COMPAQ

Addenda #1, 2, and 3 to Compaq Professional Workstation SP750 Maintenance & Service Guide

Compaq Professional Workstation SP750

Part number 158722-003

Spare part number 164414-001

The complete MSG follows these addenda.

These addenda contain changes to the original document.

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Spare Part Number

Description	Spare Part Number
Intel Pentium III processor with heatsink (179616-002) and thermal film (328614-001)	
800 MHz/133-MHz with 256K cache	174642-001
866 MHz/133-MHz with 256K cache	180711-001
Intel Pentium III processor with heatsink (215610-002) and thermal film (328614-001)	
1-GHz/133 MHz	210399-001
Four-RIMM Memory Expansion Board	158285-001
Graphics Controllers	
Intense3D Wildcat 4110, AGP 2X	166013-001
Intense3D Wildcat 4210, AGP Pro	202996-001
Matrox MGA-G400A, AGP 2x/4x	163361-001
Matrox G200 MMS	171975-001
nVIDIA TNT2 PRO, 16 MB SDRAM	179997-001
ELSA Gloria II AGP, 64 MB	174641-001
Graphics Adapter, DVI-i to VGA	202997-001
Hard Drives	
20 GB 7200 RPM Hard Drive	180475-001
30 GB 7200 RPM Hard Drive, Quiet Drive	180477-001
36.2 GB Wide-Ultra 160 SCSI Hard Drive	180337-001
Other Drives	
48X CD-ROM	187263-001
32X R-W CD-ROM	173747-001
LS-120 SuperDisk	209938-001
10X40X DVD-ROM	161430-001
Speaker w/cable	328730-001
Misc Cable Kit, includes: Diskette drive cable, long (269166-002) Diskette drive cable, (269166-003) Hard drive cable, 14” (242947-011) Hard drive cable, 16” (242947-012) Hard drive cable, 20” (269159-004) Hard drive/CD-ROM cable, 22” (270847-008) Hard drive/CD-ROM cable (270847-009) CD-ROM audio cable, 18” (171891-009)	327649-001

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

	bits per pixel			
Aspect Ratio	**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)

Specifications - Graphics Controllers (continued)

Intense3D Wildcat 4210 Graphics Controller

Supported Resolutions Without Multisampling

	bits per pixel			
Aspect Ratio	**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	128 0x 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)

Specifications - Graphics Controllers (continued)

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.

Matrox G200 Quad MMS Graphics Controller

			Refresh Rate/Display	
Graphics Memory	**Aspect Ratio**	**Resolution**	**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

Compaq Professional Workstation SP750

Maintenance and Service Guide

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Professional Workstation SP750

Maintenance and Service Guide

First Edition (January 2000)
Part Number 158722-001
Spare Part Number 164414-001
Compaq Computer Corporation

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Compaq Professional Workstation SP750 Maintenance and Service Guide
Maintenance and Service Guide
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Spare Part Number 164414-001

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continued

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Removal and Replacement Procedures

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About This Guide

This maintenance and service guide is a troubleshooting guide that can be used for reference when servicing the Compaq Professional Workstation SP750.

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 Reference Guide*
- Service Training Guides
- Compaq Service Advisories and Bulletins
- Compaq QuickFind
- Compaq Insight Manager
- 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 1-800-263-5868

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**

Product Description

Front Panel Components and LEDs

This chapter describes the front and rear panel components, drive positions, and serial number locations for the Compaq Professional Workstation SP750.

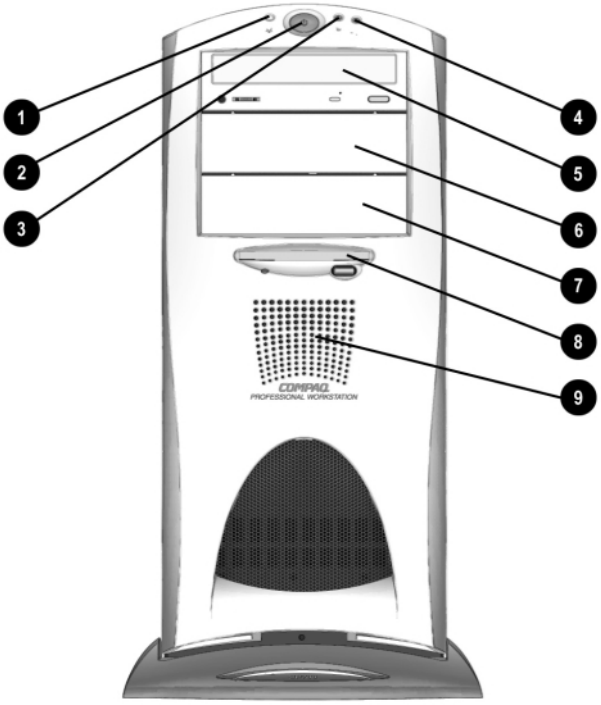


Figure 1-1. Identifying front panel components

Table 1-1
Front Panel Components

Item	Component	Description
❶	Power On/Off LED	After plugging the power cord into a grounded AC outlet and the workstation, if the LED is: **Off**—Workstation is ready to be powered up. **Steady Amber**—Processor or memory board is not seated properly. After pressing the power button, if the LED is: **Steady Green**—Workstation is turned on, and the processor or memory board is seated properly. **Blinking green**—Workstation is in Standby mode.
❷	Power button	Turns the workstation on or off.
❸	Hard drive activity LED	When lit, indicates the workstation is reading or writing data to the hard drive(s).
❹	Network activity LED	When lit, indicates the workstation is receiving or sending data on the network.
❺	Bay 4	5.25-inch, half-height drive bay, CD-ROM drive or DVD-ROM drive
❻	Bay 5*	5.25-inch, half-height drive bay
❼	Bay 6*	5.25-inch, half-height drive bay
❽	Bay 7	3.5-inch, third-height drive bay, diskette drive
❾	Speaker	Premier Sound with fixed equalization

* An optional Zip drive can be installed in bay 5 or 6.

Rear Panel Connectors

The following figure illustrates the location of the external connectors and jacks. See Table 1-2 for a description of each connector.

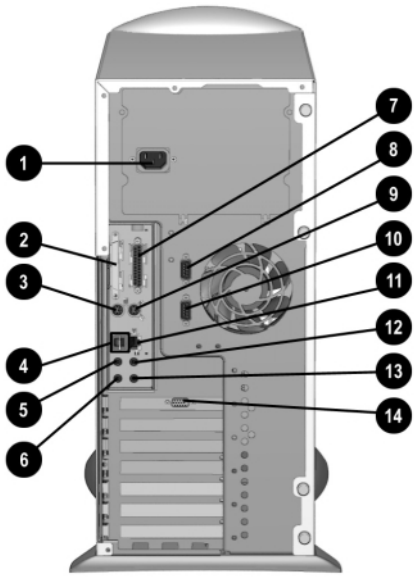


Figure 1-2. Identifying rear panel connectors

Table 1-2
Rear Panel Components

Item	Component	Item	Component
❶	Power cord connector	❽	Serial connector B
❷	Ultra3 SCSI connector	❾	Mouse connector
❸	Keyboard connector	❿	Serial connector A
❹	USB connectors (2)	⓫	RJ-45 connector
❺	Audio line-out connector	⓬	Audio line-in connector
❻	Headphone jack	⓭	Microphone jack
❼	Parallel connector	⓮	VGA (AGP) connector

Drive Positions

Your workstation supports up to seven individual drive bays. See Table 1-3 for a description of the drive bay components.

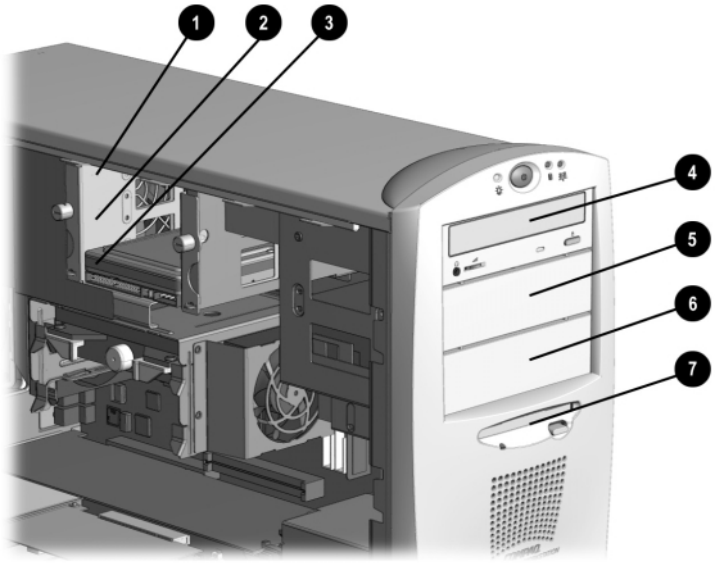


Figure 1-3. Identifying drive bay components

As shown in Figure 1-3, the workstation provides seven drive bays. Bays 1 through 3 are located in the 3.5-inch removable hard drive cage, which is located behind the side access panel of the workstation. Drive bays 4 through 7 are located on the front of the workstation. The drives support various drive configurations.

Table 1-3
Drive Bay Components

Item	Component	Description
❶	Bay 1	Part of the removable hard drive cage. A 3.5-inch, third-height bay that supports a 1.0-inch hard drive or a 1.6-inch hard drive.
❷	Bay 2	Part of the removable hard drive cage. A 3.5-inch, third-height bay that supports a 1.0-inch hard drive. Bay 2 is not available when a 1.6-inch hard drive is installed in either bay 1 or bay 3.
❸	Bay 3	Part of the removable hard drive cage. A 3.5-inch, third-height bay that supports a 1.0-inch hard drive or a 1.6-inch hard drive.
❹	Bay 4	5.25-inch, half-height bay that supports 1.0-inch or 1.6-inch storage devices. Either a CD-ROM drive or DVD-ROM drive is shipped in bay 4.
❺	Bay 5*	5.25-inch, half-height bay that supports 1.0-inch or 1.6-inch storage devices.
❻	Bay 6*	5.25-inch, half-height bay that supports 1.0-inch or 1.6-inch storage devices.
❼	Bay 7	3.5-inch, third-height bay that supports a 1.0-inch device. A standard 3.5-inch diskette drive is shipped in bay 7.

* An optional Zip drive can be installed in bay 5 or 6.

Serial Number Location

Provide the computer serial number to Compaq whenever you request information or order spare parts. The serial number is located just above the right top side of the side access panel ❷ and on the rear of the workstation ❶.

For asset control, the serial number is also embedded in the Electrically Erasable Programmable Read Only Memory (EEPROM) 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 the Power-On Self-Tests (POST). To clear the condition, re-enter the original serial number through Computer Setup.

NOTE: If a system board from another workstation is installed, POST recognizes the serial number as an invalid number.

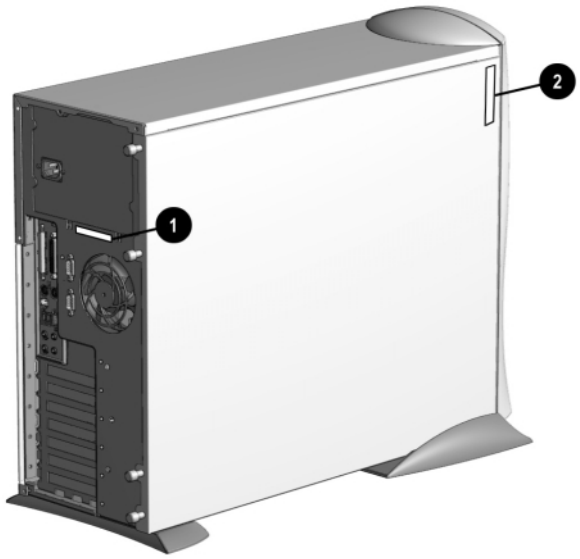


Figure 1-4. Serial number locations

Chapter **2**

Spare Parts

This chapter illustrates and classifies parts for the Compaq Professional Workstation SP750. A reference for spare parts also is provided.

System Unit

Mechanical Components

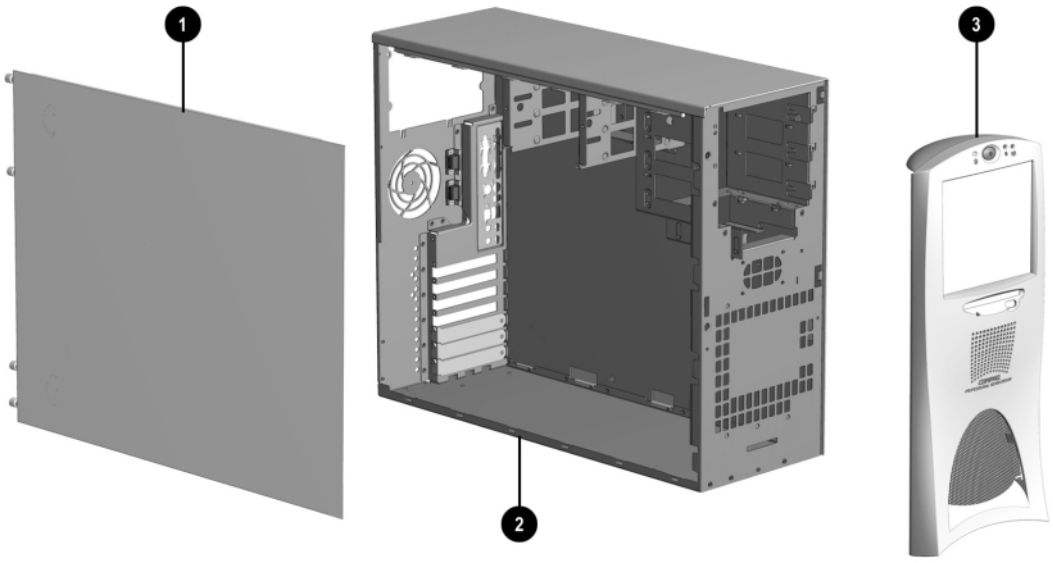


Figure 2-1. Mechanical components for the Compaq Professional Workstation SP750

Table 2-1
Mechanical Components Spare Parts List

Item	Description	Spare Part Number
❶	Workstation access panel	329263-001
❷	Chassis	N/A
❸	Front bezel	338549-001

System Components

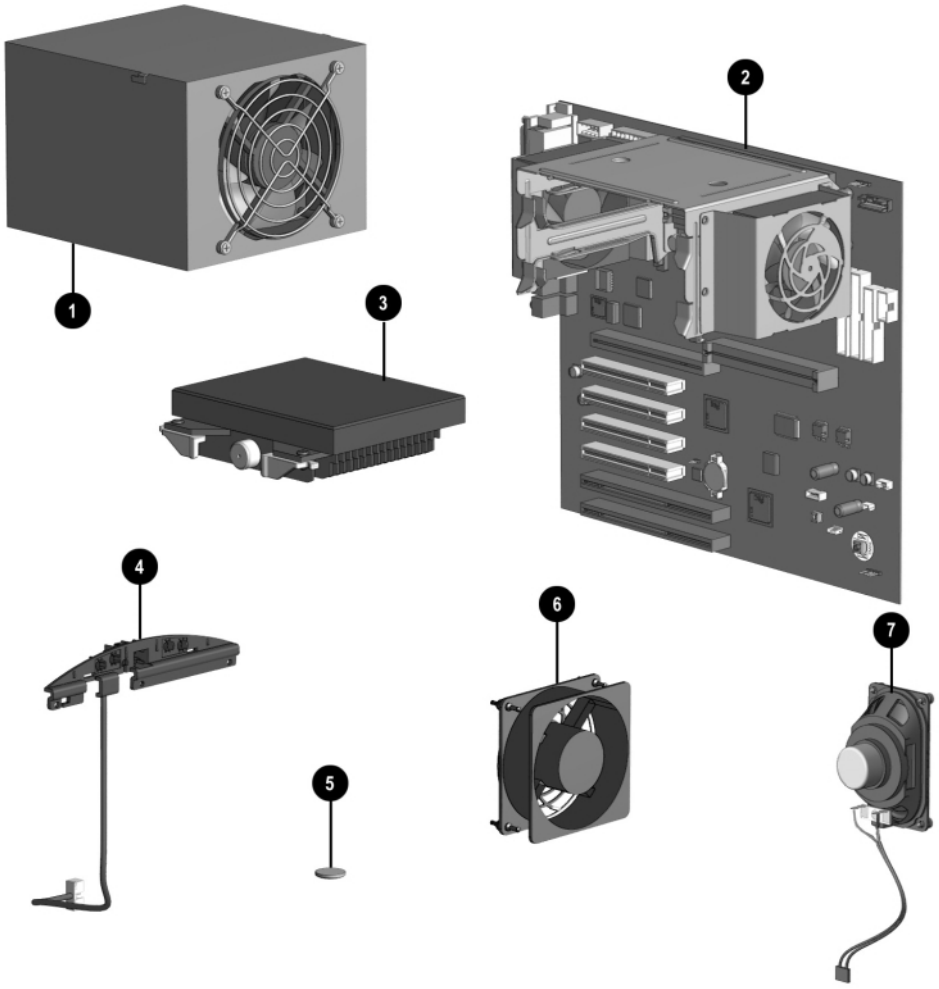


Figure 2-2. System components for the Compaq Professional Workstation SP750

Table 2-2
System Components Spare Parts List

Item	Description	Spare Part Number
❶	425-watt power supply with Power Factor Correction (PFC)	116403-001
❷	System board for the Compaq Professional Workstation SP750	158282-001
❸	Intel Pentium III Xeon Processor, 667-MHz with a 133-MHz front-side bus †	161669-001
❹	Power switch and LEDs with cable (includes power cord)	161670-001
❺	Battery	153099-001
❻	90 mm fan	166922-001
❼	Premier Sound desktop 5-watt speaker	158267-001
❽	Intel Pentium III Xeon Processor, 733-MHz with a 133-MHz front-side bus	163362-001*
❾	80 mm fan	158365-001*
❿	Compaq Professional Workstation SP750 Base Unit w/Pentium III Xeon 667 Hz processor	158282-001*
⓫	Compaq Professional Workstation SP750 Base Unit w/Pentium III Xeon 733 Hz processor	158282-001*

† The processor spares kit includes the heatsink assembly.

