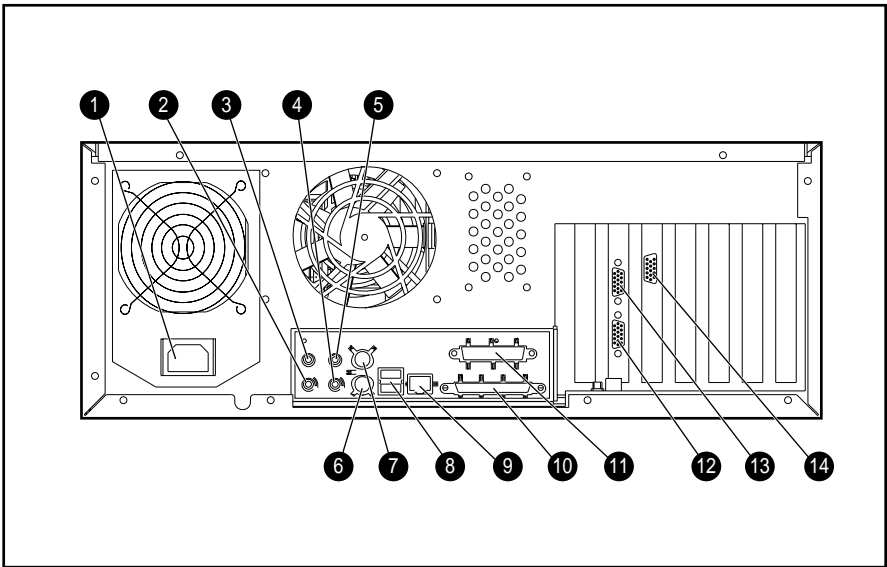


Figure 8-1. Identifying the external connectors

**Table 8-1
External Connectors**

Identifier	Connector	Identifier	Connector
1	Power cord	8	Two universal serial bus (USB)
2	Line-out	9	RJ45
3	Line-in	10	LVD/SE cable (SCSI)
4	Headphone	11	Parallel
5	Microphone	12	Serial COM1)
6	Keyboard	13	Serial (COM2)
7	Mouse	14	Video

Pin Assignments

Table 8-2
Keyboard

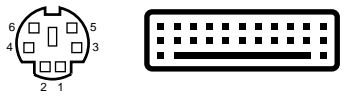
Connector and Icon (Orange)	Pin	Signal
	1	Data
	2	Unused
	3	Ground
	4	+5 VDC
	5	Clock
	6	Reserved

Table 8-3
Mouse

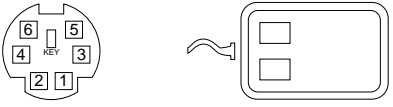
Connector and Icon (Green)	Pin	Signal
	1	Data
	2	Reserved
	3	Ground
	4	+5 VDC
	5	Clock
	6	Reserved

Table 8-4
Parallel Interface


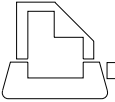
Connector and Icon	Pin	Signal	
	1	Strobe	
	2	Data Bit 0	
		3	Data Bit 1
		4	Data Bit 2
		5	Data Bit 3
		6	Data Bit 4
		7	Data Bit 5
		8	Data Bit 6
		9	Data Bit 7
		10	Acknowledge
		11	Busy
		12	Paper end
		13	Select
		14	Auto linefeed
		15	Error
		16	Initialize printer
		17	Select IN
		18-25	Signal ground

Table 8-5
Serial Interfaces

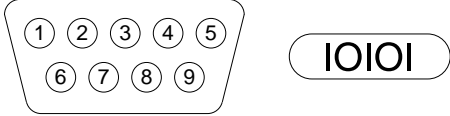
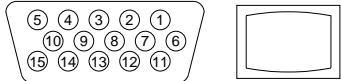
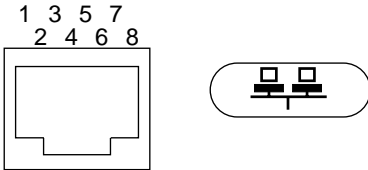
Connector and Icon	Pin	Signal
	1	Carrier detect
	2	Receive data
	3	Transmit data
	4	Data terminal ready
	5	Signal ground
	6	Data set ready
	7	Request to send
	8	Clear to send
	9	Ring indicator

Table 8-6
Video

Connector and Icon	Pin	Signal
	1	Red analog
	2	Green analog
	3	Blue analog
	4	Monitor ID bit 2
	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 (I²C monitors)

**Table 8-7
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 8-8
USB**

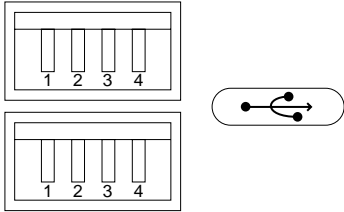
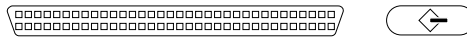
Connector and Icon	Pin	Signal
	1	VCC
	2	-Data
	3	+Data
	4	Ground



Table 8-9
LVD/SE Connector (SCSI)
(low voltage differential/single ended)

Connector and Icon





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

Table 8-10
Audio Line-In Connector

Connector and Icon	
	



Stereo 1/8-inch miniphone

Table 8-11
Audio Line-Out Connector

Connector and Icon	
	



Stereo 1/8-inch miniphone

Table 8-12
Microphone Connector

Connector and Icon (Blue)	
	

Stereo 1/8-inch miniphone

Table 8-13
Headphone Connector

Connector and Icon	
	

Stereo 1/8-inch miniphone

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