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

Memory

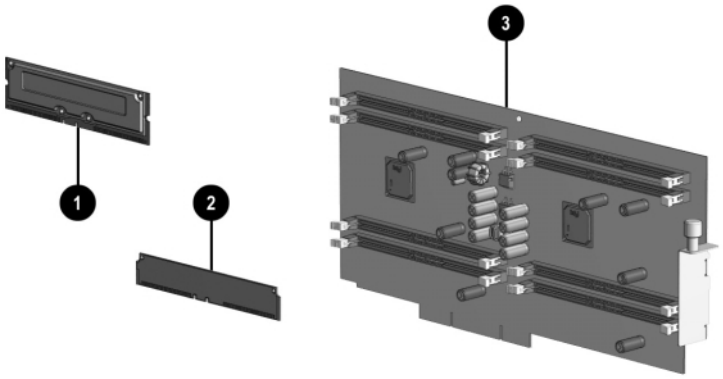


Figure 2-3. Memory components for the Compaq Professional Workstation SP750

Table 2-3
Memory Spare Parts List

Item	Description	Spare Part #
❶	64-MB ECC Direct Rambus Inline Memory Modules (RIMM) 600 MHz	157107-001
❷	Continuity RIMM (CRIMM)	158265-001
❸	Eight-RIMM Memory Expansion Board	158284-001
❹	64-MB ECC Direct Rambus Inline Memory Modules (RIMM) 800-MHz	157108-001*
❺	128-MB ECC Direct Rambus Inline Memory Modules (RIMM) 600-MHz	158264-001*
❻	128-MB ECC Direct Rambus Inline Memory Modules (RIMM) 800-MHz	157112-001*
❼	256-MB ECC Direct Rambus Inline Memory Modules (RIMM) 600-MHz	161453-001*
❽	256-MB ECC Direct Rambus Inline Memory Modules (RIMM) 600-MHz	164539-001*
❾	256-MB ECC Direct Rambus Inline Memory Modules (RIMM) 800-MHz	161454-001*

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

Mass Storage Devices

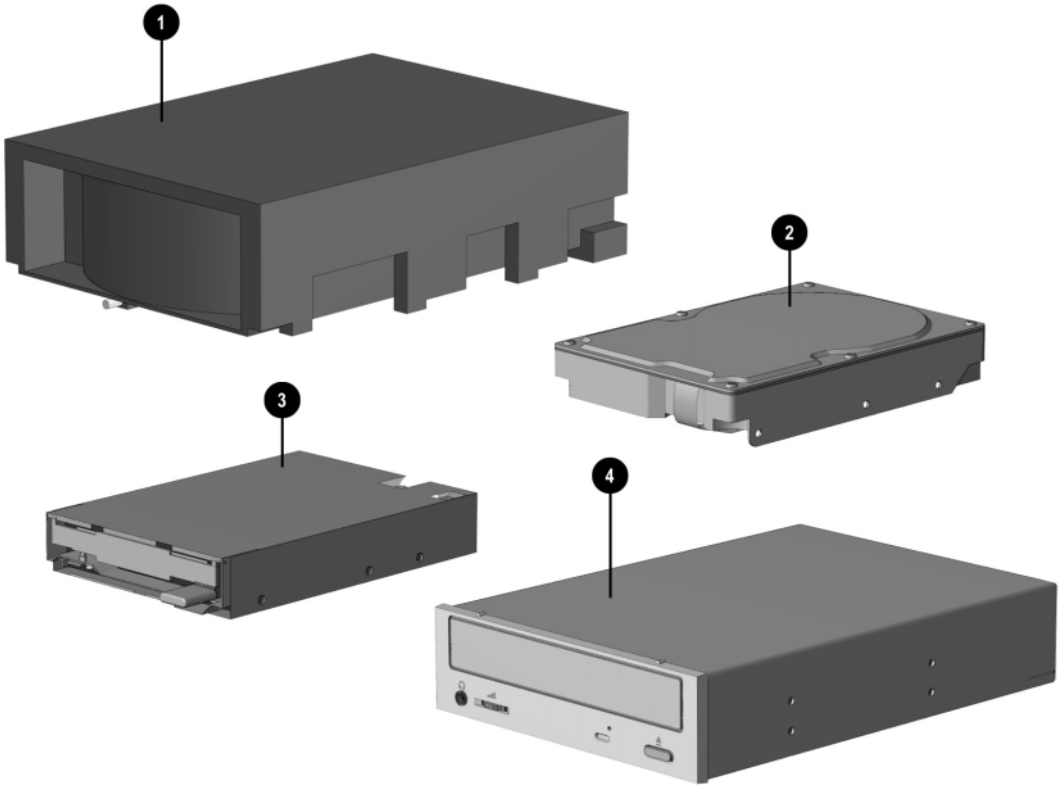


Figure 2-4. Mass storage devices for the Compaq Professional Workstation SP750

Table 2-4
Mass Storage Device Spare Parts List

Item	Description	Spare Part #
❶	18-GB Ultra3 SCSI hard drive (10,000 rpm)	160063-001
❷	9-GB Ultra3 SCSI hard drive (10,000 rpm)	160062-001
❸	1.44-MB diskette drive	158266-001
❹	40X CD-ROM drive	400807-001
❺	20-GB Ultra ATA/66 IDE hard drive (7,200 rpm)	158363-001*
❻	6X DVD-ROM drive	401624-001*
❼	250-MB ATAPI Zip drive (optional)	125776-001*
❽	100-MB ATAPI Zip drive (optional)	401624-001*
❾	10-GB Ultra ATA/66 hard drive (7,200 rpm) (no cable)	135364-001*
❿	10-GB Ultra ATA/66 hard drive (7,200 rpm) (with cable)	135364-001*
⓫	13.5-GB Ultra ATA/66 hard drive (7,200 rpm) (with cable)	140515-001*
⓬	20-GB Ultra ATA hard drive (7,200 rpm) (with cable)	157403-001*
⓭	9-GB WU2 SCSI hard drive (7,200 rpm)	179288-001*
⓮	18-GB WU2 SCSI hard drive (7,200 rpm)	144577-001*
⓯	18-GB WU3 SCSI hard drive (10,000 rpm)	160063-001*
⓰	9-GB WU2 SCSI hard drive (7,200 rpm), 2nd	179288-001*
⓱	18-GB WU2 SCSI hard drive (7,200 rpm), 2nd	144577-001*
⓲	9-GB WU3 SCSI, hard drive (10,000 rpm), 2nd	160062-001*
⓳	18-GB WU3 SCSI hard drive (10,000 rpm), 2nd	160063-001*

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

Cable Kits

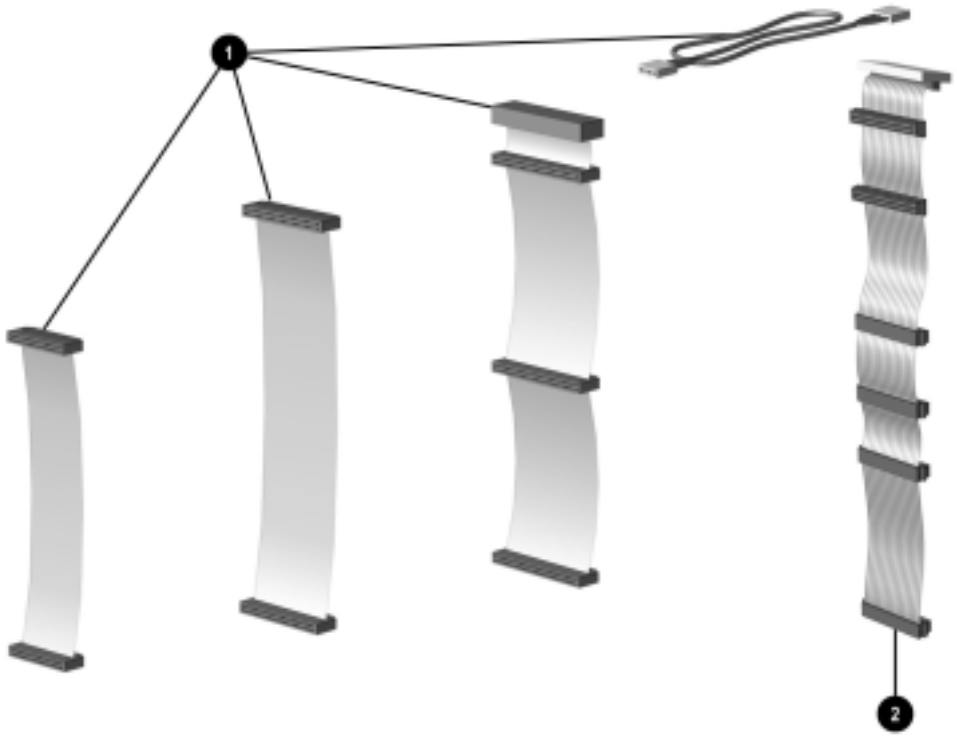


Figure 2-5. Cable kits for the Compaq Professional Workstation SP750

Table 2-5
Cable Kits Spare Parts List

Item	Description	Spare Part #
❶	Miscellaneous cable kit	327649-001
❷	Ultra2 SCSI five-device cable	402222-001
❸	SCSI LVD twisted pair cable	164412-001*
❹	Dual serial port cable	164536-001*

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

Graphic Controllers

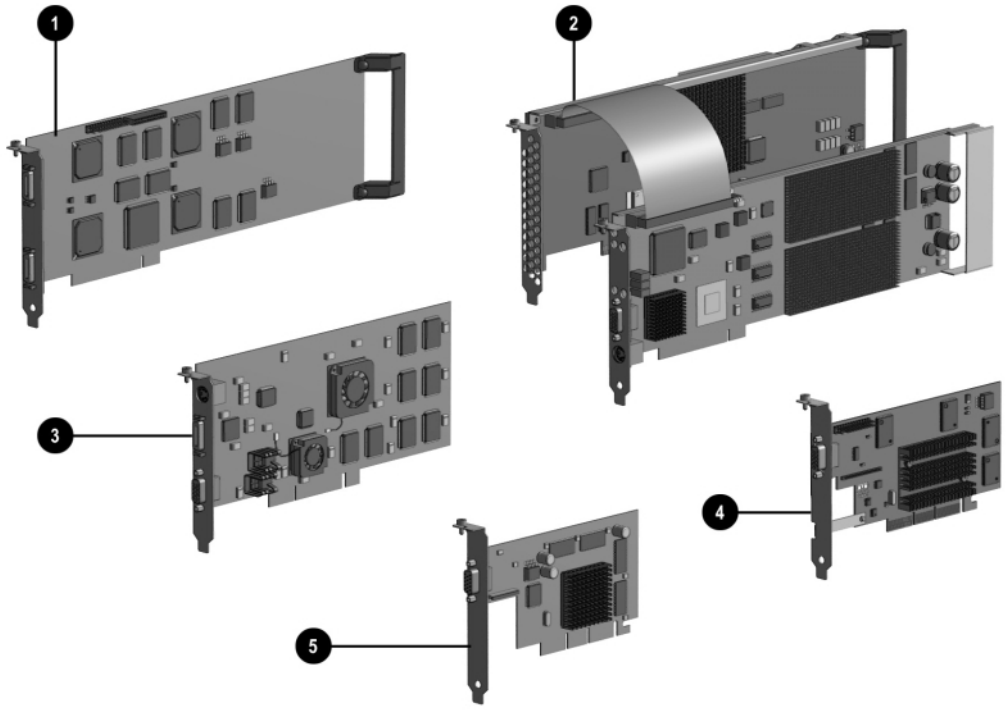


Figure 2-6. Graphic controllers for the Compaq Professional Workstation SP750

Table 2-6
Graphic Controllers Spare Parts List

Item	Description	Spare Part #
❶	Matrox Productiva G100 Quad Multi-Monitor Series (PCI)	101239-001
❷	PowerStorm 600 (enh-3D)	122926-001
❸	3Dlabs Oxygen GVX1 (AGP)	146141-001
❹	Matrox G400 Dual (AGP) (dual display, analog output)	400437-001
❺	ELSA Synergy II 32-MB 4X AGP (entry-3D)	146140-001
❻	3Dlabs Oxygen GVX1 PCI (mid-3D)	159629-001*
❼	ELSA Synergy II 32 MB (NLX/AGP)	146535-001*
	Matrox G400 16 MB (NLX/AGP)	400438-001*

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

Network Controllers

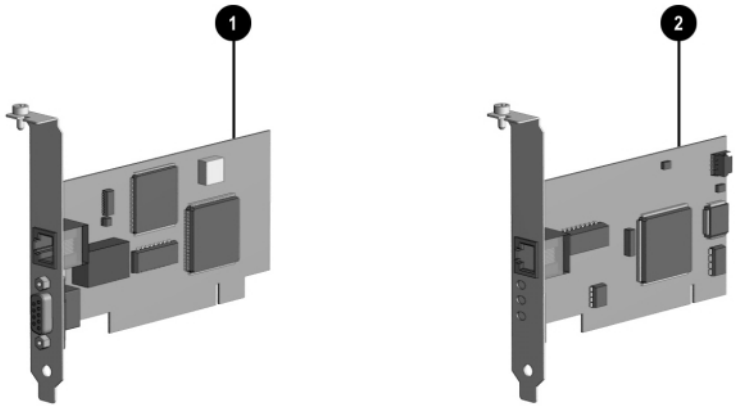


Figure 2-7. Network controllers for the Compaq Professional Workstation SP750

Table 2-7
Network Controllers/Audio/Modem Spare Parts List

Item	Description	Spare Part #
❶	Netelligent 16/4 TR PCI UTP/STP Controller	268010-001
❷	Compaq NC3121 Fast Ethernet NIC PCI, 10/100, Wake-on-LAN	323556-001
❸	Compaq NC3120 Fast Ethernet NIC PCI, 10/100	317606-001*
❹	Compaq NC3123 Fast Ethernet NIC PCI, 10/100, Wake-on-LAN	174831-001*
❺	3COM 10/100 3C905C-TX NIC RSA	118042-001*
❻	Intel ® PRO/100+ Management Adapter	116188-001*
❼	Intel ® PRO/100+ Management Adapter AoL	116188-001*
❽	ESS 1869 Audio Card	356081-001*
❾	56K Fax Modem	269412-001*

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

Input/Output Devices

Table 2-8
Input/Output Devices Spare Parts List

Item	Description	Spare Part #
Keyboard and Mouse		
❶	Keyboard	269513-XXX*
❷	Three-button mouse	327716-001*
❸	Labtec Spaceball 4000 3D motion control input device (optional)	118029-001*
Monitors		
❹	P75 monitor	307806-XXX*
❺	P1610 color monitor (Beach)	305708-XXX*
❻	P1610 color monitor (Opal)	325500-XXX*
❼	P110 monitor	325600-XXX*
❽	V1000 color monitor	351756-XXX
❾	V900 color monitor	303500-XXX
❿	V700 color monitor	325800-XXX

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

Software and Miscellaneous

Table 2-9
Software and Miscellaneous Spare Parts List

Item	Description	Spare Part #
Software		
❶	Microsoft Windows NT Workstation 4.0 CD	275573-xx1*
Miscellaneous		
❷	Shipping box with buns (U.S.)	166990-001*
❸	Shipping box with buns International	166990-002*

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

Documentation

Table 2-10
Documentation Spare Parts List

Item	Description	Spare Part #
❶	Maintenance and Service Guide	164414-001*
❷	Illustrated Parts Map	164413-001*
❸	Service Quick Reference Guide (revision 040)	162212-001*

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

Chapter **3**

Removal and Replacement Preliminaries

Preliminaries

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

CAUTION: When the computer is plugged into an AC power source, there is always voltage applied to the system board. Disconnect the power cord from the power source before opening the computer to prevent system board or component damage.

Electrostatic Discharge Information

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

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

Generating Static

The following table shows that:

- Different activities generate different amounts of static electricity.
- Static electricity increases as humidity decreases.

Table 3-1
Generating Static

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

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

NOTE: 700 volts can degrade a product.

Preventing Electrostatic Damage to Equipment

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

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

Personal Grounding Methods and Equipment

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

- **Wrist straps** are flexible straps with a minimum of one-megohm +/- 10 percent resistance in the ground cords. To provide proper ground, a strap must be worn snug against bare skin. The ground cord must be connected and fit snugly into the banana plug connector on the grounding mat or workstation.
- **Heel straps/Toe straps/Boot straps** can be used at standing workstations and are compatible with most types of shoes or boots. On conductive floors or dissipative floor mats, use them on both feet with a minimum of one-megohm +/- 10 percent resistance between the operator and ground.

Table 3-2
Static Shielding Protection Levels

Method	Voltage
Antistatic plastic	1,500
Carbon-loaded plastic	7,500
Metallized laminate	15,000

Grounding Workstations

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

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

Recommended Materials and Equipment

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

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

General Cleaning Safety Precautions

- Never use solvents or flammable solutions to clean the computer.
- Never immerse any parts in water or cleaning solutions; apply any liquids to a clean cloth and then use the cloth on the component.
- Always turn off the computer when cleaning with liquids or damp cloths.
- Always turn off the computer before cleaning the keyboard, mouse, or air vents.
- Disconnect the keyboard before cleaning it.
- Wear safety glasses equipped with side shields when cleaning the keyboard.

Cleaning the Computer Case

Follow all safety precautions in the "General Cleaning Safety Precautions" section in this chapter before cleaning the computer.

To clean the computer case, follow the procedures described below:

- To remove light stains or dirt, use plain water with a clean, lint-free cloth or swab.
- For stronger stains, use a mild dishwashing liquid diluted with water. Rinse well by wiping it with a cloth or swab dampened with clear water.
- For stubborn stains, use isopropyl (rubbing) alcohol. No rinsing is needed as the alcohol will evaporate quickly and not leave a residue.
- After cleaning, always wipe the unit with a clean, lint-free cloth.
- Occasionally clean the air vents on the computer. Lint and other foreign matter can block the vents and limit the airflow.

Cleaning the Keyboard

Follow all safety precautions in the "General Cleaning Safety Precautions" section in this chapter before cleaning the keyboard.

To clean the tops of the keys or the keyboard body, follow the procedures described in the "Cleaning the Computer Case" section in this chapter.

When cleaning debris from under the keys, review all rules in section in the "General Cleaning Safety Precautions" in this chapter before following these procedures:

CAUTION: Use safety glasses equipped with side shields before attempting to clean debris from under the keys.

- Visible debris underneath or between the keys may be removed by vacuuming or shaking.
- Canned, pressurized air may be used to clean debris from under the keys. Caution should be used as too much air pressure can dislodge lubricants applied under the wide keys.
- If you remove a key, use a specially designed key puller to prevent damage to the keys. This tool is available through many electronic supply outlets.

CAUTION: Never remove a wide leveled key (like the space bar) from the keyboard. If these keys are improperly removed or installed, the keyboard may not function properly.

- Cleaning under a key may be done with a swab moistened with isopropyl alcohol and squeezed out. Be careful not to wipe away lubricants necessary for proper key functions. Use tweezers to remove any fibers or dirt in confined areas. Allow the parts to air dry before reassembly.

Cleaning the Monitor

- Wipe the monitor screen with a clean cloth moistened with water or with a towelette designed for cleaning monitors. Do not use sprays or aerosols directly on the screen, the liquid may seep into the housing and damage a component. Never use solvents or flammable liquids on the monitor.
- To clean the monitor body follow the procedures in the "Cleaning the Computer Case" section in this chapter.

Cleaning the Mouse

- Before cleaning the mouse, ensure that the power to the computer is turned off.
- Clean the mouse ball by first removing the retaining plate and the ball from the housing. Pull out any debris from the ball socket and wipe the ball with a clean dry cloth before reassembly.
- To clean the mouse body, follow the procedures in the "Cleaning the Computer Case" section in this chapter.

Service Considerations

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

Power Supply Fan

The power supply fan is a variable-speed fan based on the temperature in the power supply.

CAUTION: The cooling fan is off **only** when the computer is turned off or the power cable has been disconnected.

The cooling fan is always on in all other instances (when the computer is either in the "On," "Standby," or "Suspend" mode).

You must disconnect the power cord from the power source before opening the computer to prevent system board or component damage.

Tools and Software Requirements

To service the computer, you need the following:

- Torx T-15 screwdriver (Compaq screwdriver with bits PN 161946-001)
- ¼-inch wrench for the speaker nuts
- Flat-bladed screwdriver (may sometimes be used in place of the Torx screwdriver)
- Diagnostics software
- Compaq tamper-resistant T-15 wrench (Smart Cover FailSafe Key, PN 166527-001) or Compaq tamper-resistant bits (Smart Cover FailSafe Key, PN 166527-002)

Screws

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

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

Cables and Connectors

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

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

Hard Drives

- Handle hard drives as delicate precision components, avoiding all physical shock and vibration. This applies to failed drives as well as replacement spares.
- Use only the packaging provided by Compaq for shipping.
- Do not remove hard drives from the shipping package for storage. Keep hard drives in their protective packaging until they are actually mounted in the CPU.
- Avoid dropping drives from any height onto any surface.

Lithium Coin Cell Battery

The battery that comes with the computer provides power to the real-time clock and has a lifetime of about five years. When replacing the battery, use the appropriate 3-volt lithium coin cell battery.

See Chapter 4, “Removal and Replacement Procedures,” for instructions on the replacement procedures.

WARNING: This computer contains a lithium-ion battery. There is a risk of fire and chemical burn if the battery is handled improperly. Do not disassemble, crush, puncture, short external contacts, dispose in water or fire, or expose the battery to temperatures higher than 140ºF (60ºC).

Chapter 4

Removal and Replacement Procedures

This chapter provides subassembly/module-level removal and replacement procedures for the Compaq Professional Workstation SP750.

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

Service Preparations

CAUTION: The power supply in the Compaq Professional Workstation SP750 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: Electrostatic discharge can damage electronic components of the workstation. Before beginning these procedures, be sure you are properly grounded. See Chapter 3, "Removal and Replacement Preliminaries" 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.
3. Turn off all peripheral devices and disconnect their cables from the rear of the workstation.
4. Remove the cable lock, if installed. See the next section for instructions.

NOTE: In some of the removal procedures in this chapter, you will be asked to place the workstation on its side when servicing certain internal components.

NOTE: For more information on preparing the workstation for service, see Chapter 3, "Removal and Replacement Preliminaries."

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 accessing internal components.

To remove the lock:

1. Unlock and remove the cable lock or the padlock.
2. Remove the security bracket (plate) seated over the cable lock bracket.
3. Unfasten the retaining screw to release the cable lock bracket.

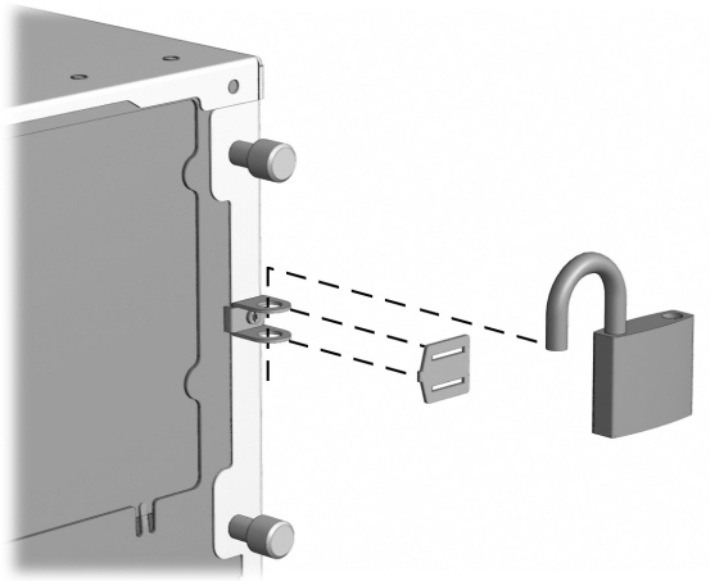


Figure 4-1. Removing the padlock

Workstation Feet

NOTE: Not all procedures in this chapter require the removal of the workstation feet. Be sure to thoroughly read each removal and replacement procedure before attempting to access any internal components.

To remove the workstation feet:

1. Perform the steps in the "Service Preparations" section in this chapter, then place the workstation on its side.

CAUTION: Before removing the side 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 screws that secure the feet.
3. Remove the workstation feet.

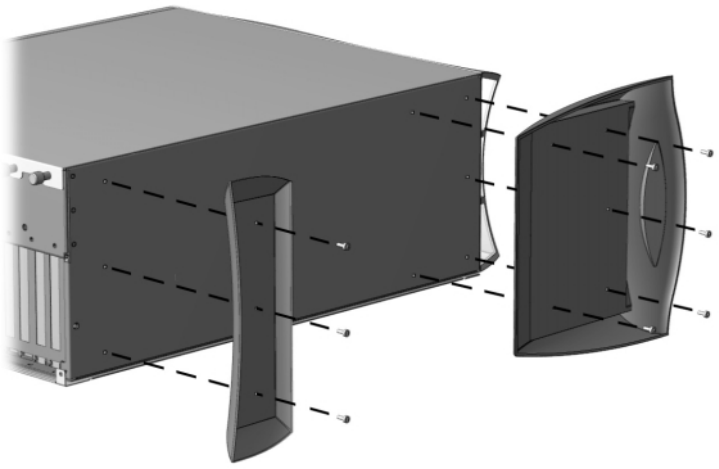


Figure 4-2. Removing the workstation feet

To replace the feet, reverse the above procedure.

Side Access Panel

CAUTION: Do not operate the workstation with the side access panel removed. The panel is an integral part of the cooling system; removing it while the system is running may adversely affect data integrity.

To remove the side access panel:

1. Perform the steps in the "Service Preparations" section in this chapter, then place the workstation on its side.

CAUTION: Before removing the side 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 four rear panel thumbscrews and slide off the access panel.

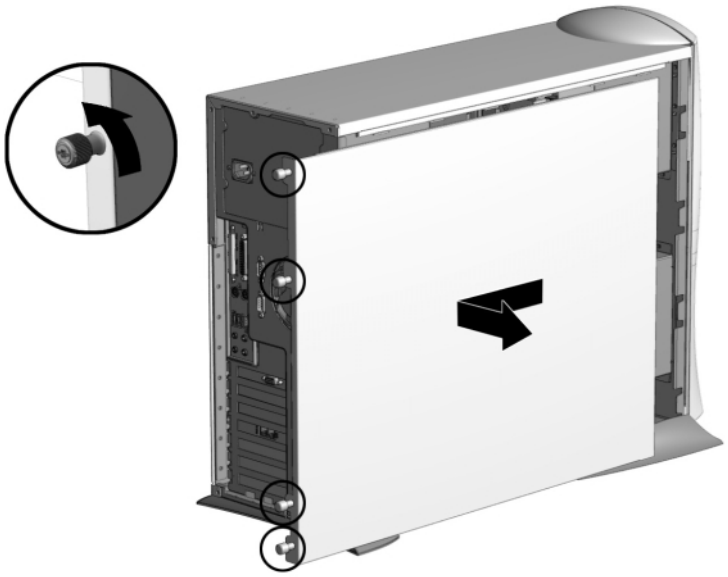


Figure 4-3. Loosening the thumbscrews and removing the side access panel

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

WARNING: When replacing the side access panel, be sure to tighten all four thumbscrews.

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

Front Bezel

The front bezel is mounted to the chassis with release levers that are integrated into the bezel.

To remove the front bezel:

1. Perform the steps in the “Service Preparations” section in this chapter, then place the workstation on its side.

CAUTION: Before removing the side 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 access panel.
3. Press the front bezel release latches and remove the front bezel.

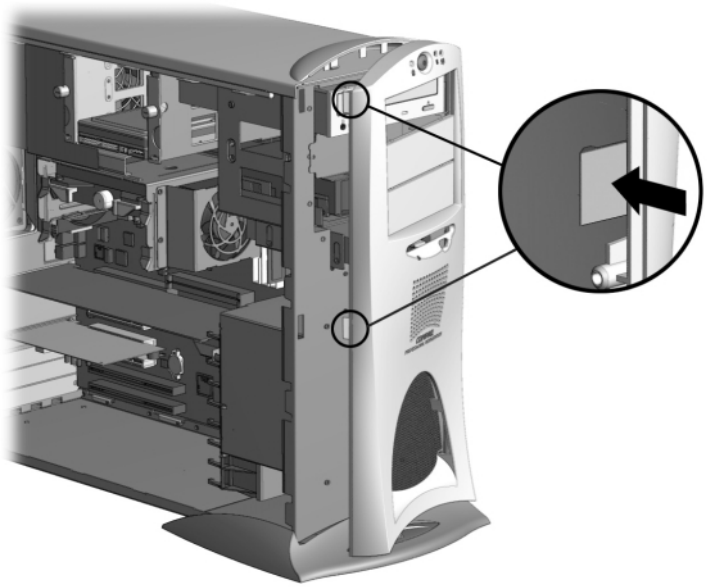


Figure 4-4. Removing the front bezel

To replace the front bezel, reverse the above procedure.

Blank Drive Bezel

To remove the blank drive bezel from the front bezel:

1. Perform the steps in the “Service Preparations” section in this chapter, then place the workstation on its side.

CAUTION: Before removing the side 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 following components:
   - Side access panel
   - Front bezel
3. Remove the screws that secure the blank drive bezel, then remove the blank bezel from the front bezel.

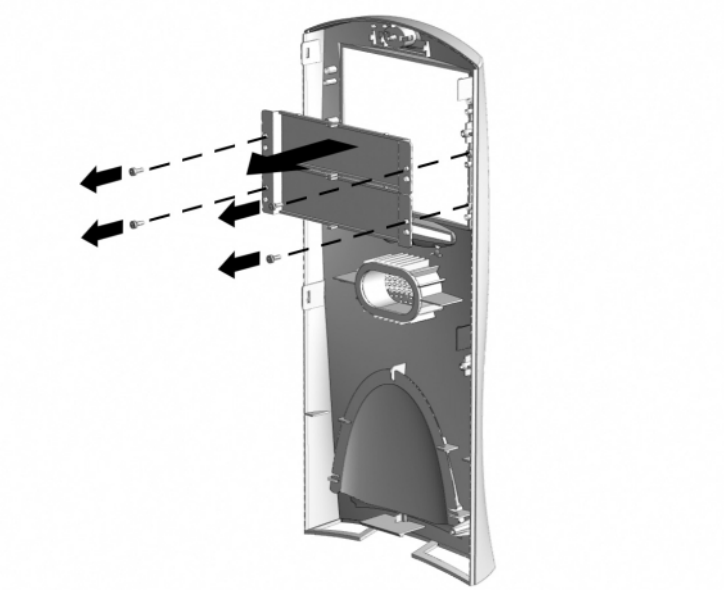


Figure 4-5. Removing the blank bezel

To replace the blank drive bezel, reverse the above procedure.

EMI/Cooling Shield

An EMI/cooling shield covers bays 5 and 6 to provide proper cooling and EMI protection. To remove the EMI/cooling shield:

1. Perform the steps in the “Service Preparations” section in this chapter, then place the workstation on its side.

CAUTION: Before removing the side 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 following components:
   - Side access panel
   - Front bezel
3. Remove the two screws that connect the EMI/cooling shield to the front of the chassis.
4. Remove the EMI/cooling shield from the drive slot.

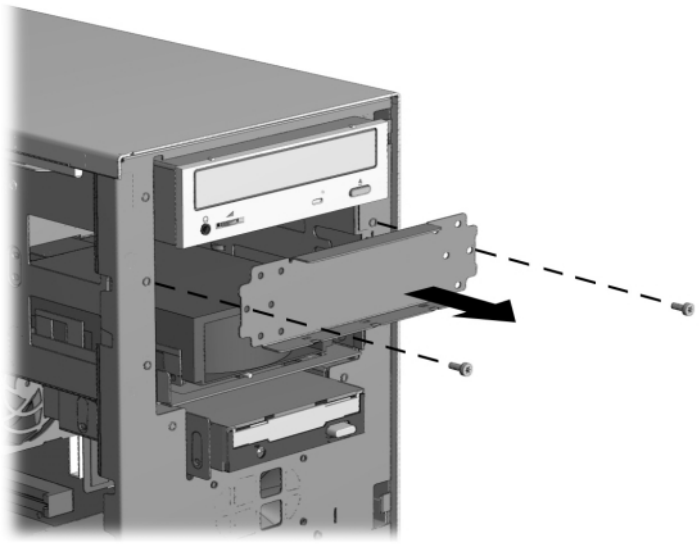


Figure 4-6. Removing the EMI/cooling shield

IMPORTANT: Replace the shield after the drive is installed in the bay.

To replace the EMI/cooling shield, reverse the above procedure.

Power Supply Air Baffle

To remove the power supply air baffle:

1. Perform the steps in the “Service Preparations” section in this chapter, then place the workstation on its side.

> **CAUTION:** Before removing the side 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 following components:
   - Workstation feet
   - Side access panel
3. Remove the power supply air baffle from the Velcro adhesive tabs.

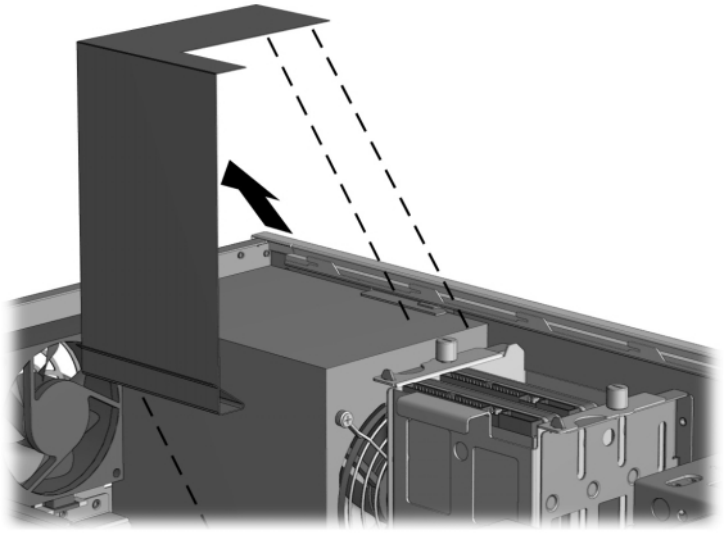


Figure 4-7. Removing the power supply air baffle

To replace the power supply air baffle, reverse the above procedure.

Mass Storage Devices

This section discusses removal and replacement procedures for the mass storage devices supported on the Compaq Professional Workstation SP750.

Drive Positions

The Compaq Professional Workstation SP750 can house up to seven mass storage devices. The following illustration identifies the physical drive locations. Refer to the corresponding table for a list of the recommended drive configurations.

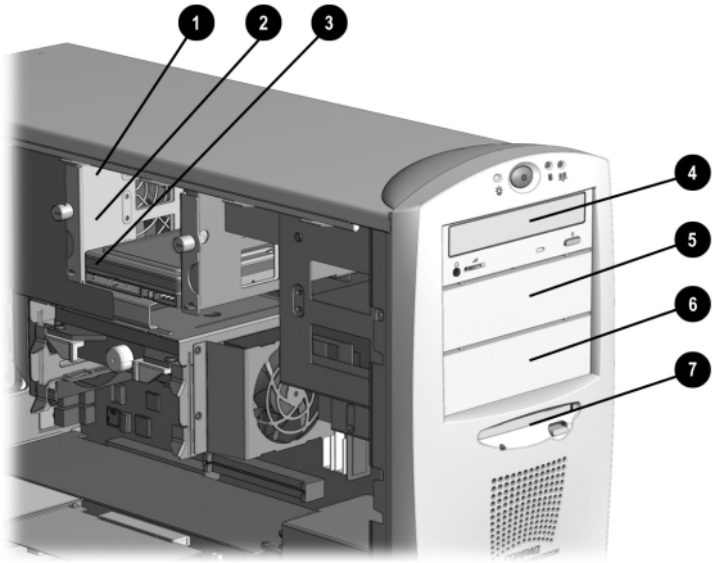


Figure 4-8. Drive positions

Table 4-1
Drive Positions

Item	Component	Description
❶	Bay 1	Part of the removable hard drive cage. A 3.5-inch, third-height bay that supports a 1.0-inch hard drive or a 1.6-inch hard drive.
❷	Bay 2	Part of the removable hard drive cage. A 3.5-inch, third-height bay that supports a 1.0-inch hard drive. Bay 2 is not available when a 1.6-inch hard drive is installed in either bay 1 or bay 3.
❸	Bay 3	Part of the removable hard drive cage. A 3.5-inch, third-height bay that supports a 1.0-inch hard drive or a 1.6-inch hard drive.
❹	Bay 4	5.25-inch, half-height bay that supports 1.0-inch or 1.6-inch storage devices. Either a CD-ROM drive or DVD-ROM drive is shipped in bay 4.
❺	Bay 5*	5.25-inch, half-height bay that supports 1.0-inch or 1.6-inch storage devices.
❻	Bay 6*	5.25-inch, half-height bay that supports 1.0-inch or 1.6-inch storage devices.
❼	Bay 7	3.5-inch, third-height bay that supports a 1.0-inch device. A standard 3.5-inch diskette drive is shipped in bay 7.

* An optional Zip drive can be installed in bay 5 or 6.

CAUTION: If a drive is not installed in bays 5 or 6 or if the bays are empty, be sure an EMI/cooling shield is installed to ensure proper airflow and cooling.

Hardware Screws

There are 17 extra hardware screws on the side of the air plenum. The top group of eight screws ❶ is for installing hard drives in the removable hard drive cage. The bottom group of nine screws ❷ is for installing removable media storage devices in the front drive bays.

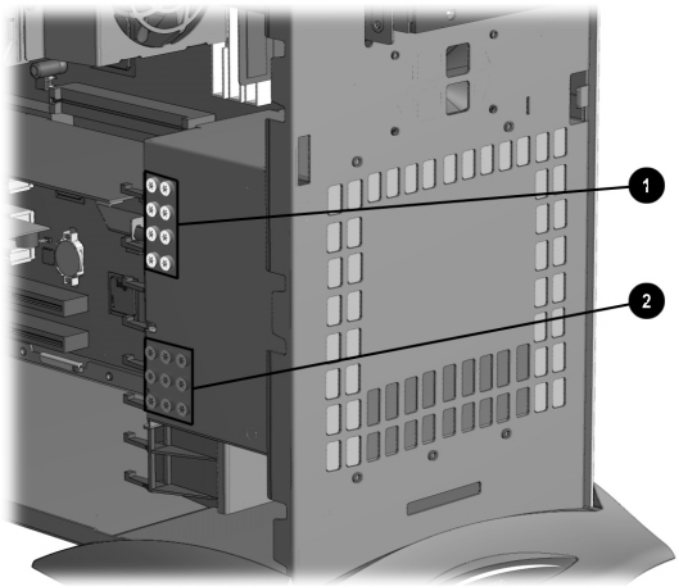


Figure 4-9. Hardware screws for drive bay installations

CD-ROM Drive

NOTE: This procedure also applies to removing a DVD-ROM drive.

To remove the CD-ROM or DVD-ROM drive:

1. Perform the steps in the "Service Preparations" section in this chapter, then place the workstation on its side.

CAUTION: Before removing the side 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 following components:
   - Side access panel
   - Front bezel
3. Remove the two screws securing the right side of the drive.
4. Slide the drive slightly out of the drive cage.
5. Disconnect all cables from the rear of the CD-ROM drive.
6. Pull the drive straight out of the chassis.

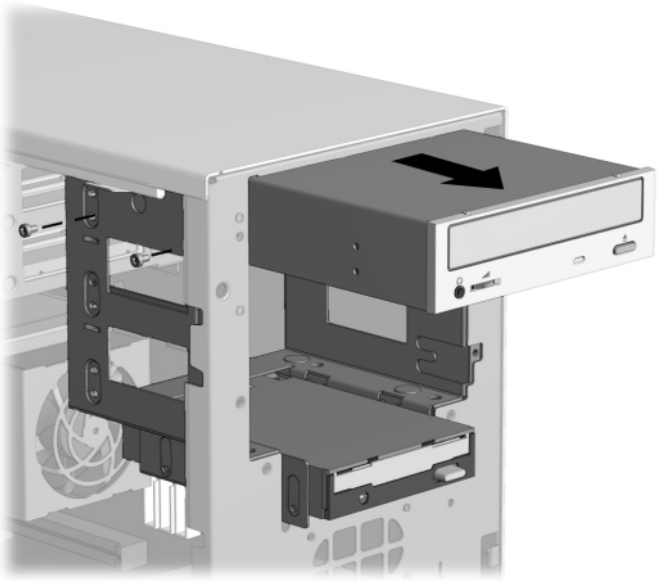


Figure 4-10. Removing the screws and sliding the CD-ROM drive out of the drive cage

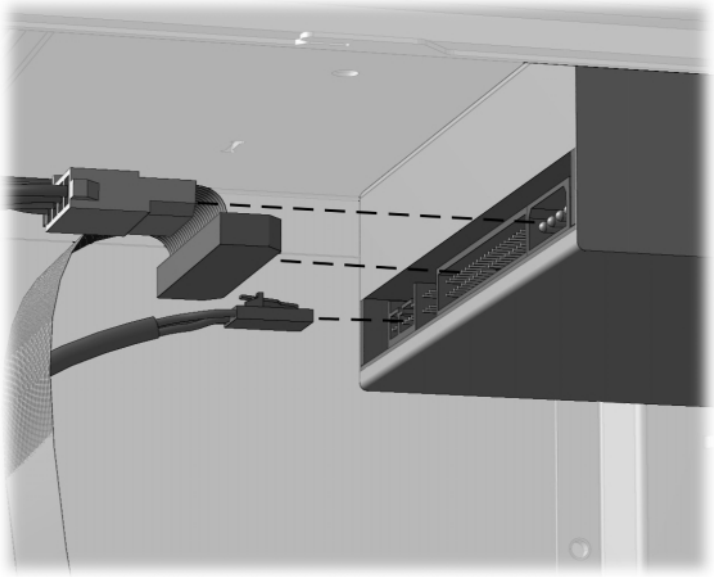


Figure 4-11. Disconnecting the cables from the CD-ROM drive

To replace the CD-ROM or DVD-ROM drive, reverse the above procedure.

CAUTION: Use only 3/16-inch or 5-mm screws as guide screws. Longer screws can damage the internal components of the drive. Be sure to transfer the guide screw from the old drive to the new one. The screw is installed on the right front side of the drive. Note that extra guide screws are provided on the side of the air plenum.

CAUTION: When servicing the workstation, be sure cables are placed in their proper locations during the reassembly process. Improper cable placement can damage the workstation.

Diskette Drive

IMPORTANT: Before beginning the removal procedure, be sure there is no diskette in the drive.

To remove the diskette drive:

1. Perform the steps in the “Service Preparations” section in this chapter, then place the workstation on its side.

CAUTION: Before removing the side 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 following components:
   - Side access panel
   - Front bezel
3. Disconnect the cables from the back of the diskette drive.

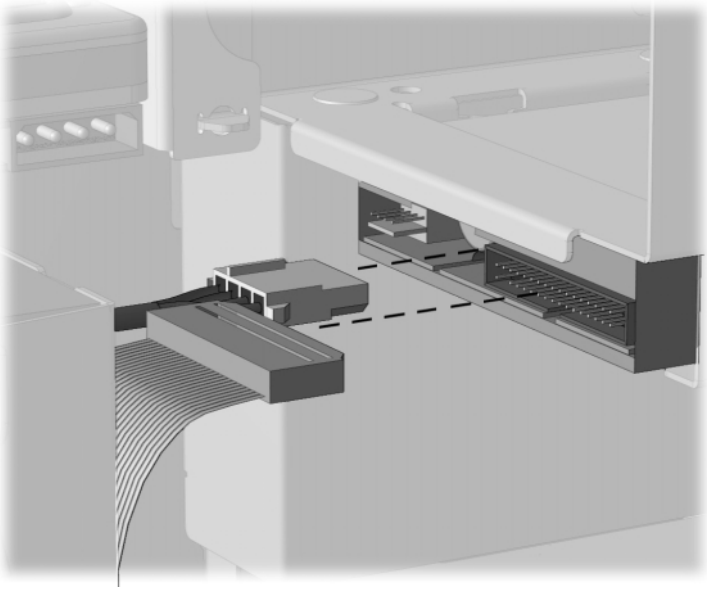


Figure 4-12. Disconnecting the cables from the diskette drive

4. Remove the two screws that secure the diskette drive.
5. Pull the diskette drive straight out of the drive cage.

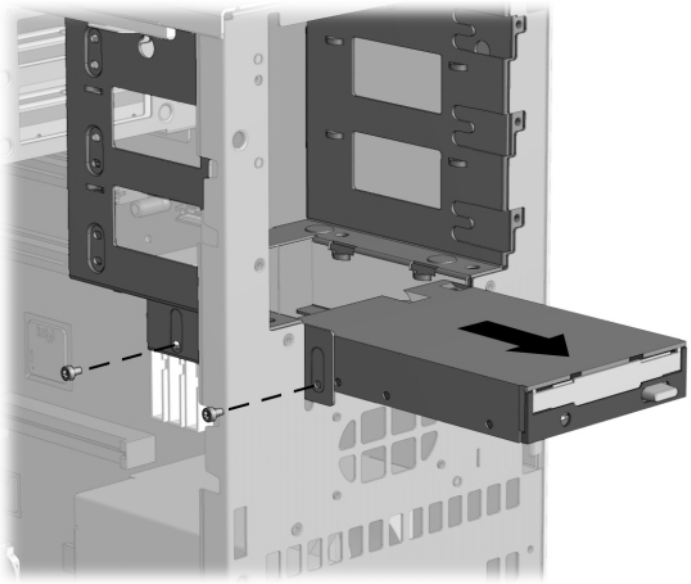


Figure 4-13. Removing the diskette drive

To replace the diskette drive, reverse the above procedure.

CAUTION: Use only 3/16-inch or 5-mm long screws. Longer screws can damage the internal components of the drive. If you are replacing the drive with a new one, transfer the guide screw from the old drive to the new one. Be sure the guide screw is placed in the first hole on the right side of the drive. Note that extra guide screws are provided on the side of the air plenum.

CAUTION: When servicing the workstation, be sure cables are placed in their proper locations during the reassembly process. Improper cable placement can damage the computer.

Removing a Hard Drive from Bays 5 or 6

Drive bays 5 and 6 can be configured with either a 1.0-inch or 1.6-inch hard drive. To remove a hard drive:

NOTE: Before removing a SCSI device, please read the "SCSI Guidelines" chapter in the *Compaq Service Reference Guide*.

1. Turn off the workstation and disconnect the power cord from the grounded AC outlet and the back of the workstation.

CAUTION: Before removing the side 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 following components:
   - Side access panel
   - Front bezel
3. Refer to the following illustrations to remove a hard drive from bays 5 or 6.

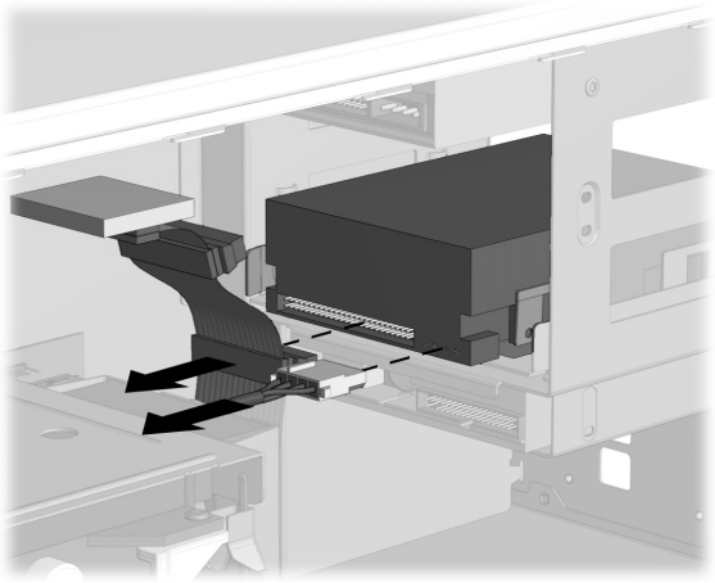


Figure 4-14. Disconnecting the SCSI signal cable and power cable

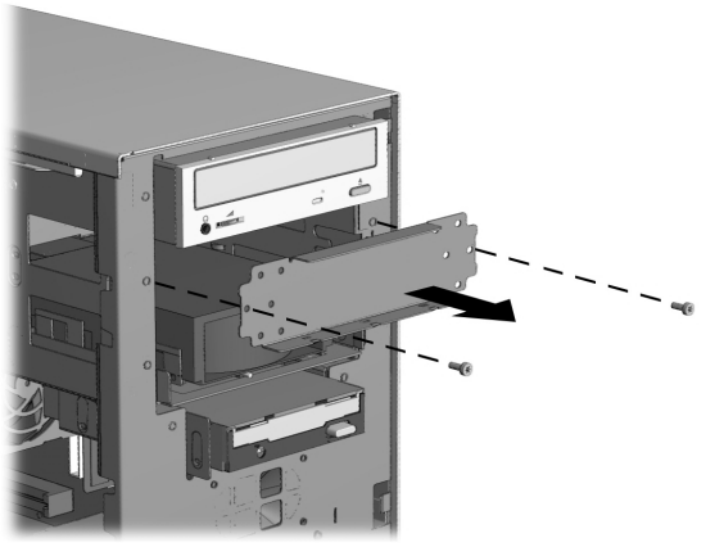


Figure 4-15. Removing the EMI/cooling shield

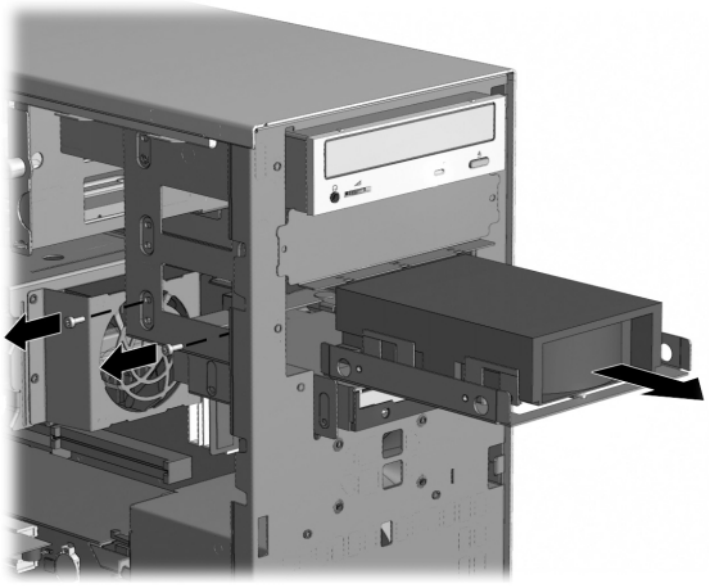


Figure 4-16. Removing the hard drive

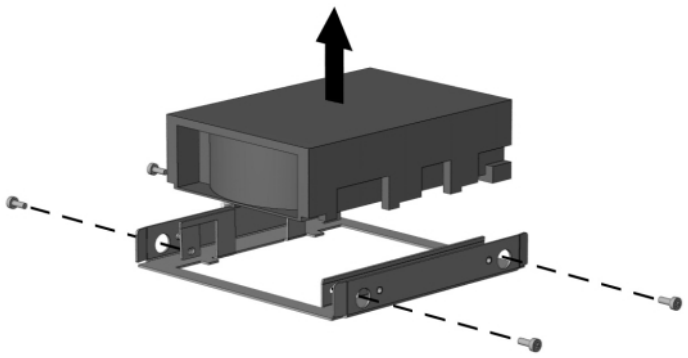


Figure 4-17. Removing a hard drive from the hard drive bracket

To replace the hard drive, reverse the previous procedure.

Removing a Hard Drive from the Removable Hard Drive Cage in Bays 1 through 3

NOTE: The removable hard drive cage supports up to three 1.0-inch hard drives or two 1.6-inch hard drives. Other than using different screw holes, the removal and replacement for both drives is basically the same.

To remove a hard drive from the removable hard drive cage:

1. Perform the steps in the "Service Preparations" section in this chapter, then place the workstation on its side.

CAUTION: Before removing the side 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 following components:
   - Workstation feet
   - Side access panel
3. Disconnect the cables from the back of the hard drive.

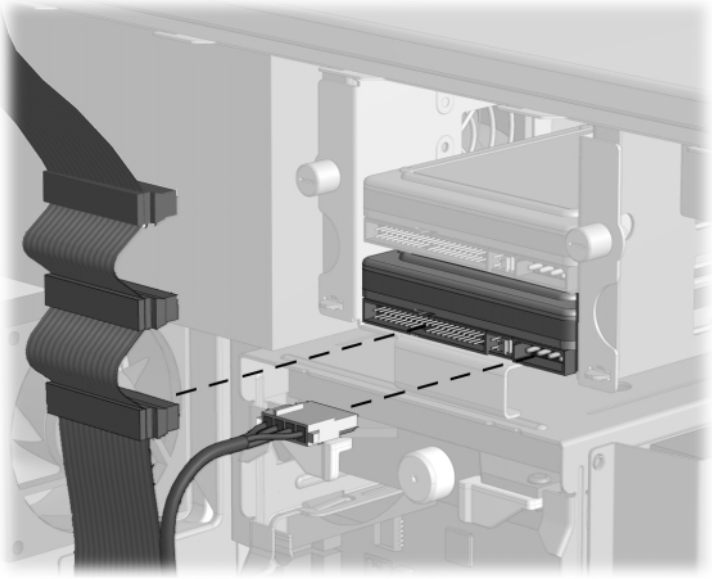


Figure 4-18. Disconnecting the cables from the back of a hard drive

4. Pull back the power supply air baffle, as illustrated in the "Power Supply Air Baffle" section in this chapter, to access the hard drive cage.
5. Loosen the two thumbscrews that hold the drive cage in place.
6. Slide the drive cage out of the chassis.

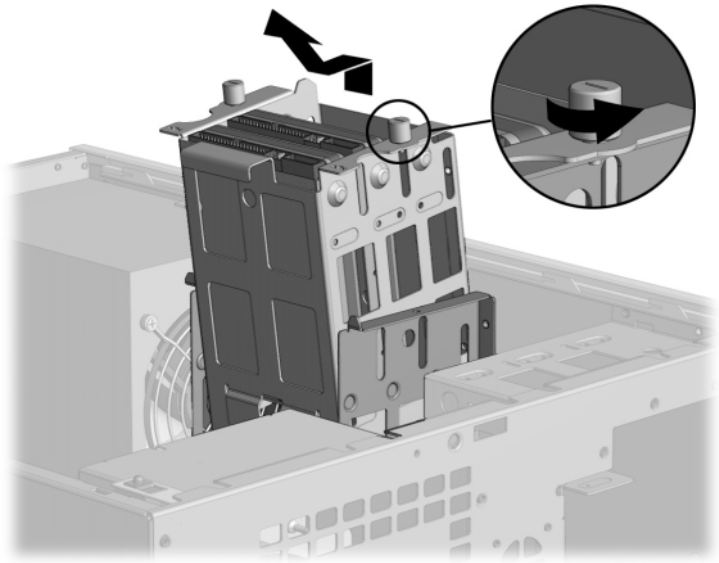


Figure 4-19. Removing the removable hard drive cage

7. Remove the four hard drive screws that secure the hard drive in the removable hard drive cage, then pull the hard drive straight out.

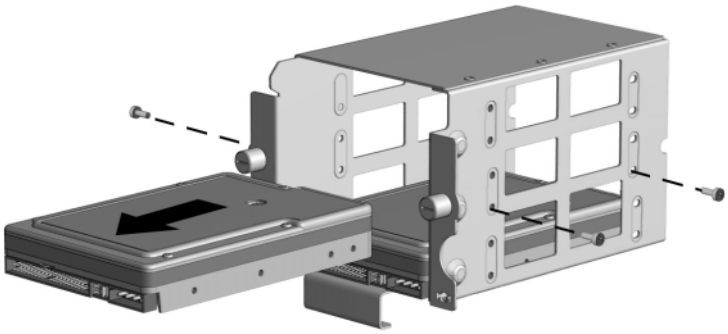


Figure 4-20. Removing a hard drive from the removable hard drive cage

CAUTION: When servicing the workstation, make sure cables are placed in their proper locations during the reassembly process. Improper cable placement can damage the workstation.

Installing a Hard Drive in the Removable Hard Drive Cage in Bays 1 through 3

NOTE: Before installing a SCSI device, please read the "SCSI Guidelines" chapter in the *Compaq Service Reference Guide*.

To install a hard drive in the removable hard drive cage:

1. Perform the steps in the "Service Preparations" section in this chapter, then place the workstation on its side.

CAUTION: Before removing the side 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 following components:
   - ❑ Workstation feet
   - ❑ Side access panel
   - ❑ Removable hard drive cage
3. Remove four hard drive screws (top group of screws) from the side of the air plenum located at the front of the workstation.
4. Locate the correct hard drive cage screw holes for the hard drive you are installing.

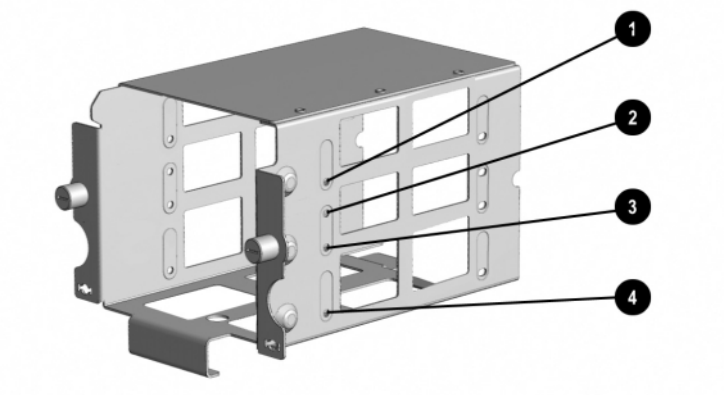


Figure 4-21. Locating the removable hard drive screw holes

Table 4-2
Hard Drive Screw Holes

Item	Location
❶	1.0-inch drive
❷	1.6-inch drive
❸	1.0-inch drive
❹	1.0-inch or 1.6-inch drive

5. Install an optional hard drive in the removable hard drive cage.

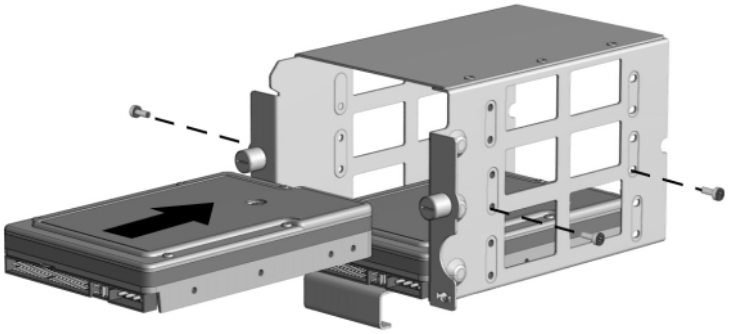


Figure 4-22. Installing a 1.0-inch hard drive

6. Reinstall the removable hard drive cage.

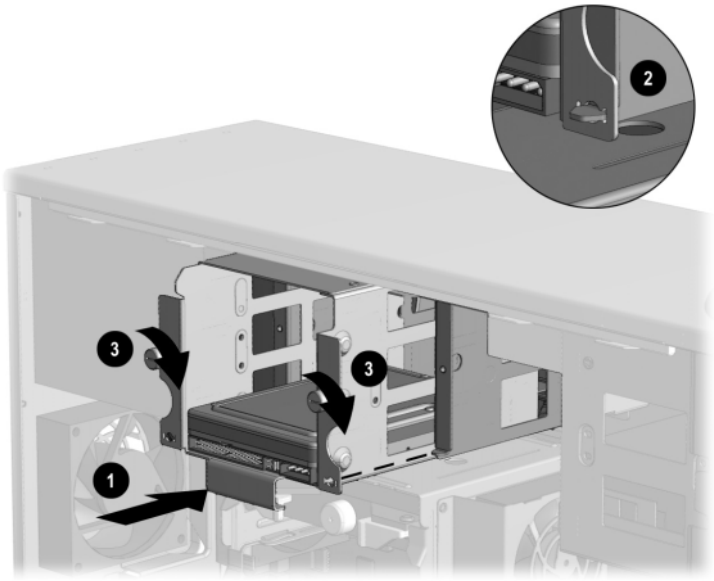


Figure 4-23. Reinstalling the removable hard drive cage

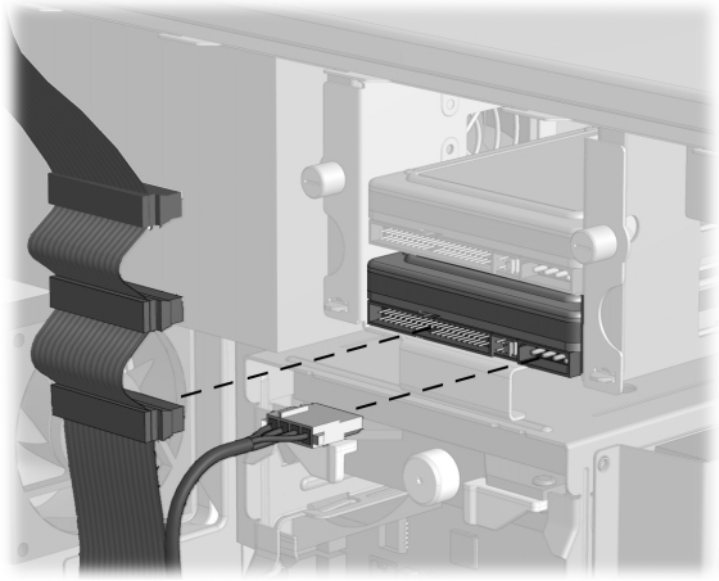


Figure 4-24. Connecting the signal and power cables to the hard drive

7. Reassemble the workstation.

SCSI Cables and Guidelines

All workstation models use the following three areas for connecting mass storage SCSI devices:

1. Internally with hard drives in the removable hard drive cage
2. Internally with storage devices in the front panel drive bays
3. Externally with external storage devices

The workstation ships standard with a five-device SCSI cable. One end of this cable connects to the internal Channel 1 and the other end (first device connector) of the cable connects to the hard drives in the removable hard drive cage. The cable has five connectors to handle up to five SCSI devices, a maximum of three in the removable hard drive cage and two in the front drive bay area.

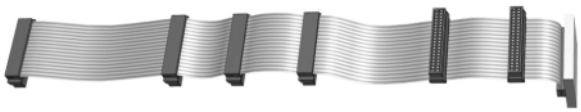


Figure 4-25. Five-device SCSI cable

NOTE: Before removing a SCSI device, please read the "SCSI Guidelines" chapter in the *Compaq Service Reference Guide*.

Expansion Boards

This section discusses removal and replacement procedures for PCI expansion boards.

NOTE: The following instructions also apply to installing and removing graphics controllers. Additional information on your graphic controllers may be found on the Workstation Reference Library CD.

The Compaq Professional Workstation SP750 contains four 32-bit/33-MHz and two 64-bit/66-MHz PCI expansion slots. The following figure identifies the physical locations of these slots. See Table 4-3 for component names.

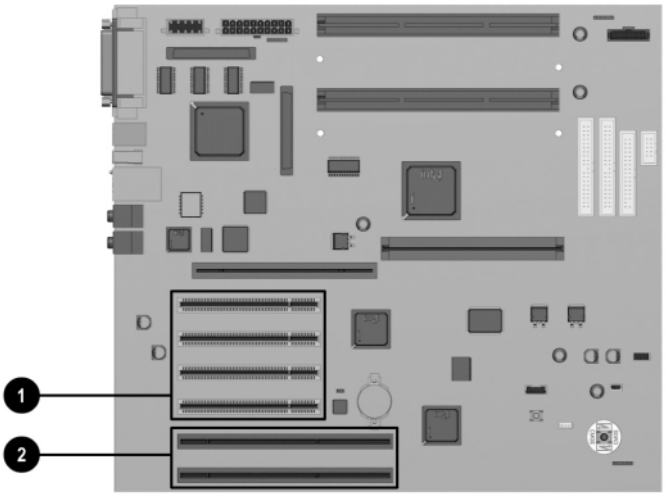


Figure 4-26. Identifying PCI expansion slots

Table 4-3
PCI Expansion Slots

Item	Component	Bus Location
❶	Four 32-bit/33-MHz PCI expansion slots	Primary bus
❷	Two 64-bit/66-MHz PCI expansion slots	Secondary bus

Removing an Expansion Board

To remove an expansion board:

1. Perform the steps in the "Service Preparations" section in this chapter, then place the workstation on its side.

> **CAUTION:** Before removing the side 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 access panel.
3. Disconnect any cables attached to 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. Do not scrape the board against other components.

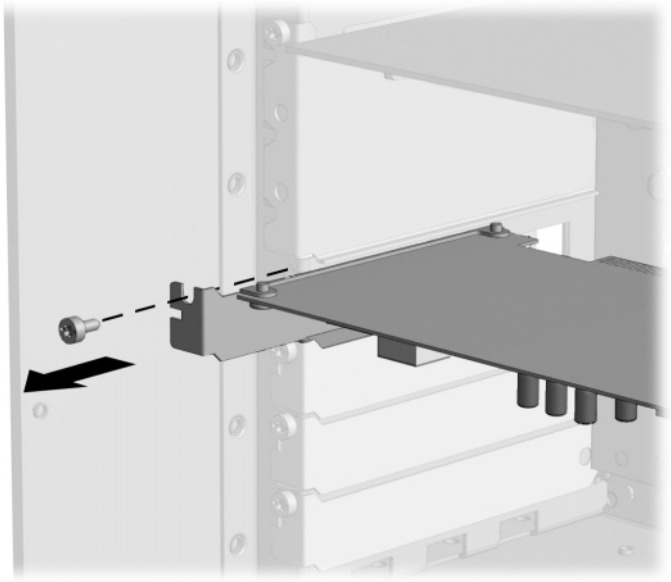


Figure 4-27. Removing an expansion board

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

Installing an Expansion 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 side access panel and locate the correct vacant PCI slot.
3. Remove the screw securing the expansion slot cover, then remove the slot cover, as illustrated.

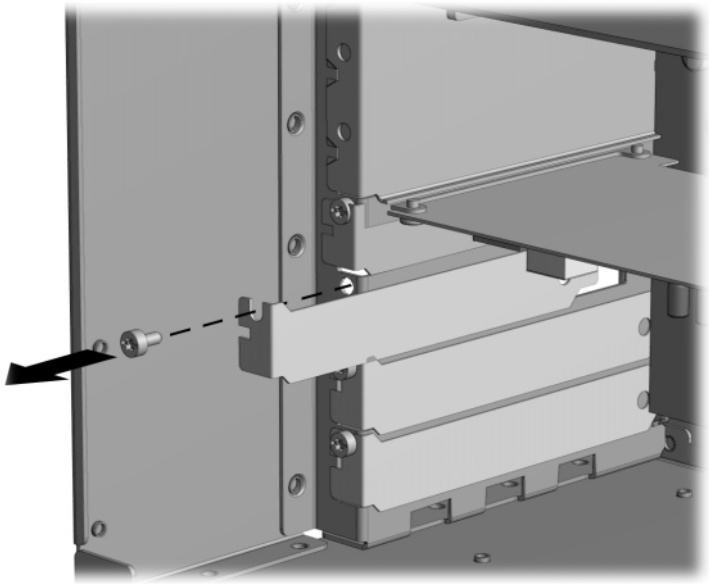


Figure 4-28. Removing the screw and expansion slot cover

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

4. Slide the expansion board into the expansion slot and press the board firmly into place.

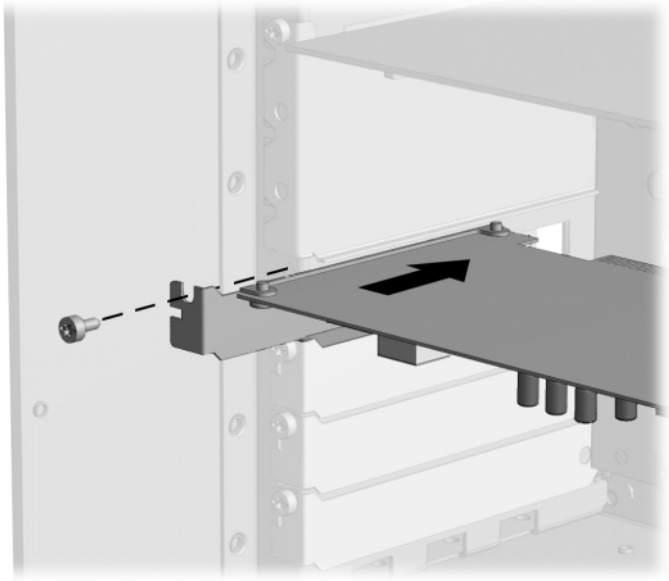


Figure 4-29. Installing an expansion board

IMPORTANT: When installing 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 board, make sure the card is engaged with the card guide.

5. Replace the screw at the side of the expansion slot.
6. Replace the side access panel.
7. Connect external cables to the installed board, if necessary.
8. Plug the network cable back into the system. Reconnect external devices. Plug the power cord back into the grounded AC outlet.

Memory Components

The Compaq Professional Workstation SP750 includes a memory expansion board that must be removed from the system board to remove and replace memory modules.

Overview

The Compaq Professional Workstation SP750 supports 600- or 800-MHz Direct Rambus Inline Memory Modules (RIMMs). Additional RIMMs are available to upgrade the memory. Continuity RIMMs (CRIMMs) are also available to populate empty RIMM slots.

The workstation ships with an eight-RIMM slot memory expansion board with two Direct RDRAM channels. The workstation supports 2 GB of memory with 256-MB Direct DRAM technology, or 4 GB using 512-MB RIMMs (when available). A maximum of 32 Direct RDRAM devices is supported per channel. See the “Eight-RIMM Slot Memory Board” section in this chapter for more information.

NOTE: The procedures for removing the memory board must be followed to access your RIMM slots.

Removing a Memory Board

To remove a memory board:

1. Perform the steps in the “Service Preparations” section in this chapter, then place the workstation on its side.

> **CAUTION:** Before removing the side 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 access panel and locate the memory board in the memory board connector ❶ on the workstation system board.

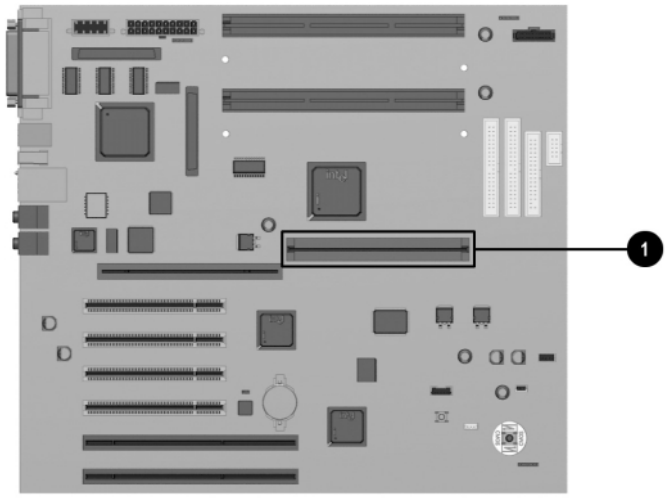


Figure 4-30. Locating the memory board connector on the system board

3. Loosen the thumbscrew on the back of the metal slot cover that secures the memory board to the expansion slot.

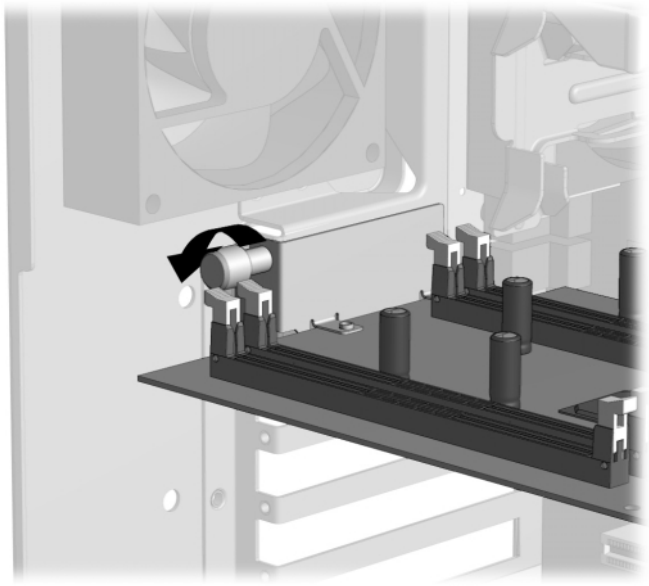


Figure 4-31. Loosening the thumbscrew on the back of the metal slot cover

4. To release the memory board, press downward on the plastic release latch holding the memory board in the memory board retainer.
5. Carefully remove the memory board from the memory board connector.

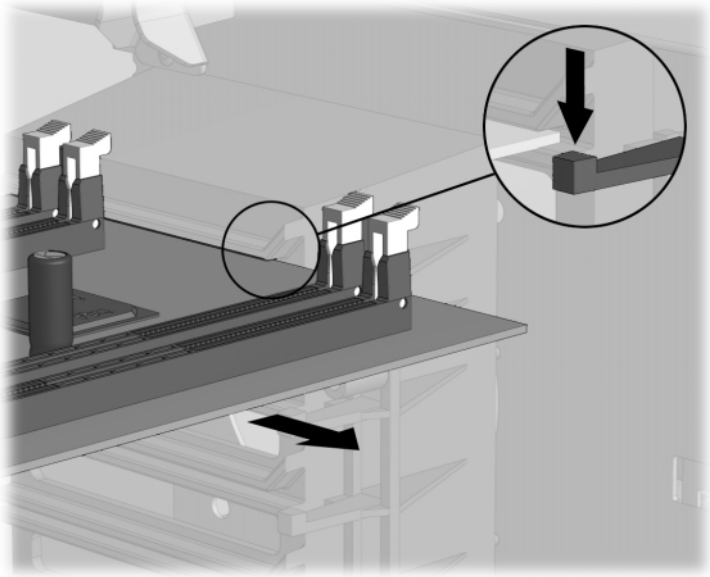


Figure 4-32. Releasing and removing the memory board from the memory board connector.

To install the memory board, reverse the above procedure.

RIMM Slot Locations

The Compaq Professional Workstation SP750 ships with an eight-RIMM slot memory expansion board (four RIMM slots per memory channel).

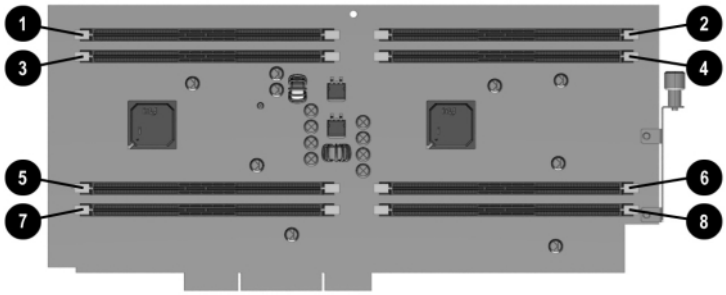


Figure 4-33. Location of eight RIMM slots

Table 4-4
RIMM Slot Locations

Identifier	RIMM Slot	Memory Channel
❶	RIMM Slot 1	Channel B
❷	RIMM Slot 2	Channel A
❸	RIMM Slot 3	Channel B
❹	RIMM Slot 4	Channel A
❺	RIMM Slot 5	Channel B
❻	RIMM Slot 6	Channel A
❼	RIMM Slot 7	Channel B
❽	RIMM Slot 8	Channel A

RIMM Slot Configurations

When installing RIMMs on the eight-RIMM slot memory board, you must follow one of the following four configurations:

Configuration 1

Table 4-5
Configuration 1 (One Pair of RIMMs)

Location	Contents
RIMM Slots 1 and 2	CRIMM
RIMM Slots 3 and 4	RIMM
RIMM Slots 5 and 6	Empty
RIMM Slots 7 and 8	Empty

Configuration 2

Table 4-6
Configuration 2 (Two Pairs of RIMMs)

Location	Contents
RIMM Slots 1 and 2	RIMM
RIMM Slots 3 and 4	RIMM
RIMM Slots 5 and 6	Empty
RIMM Slots 7 and 8	Empty

Configuration 3

Table 4-7
Configuration 3 (Three Pairs of RIMMs)

Location	Contents
RIMM Slots 1 and 2	RIMM
RIMM Slots 3 and 4	RIMM
RIMM Slots 5 and 6	RIMM
RIMM Slots 7 and 8	CRIMM

Configuration 4

Table 4-8
Configuration 4 (Four Pairs of RIMMs)

Location	Contents
RIMM Slots 1 and 2	RIMM
RIMM Slots 3 and 4	RIMM
RIMM Slots 5 and 6	RIMM
RIMM Slots 7 and 8	RIMM

WARNING: To reduce the risk of personal injury when replacing or removing RIMMs, allow the module being removed from the RIMM slot sufficient time to cool. RIMM temperatures can reach 100°C (212°F).

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

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

Important Guidelines for RIMM Installation

When installing RIMMs, you must follow the guidelines in Table 4-9.

CAUTION: The listed guidelines must be followed when installing RIMMs or your workstation will not function.

Table 4-9
Important Guidelines for RIMM Installation

Guideline	Comment
Use only 64-, 128-, or 256-MB, 600-MHz or 800-MHz Error Checking and Correcting (ECC) RIMMs.	RIMMs must support Error Checking and Correcting (ECC).
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.
RIMMs must be installed correctly.	Be sure to match the two key slots on the RIMM with the tab on the RIMM slot. Push the RIMM down into the RIMM slot, ensuring that it is fully inserted and properly seated.
Install RIMMs in pairs across both channels.	Each RIMM slot populated with a RIMM or CRIMM on channel A must be populated with an identical RIMM or CRIMM on Channel B.
Do not mix 600-MHz with 800-MHz RIMMs.	Performance will reflect the lowest speed RIMMs.

Installing a RIMM

To install a RIMM after the memory board has been removed from the workstation system board:

1. Press outward on the two RIMM slot retainer latches.
2. Place the RIMM in the appropriate RIMM slot ensuring that it is fully inserted and properly seated.

CAUTION: Be sure to follow the correct configuration guidelines respective to your memory board or your system will not function.

3. Press inward on the two retainer latches to secure the RIMM in the slot.

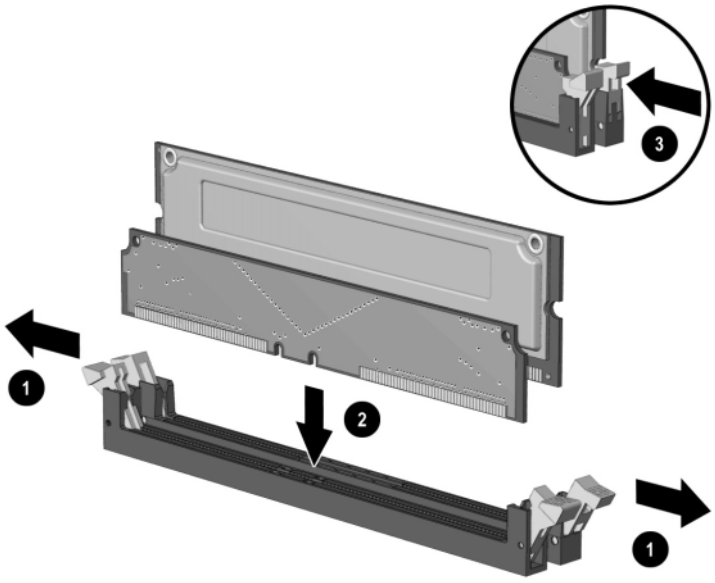


Figure 4-34. Installing a RIMM

To remove a memory module from a RIMM slot, reverse the above procedure.

Installing a Memory Board

To install a memory board:

1. Perform the steps in the "Service Preparations" section in this chapter, then place the workstation on its side.

CAUTION: Before removing the side 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 access panel and locate the memory board that is connected to the workstation system board.
3. Place the memory board into the memory board connector on the system board.

IMPORTANT: When installing a memory board, press firmly on the board so that the whole connector seats properly in the memory board slot. After you install the memory board, make sure the board is engaged with the card guide.

4. Tighten the thumbscrew on the memory board metal slot cover.

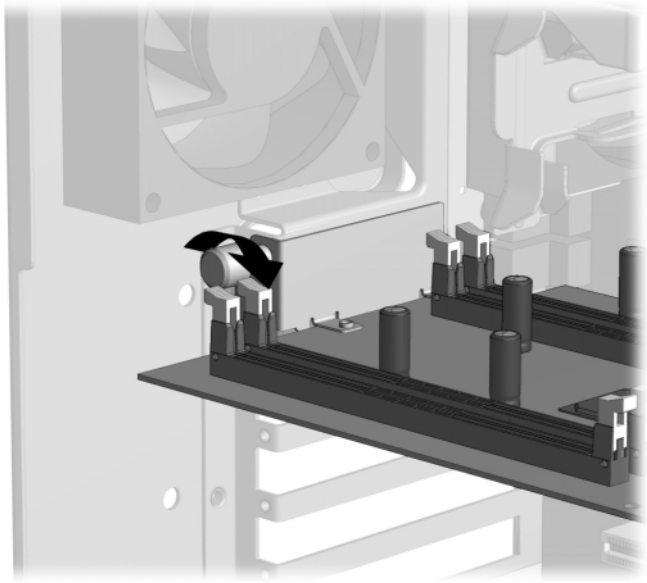


Figure 4-35. Tightening the thumbscrew to secure the memory board

5. Replace the side access panel.
6. Plug the network cable back into the system. Reconnect external devices. Plug the power cord back into the grounded AC outlet.

Removing an Ultra3 SCSI Controller

To remove an Ultra3 SCSI Controller:

1. Perform the steps in the "Service Preparations" section in this chapter, then place the workstation on its side.

CAUTION: Before removing the side 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 following components:
   - Workstation feet
   - Side access panel
3. Disconnect the SCSI cable from the controller.
4. Remove the retaining screw that holds the controller in place.
5. Remove the controller.

To replace the controller, reverse the above procedure.

Accelerated Graphics Port Controller

The workstation ships standard with a graphics controller installed in the Accelerated Graphics Port (AGP) graphics controller slot. The following figure shows the location of the AGP graphics controller slot.

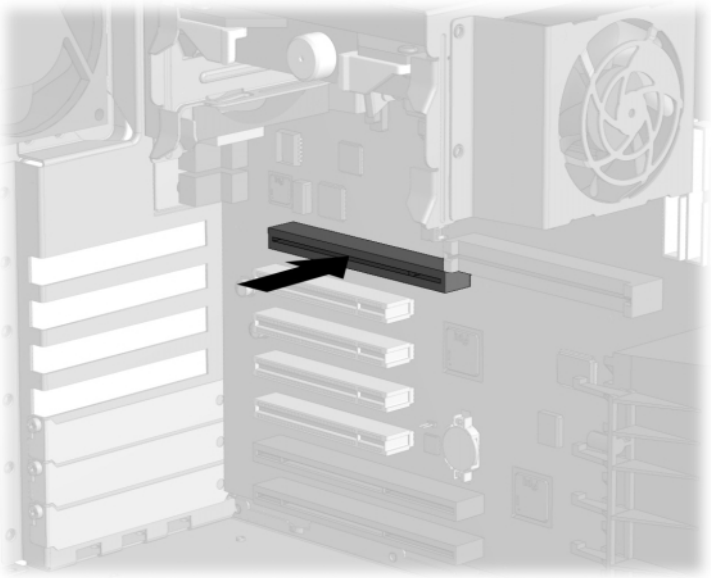


Figure 4-36. Identifying the AGP Pro graphics controller expansion slot

NOTE: AGP Pro specifications allow an AGP Pro card to occupy up to two adjacent PCI slots, with additional components or cards, on your workstation system board.

Removing an AGP Graphics Controller

To remove the AGP graphics controller:

1. Perform the steps in the "Service Preparations" section in this chapter, then place the workstation on its side.

CAUTION: Before removing the side 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 access panel.
3. Disconnect any cables attached to the controller.
4. Remove the screw that secures the controller.

5. Hold the board at each end and carefully rock it back and forth until the connectors pull free from the slot. Do not scrape the board against other components.

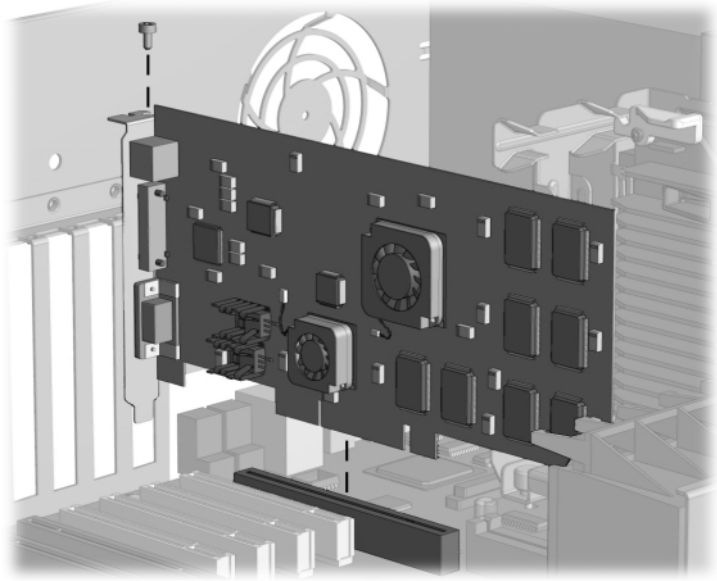


Figure 4-37. Removing an AGP Graphics Controller

6. Store the board in antistatic packaging.

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

7. Replace the side access panel.
8. Plug the network cable back into the system. Reconnect external devices and plug the power cord back into the grounded AC outlet.

To install an AGP graphics controller, reverse the above procedure.

IMPORTANT: To ensure the board fits properly, use AGP graphics controllers with ATX format brackets.

IMPORTANT: When installing an AGP board, press firmly on the board so that the whole connector seats properly in the AGP Pro slot. If you are installing a full-length expansion board, be sure to engage the card guide.

Processor

Removing the Processor

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

To remove the processor and heatsink assembly:

1. Perform the steps in the "Service Preparations" section in this chapter, then place the workstation on its side.

CAUTION: Before removing the side 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 following components:
   - Workstation feet
   - Side access panel
3. Loosen the middle thumbscrew that holds the processor in place ❶.
4. Open the two release latches ❷, then slide out the processor.

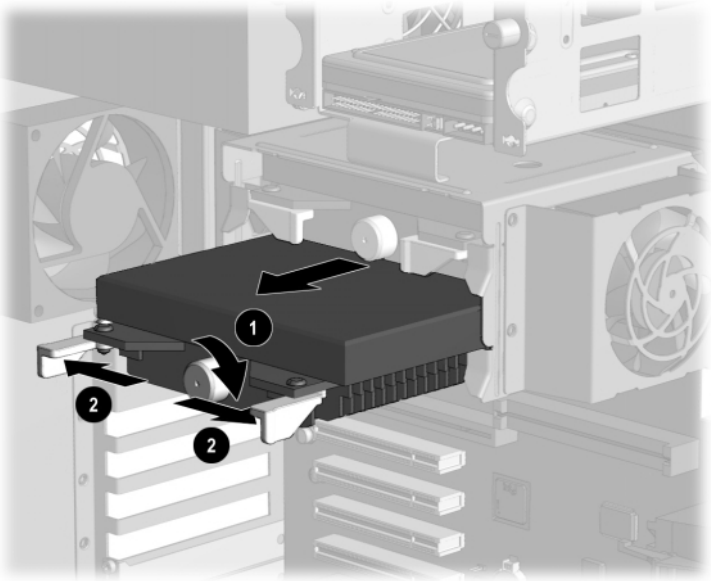


Figure 4-38. Removing the processor and heatsink assembly

CAUTION: Do not separate the processor and the heatsink assembly. Separating the two components can result in damage to the thermal pad.

To replace the processor, reverse the above procedure.

CAUTION: After connecting the power cord to the grounded AC outlet and to the workstation, **DO NOT** turn on the power switch if the power LED is a steady amber color. A steady amber color indicates that the processor is not seated properly.

Installing an Additional 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.

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

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

CAUTION: Before removing the side 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.

To install a second 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 access panel.
3. Install the second processor:
   - Insert the processor ❶, then close the two release latches ❷.
   - Tighten the middle screw ❸.

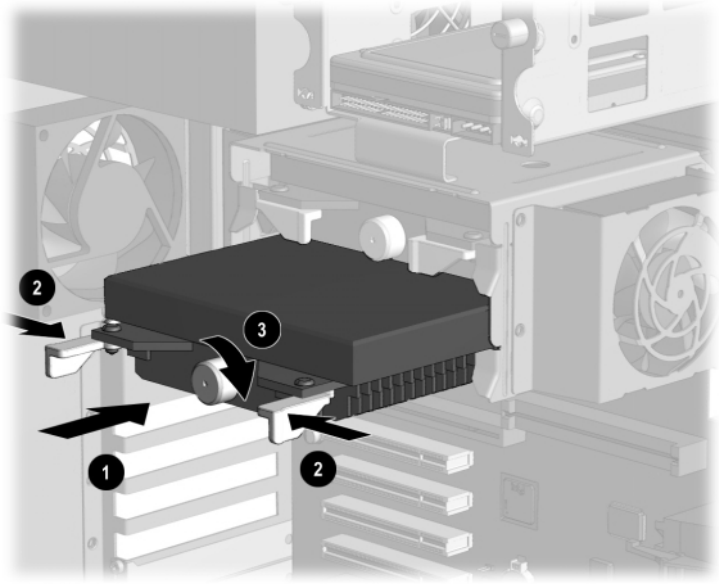


Figure 4-39. Installing a second processor/heatsink assembly

CAUTION: A primary processor must be installed in the primary processor slot when installing a second processor or your workstation will not function.

4. Reassemble the workstation and connect the power cord that was disconnected from the grounded AC outlet or the back of the workstation.

IMPORTANT: When replacing the side access panel, be sure to tighten all four thumbscrews.

Speaker

To remove the speaker:

1. Perform the steps in the “Service Preparations” section in this chapter, then place the workstation on its side.

> **CAUTION:** Before removing the side 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 access panel.
3. Unplug the speaker connector from the system board and remove the cable from the clip.
4. Remove the four T-15 screws securing the front of the speaker to the chassis.
5. Remove the speaker from the workstation by sliding it back, then lifting it up and out of the chassis.

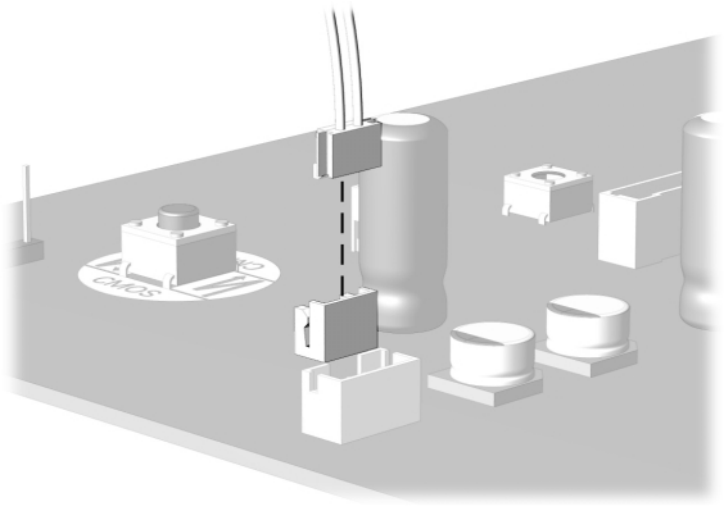


Figure 4-40. Unplugging the speaker connector from the system board

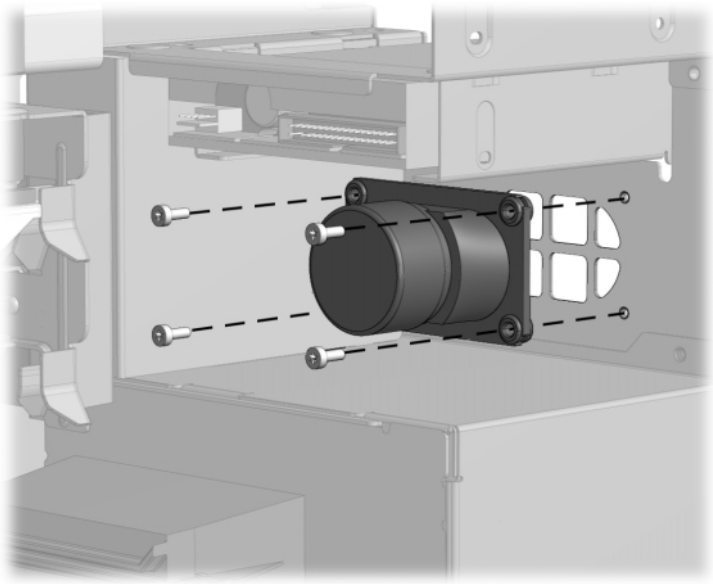


Figure 4-41. Removing the fours screws and removing the speaker

To replace the speaker, reverse the above procedure.

Card Guide

To remove the card guide:

1. Perform the steps in the “Service Preparations” section in this chapter, then place the workstation on its side.

> **CAUTION:** Before removing the side 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 access panel.
3. Remove any expansion cards from the card guide.
4. Remove the two screws attaching the card guide bracket to the air plenum.
5. Remove the four screws securing the card guide to the card guide bracket.
6. Remove the card guide.

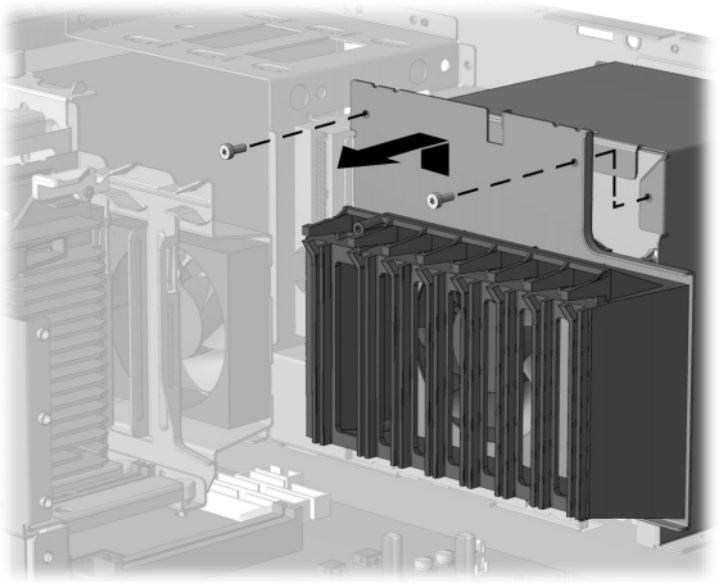


Figure 4-42. Removing the two screws attaching the card guide to the air plenum

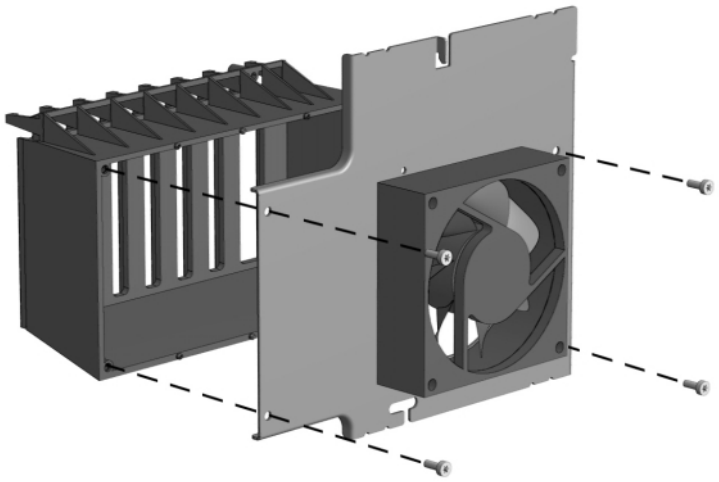


Figure 4-43. Removing the four screws securing the card guide to the card guide bracket

To replace the card guide, reverse the above procedure.

System Fan

To remove the system fan:

1. Perform the steps in the “Service Preparations” section in this chapter, then place the workstation on its side.

> **CAUTION:** Before removing the side 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 access panel.
3. Disconnect the fan cable from the system board and remove the cable from the clip.
4. Remove the card guide as illustrated in the previous section.
5. Remove the four screws securing the fan to the fan bracket.
6. Remove the fan.

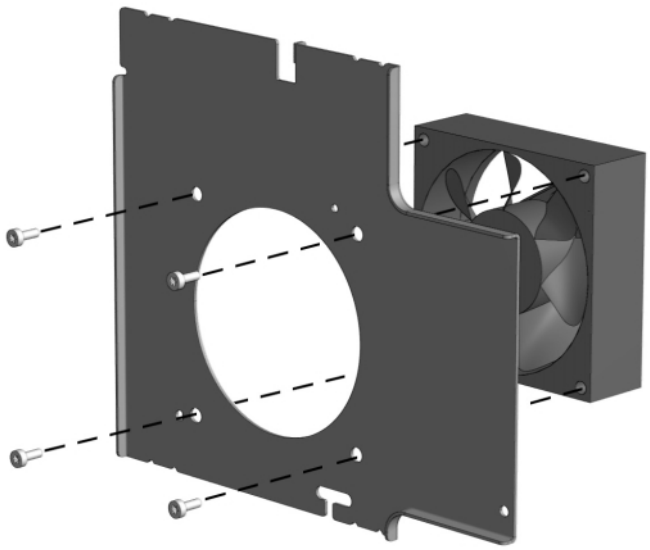


Figure 4-44. Removing the system fan

To replace the system fan, reverse the above procedure.

Processor Cage

To remove the processor cage:

1. Perform the steps in the “Service Preparations” section in this chapter, then place the workstation on its side.

CAUTION: Before removing the side 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 following components:
   - Side access panel
   - Processor
3. Unscrew the processor cage from the chassis.
4. Remove the processor cage.

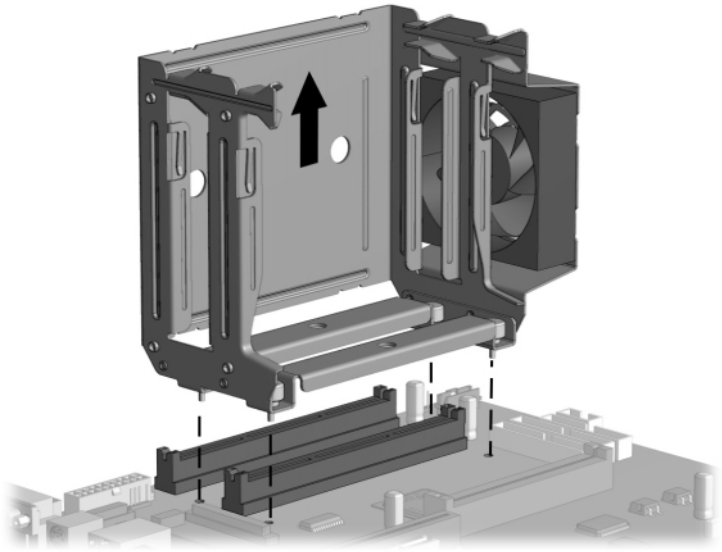


Figure 4-45. Unscrewing the four processor cage screws and removing the processor

To replace the processor cage, reverse the above procedure.

System Board

The system board contains the memory expansion board, primary processor, secondary processor (if installed), AGP graphics controller (if installed), and the battery. Each of these components is spared separately.

The following illustration and Table 4-10 identify the internal system board components of your workstation.

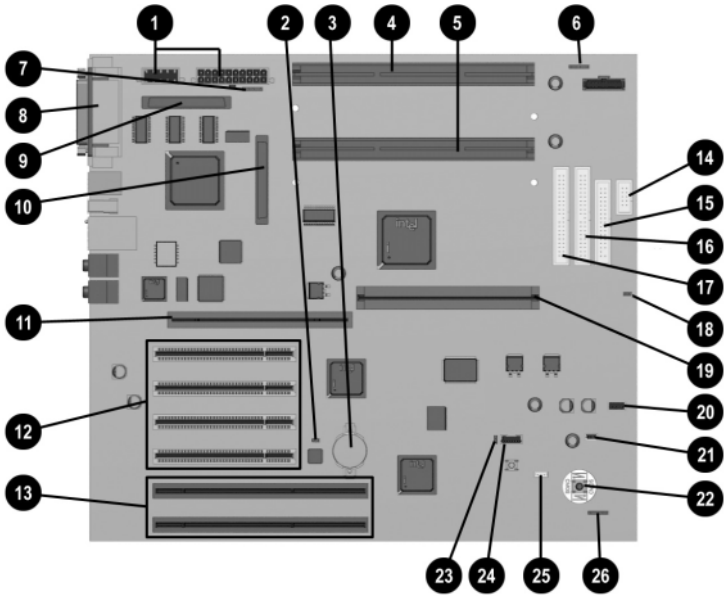


Figure 4-46. Identifying system board components

Table 4-10
System Board Components

Item	Component	Item	Component
❶	Power connectors	⓮	Power switch and LED connector
❷	Clear/disable password header	⓯	Floppy diskette drive connector
❸	Battery	⓰	Secondary IDE Ultra ATA connector
❹	Primary processor slot	⓱	Primary IDE Ultra ATA connector
❺	Secondary processor slot	⓲	SCSI option card LED connector
❻	Processor cage fan connector	⓳	Memory board connector
❼	Back processor fan	⓴	CD connector
❽	External Ultra3 SCSI connector (channel B)	㉑	Speaker connector
❾	Ultra3 SCSI connector (channel B)	㉒	CMOS reset button
❿	Ultra3 SCSI connector (channel A)	㉓	Hood sensor connector
⓫	AGP Pro expansion slot	㉔	Alert-on-LAN connector
⓬	PCI expansion slots 1-4 (32-bit/33-MHz) located on primary bus	㉕	Wake-on-LAN connector
⓭	PCI expansion slots 5 and 6 (64-bit/66-MHz) located on secondary bus	㉖	Chassis fan connector

To remove the system board:

1. Perform the steps in the “Service Preparations” section in this chapter, then place the workstation on its side.

CAUTION: Before removing the side 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 following components:
   - ❑ Workstation feet
   - ❑ Side access panel
   - ❑ Processor cage
3. Disconnect and remove all cables plugged into the system board.
4. Remove the screws securing the system board to the chassis.

5. Remove the system board.

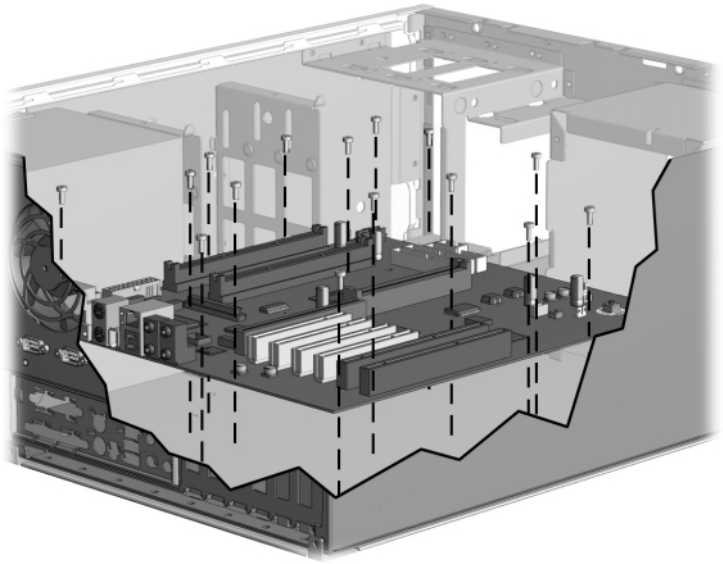


Figure 4-47. Removing the system board

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

Lithium Battery

The battery that comes with your workstation provides power to the real-time clock and has a life of about five years. When replacing the battery, use a CR2032 or equivalent 3-volt lithium coin cell battery.

1. Turn off the workstation and any external devices. Disconnect the power cord from the grounded AC outlet. Disconnect the network cable and any external devices from the system. Remove the side access panel.

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

NOTE: It may be necessary to remove an expansion board to gain access to the battery.

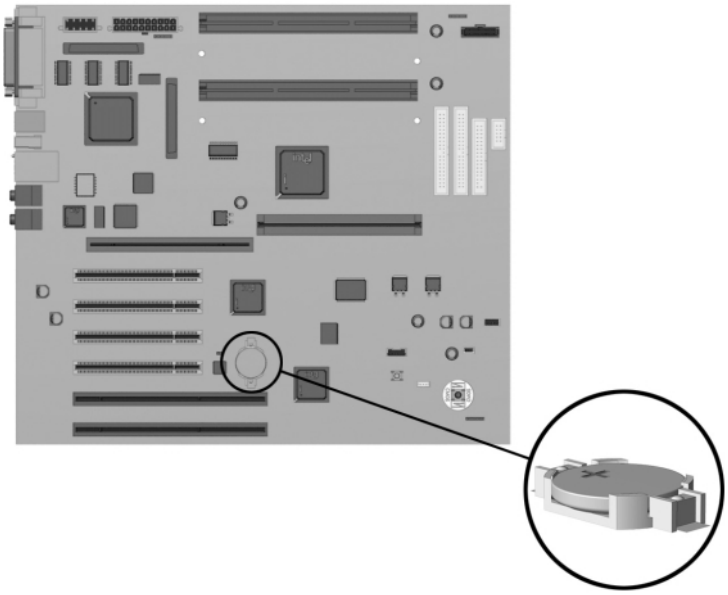


Figure 4-48. Locating the battery on the system board

2. Lift the battery out of its holder.

IMPORTANT: Properly dispose of the old battery.

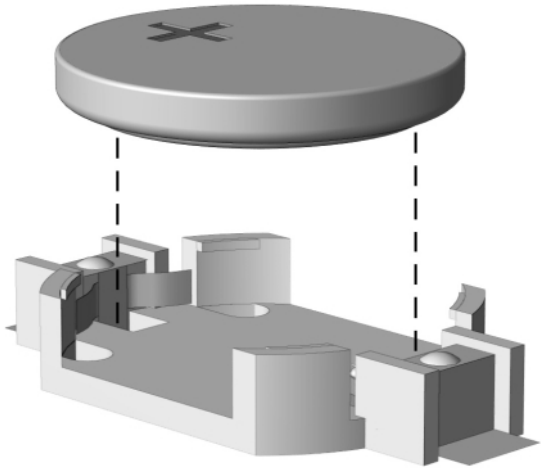


Figure 4-49. Removing the coin cell battery

3. Insert new battery.

NOTE: Positive polarity should be positioned up.

4. The battery holder automatically secures the battery in the proper position.
5. Replace any expansion boards you have removed.
6. Replace the side access panel.
7. Plug the network cable back into the system. Reconnect external devices and plug the power cord back into the grounded AC outlet.

Reset the date and time, your passwords, and any special system setups using Compaq Computer Setup.

Power Switch and LED Cable Assembly

The power switch can be replaced without removing the power supply. To remove the power switch:

1. Perform the steps in the “Service Preparations” section in this chapter, then place the workstation on its side.

CAUTION: Before removing the side 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 following components:
   - Side access panel
   - Front bezel
   - CD-ROM or DVD-ROM drive
3. Disconnect the power switch cable from the system board ❶.
4. Remove the ferrite bead, then remove the cable from the clips ❷.
5. Remove the screws securing the crown assembly, then gently slide the cable through the CD-ROM or DVD-ROM drive bay opening ❸.
6. Remove the power switch and cable from the chassis.

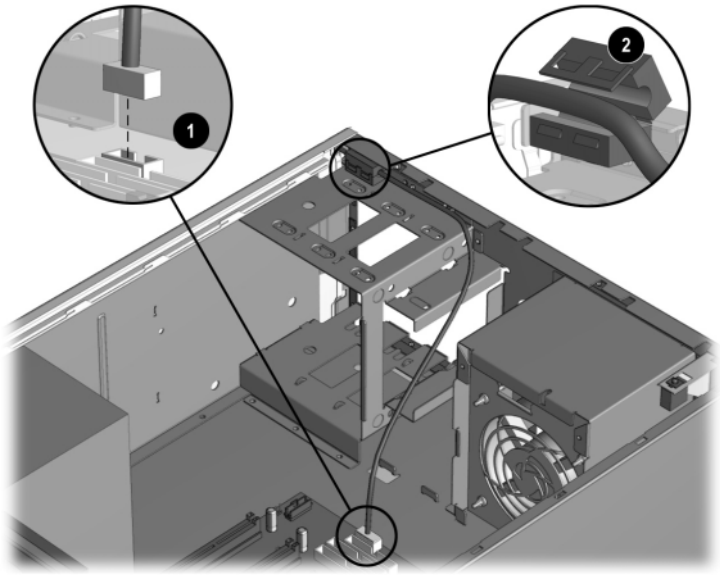


Figure 4-50. Removing the power switch

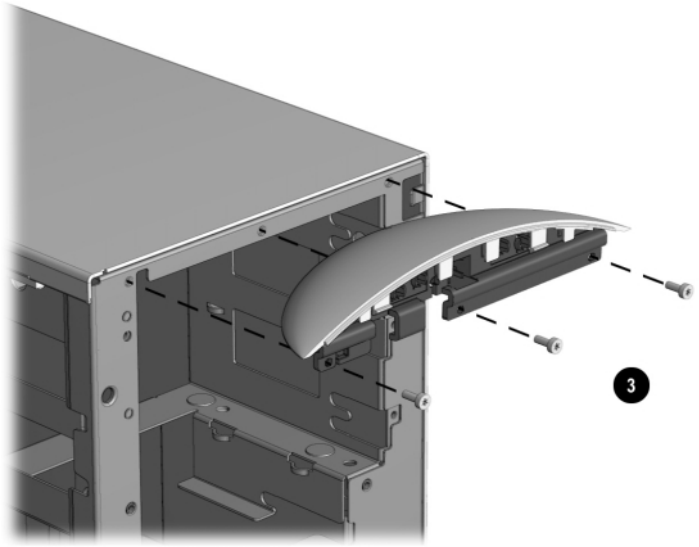


Figure 4-51. Removing the screws securing the crown assembly

To replace the power switch holder, reverse the above procedure.

Power Supply

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

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: 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.

To remove the power supply:

1. Perform the steps in the "Service Preparations" section in this chapter, then place the workstation on its side.

CAUTION: Before removing the side 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 following components:
   - ❑ Workstation feet
   - ❑ Side access panel
   - ❑ Power supply air baffle
   - ❑ Processor cage

CAUTION: Remove the processor cage before removing the power supply in order to properly access the power supply.

3. Remove the five screws that secure the power supply to the back of the chassis.

4. Slide the power supply toward the front of the chassis, then pull up to remove it.

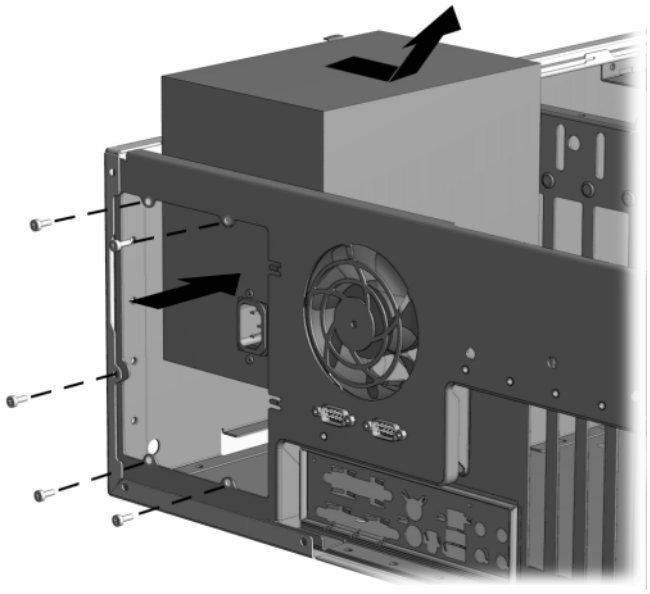


Figure 4-52. Removing the power supply

To replace the power supply, reverse the above procedure.

Chapter **5**

Connectors, Jumpers, and Switches

Overview

This chapter provides jumper and switch information for the Compaq Professional Workstation SP750.

Disable and Clear Password Jumper

To disable the Power-On and Setup Password features, or to clear the Power-On and Setup Passwords if you forget them and cannot access the workstation system or Computer Setup, follow these steps:

1. Turn off the workstation. Disconnect the power cord from the grounded AC outlet and from the power connector on the rear of the workstation.

CAUTION: Before removing the side 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 access panel to access the P49 Jumper on the system board.
3. Remove the P49 Jumper.

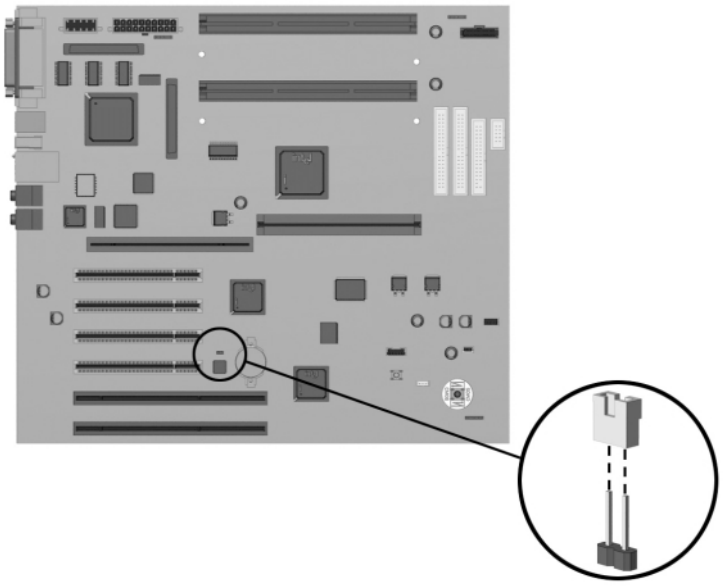


Figure 5-1. Locating the P49 Jumper

4. Reassemble the workstation and reconnect the power cord to the power connector on the rear of the workstation and to the electrical wall outlet.
5. Turn on the workstation.

IMPORTANT: To reenable the Power-On Password feature, reinstall the P49 Jumper.

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.

CMOS Reset Switch

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

1. Turn off the workstation and any external devices, then disconnect the power cord from the back of the workstation and 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 electric 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 them.

CAUTION: Before removing the side 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.

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 side access panel to access the system board.

4. Locate the SW50 pushbutton switch on the system board.

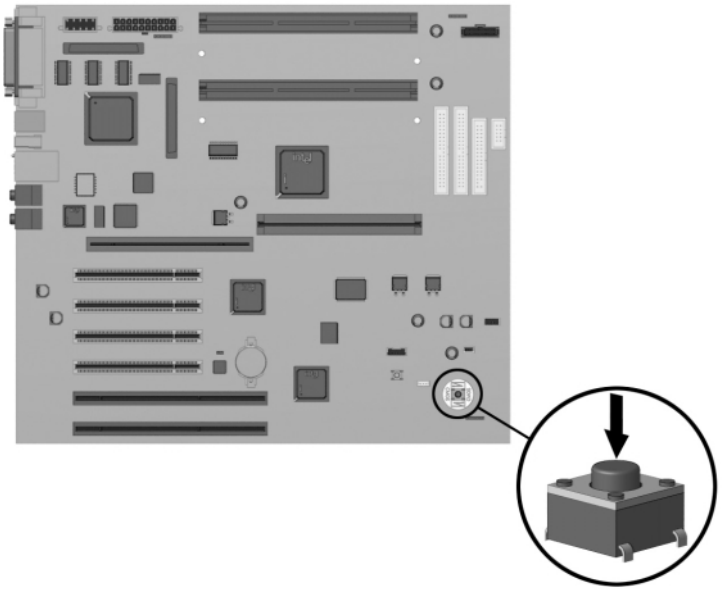


Figure 5-2. Locating the SW50 pushbutton switch on the system board

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

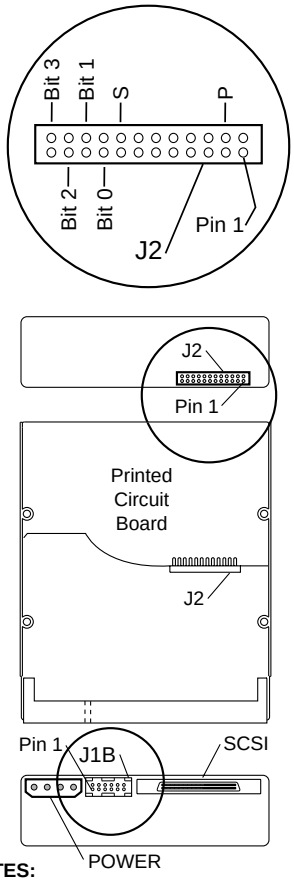
NOTE: When the CMOS pushbutton switch is pressed, your passwords will become invalid because the passwords are stored in the configuration memory. Reset your passwords and any special system setups.

Mass Storage

The Compaq Professional Workstation SP750 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.

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

NOTE:

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

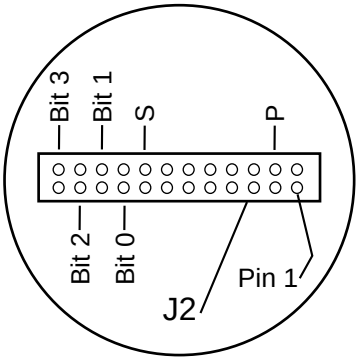
NOTES:

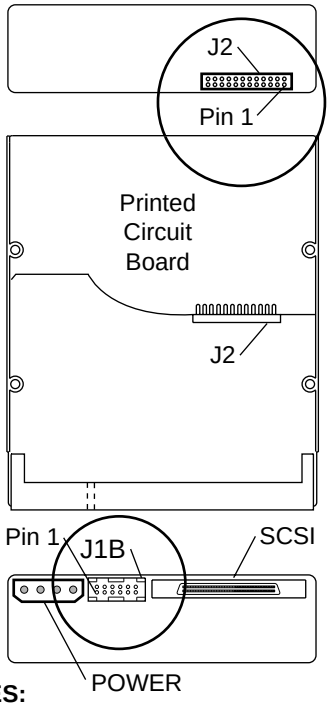
1. All jumper and switch settings are shown in the factory default setting, including those not labeled.
2. Termination is disabled/removed.

Figure 5-3. 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

NOTE:

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

NOTES:

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

Figure 5-4. Locating the jumper positions for the 18-GB hard drive (Ultra3 SCSI)

CD-ROM or DVD-ROM Drive

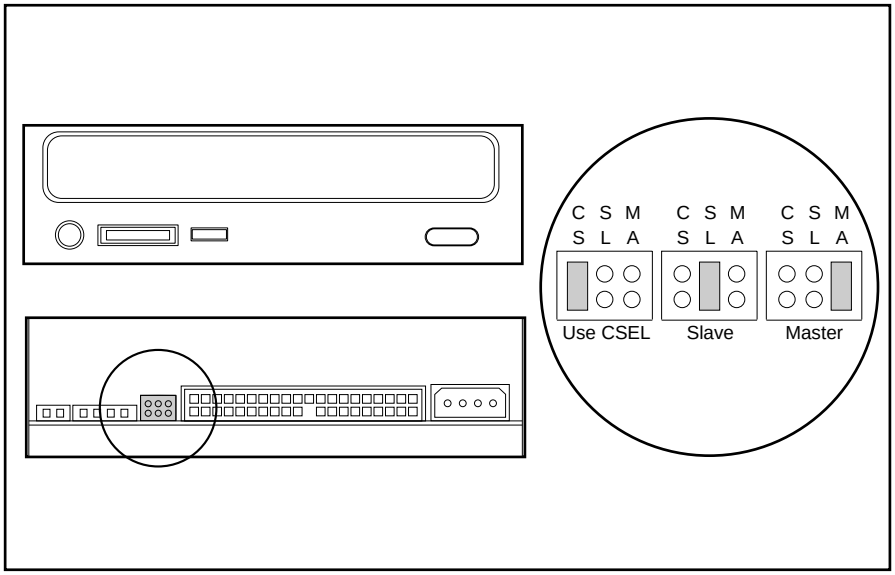
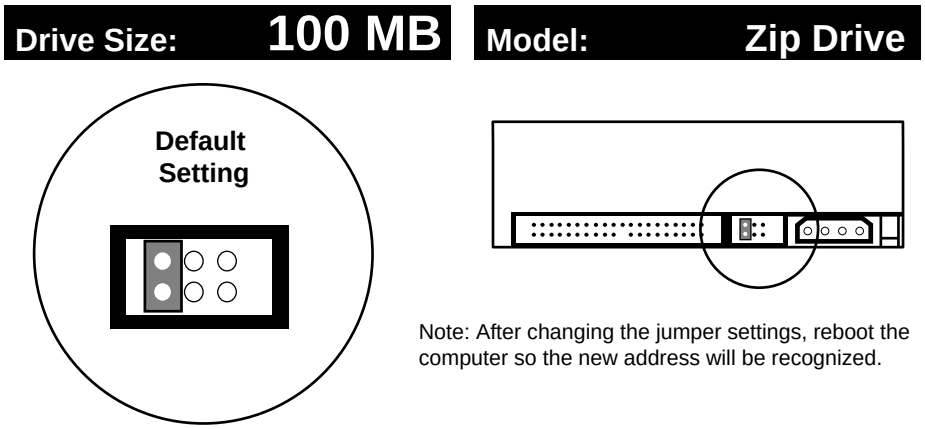


Figure 5-5. Locating the jumper positions for the 40X Max CD-ROM drive (IDE) or the DVD-ROM drive

Zip Drive

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



IDE Settings

Configuration			
Device 0 (Master)	○ ○	○ ○	▪ ○
Device 1 (Slave)	○ ○	○ ○	○ ○
Cable Select (Default)	▪ ○	○ ○	○ ○

Key ○ Jumper NOT Installed

▪ Jumper Installed

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

Chapter **6**

Specifications

Overview

This chapter provides operating and performance specifications for the following Compaq Professional Workstation SP750 hardware:

- System unit
- Diskette drive
- Zip drive
- CD-ROM drive
- DVD-ROM drive
- Hard drives
- Audio system
- Keyboard
- Mouse (Three-button)
- Graphics controllers
- Network controllers

System Unit

Table 6-1
Workstation Specifications

Dimensions (with bezel and without feet)	**U.S.**	**Metric**
Height	18.7 inch	47.50 cm
Depth	23.2 inch	58.90 cm
Width	8.03 inch	20.40 cm
Weight	54.75 lb	24.89 kg
Power Supply Input Requirements	**Low Range**	**High Range**
Rated Input Voltage	100VAC to 120VAC	200VAC to 240VAC
Rated Input Current	8 A	4 A
Rated Input Frequency	50 Hz to 60 Hz	50 Hz to 60 Hz
Input Power	708 W	708 W
Input Power (BTU/H)	2418 BTU/h	2418 BTU/h
Power Supply Output Power		
Rated Steady-State Power	425 W	425 W
Maximum Peak Power	445 W	445 W
Relative Humidity		
Operating	20% to 80%	20% to 80%
Nonoperating	10% to 95%	10% to 95%
Temperature	**U.S.**	**Metric**
Operating	50°F to 104°F	10°C to 40°C
Nonoperating	-40°F to 149°F	-40°C to 65°C

Table 6-2
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 6-3
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 6-4
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 6-4
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	Coprocessor 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 during 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 6-4
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 (second 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 6-5
System Memory Map

Memory Address	Size	System Function
FFFFFFFFh to FFF80000h	512 KB	System ROM
FEEFFFFFh to FEE00000h	1024 KB	Local APIC address range
FECFFFFFh to FEC00000h	1024 KB	I/O APIC address range
FEBFFFFFh 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 is 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	15360 KB	HOST memory expansion
000FFFFFh to 000F0000h	64 KB	System ROM
000EFFFFh to 000E0000h	64 KB	Expansion system ROM
000DFFFFh to 000C0000h	128 KB	Option ROM
000BFFFFh to 000A0000h	128 KB	Video RAM
0009FFFFh to 00000000h	640 KB	Base memory

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

Diskette Drive

Table 6-6
1.44-MB Diskette Drive

Size and Capacity	Specifications
Size	3.5 inch
High density	1.44 MB
Low density	720 KB
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	
Track-to-track (high/low)	3/6 ms
Average (high/low)	94/173 ms
Latency average (ms)	100 ms
Data Transfer Rate	
High/low (to/from media)	500/250 Kb/s

Zip Drive

Table 6-7
100-MB Zip Drive

Disk	Specifications
Data Transfer Rate	
Sustained	Up to 11.2 Mb/sec
Burst	Up to 88.9 Mbs/sec
Seek Time (Includes Settling Time)*	
Minimum	4 ms
Average	29 ms
Maximum	55 ms
Latency (Average Rotational Delay)	10.2 ms
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 6-8
100-MB Zip Drive Cartridge Characteristics

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

Table 6-9
250-MB Zip Drive

Disk	Specifications
Data Transfer Rate	
Maximum sustained	
250-MB cartridge	2.4 MB/s
100-MB cartridge	
Read	1.4 MB/s
Write	0.25 MB/s
Burst (both cartridges)	11.11 MB/s
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 6-10
250-MB Drive Zip Cartridge Characteristics

Disk	Specifications
Spares capacity	5.2 MB
Form factor width	3.875 inch (98.0 mm)
Weight (typical)	1.5 oz (43 grams)
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°F to 125°F (-40°C to 51.5°C)

* Extrapolated from previous product data.

† Do not exceed operating temperature limits inside the cartridge.

CD-ROM Drive

Table 6-11
40X Max Tray-Load CD-ROM Drive (IDE)

Disk	**Specifications**
Diameter	12 cm
Capacity Mode 1 Mode 2	 540 MB 650 MB
Disk thickness	1.2 mm
Track pitch	1.6 μm
Performance	**Specifications**
Access Time Random seek Full stroke seek	 <100 ms <150 ms
Data transfer rate Sustained Burst	 150 KB/s 2550 to 6000 KB/s (17x to 40x variable)
Bus rate	4.0 MB/s
Cache/buffer	128 KB/s
Start-up time Single Multisession	 <7 s <30 s
Stop-time	< 4 s
Error rates Soft error Hard error Seek error	 10^{-9} 10^{-12} 10^{-6}
Dimensions	**Specifications**
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 6-11
40X Max Tray-Load CD-ROM Drive (IDE) *continued*

Audio Interface	**Specifications**
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	Two-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	**Specifications**
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 (Standby mode)	< 1 W

DVD-ROM Drive

Table 6-12
DVD-ROM Drive

Disk	Specifications
Applicable disc formats	DVD (single and double layer)
	CD-ROM Mode 1 and 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 multisession)
Disc diameter	12 cm, 8 cm
Capacity	4.70 GB
	8.54 GB
	9.40 GB
	550 MB (Mode 1, 12 cm)
	640 MB (Mode 2, 12 cm)
	180 MB (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	**Specifications**
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	150 KB/s (sustained, 1X CD-ROM mode)
(1KB = 1024 Bytes)	1200 - 4800 KB/s (32X CAV CD-ROM mode)
	2705 - 8115 KB/s (6X CAV DVD mode)

continued

Table 6-12
DVD-ROM Drive *continued*

Performance	**Specifications**
Bus rate	16.6 MB/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	**Specifications**
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	**Specifications**
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 6-13
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	0.8 ms
Average	5.0 ms
Full stroke	12.0 ms
Disk Rotation Speed	10,000 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 6-14
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	5.0 ms
Full stroke	12.0 ms
Disk Rotation Speed	10,000 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 6-15
20-GB Ultra ATA/66 IDE Hard Drive

Capacity	20 GB
Drive type	65 (soft)
Transfer Rate	
Media	323 Mb/s or 40 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	16,383
Data Heads (logical)	16
Sectors/Track (logical)	63
Buffer Size	512 KB
Logical Blocks	39,102,336
Operating Temperature	5° to 55°C

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

Audio System

Table 6-16
Audio System

Sampling Rate	7 KHz to 48 KHz (adjustable)
Full Scale Input Voltage (rms)	
Microphone-in	0.100 mV
Line-in	2.2 V
Full Scale Output Voltage (rms)	
Line output	1.4 V
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 6-17
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 6-18
Three-Button Mouse

	U.S.	Metric
Dimensions		
Height	1.42 inch	3.6 cm
Length	4.17 inch	10.7 cm
Width	2.87 inch	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	Exceeds 300 miles	Exceeds 483 km
Switch	Exceeds 1 million operations	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 6-19
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	16.7 million	100/80
1152 x 864	16.7M	16.7 million	100
1024 x 768	16.7M	16.7 million	100
800 x 600	16.7M	16.7 million	100
640 x 480	16.7M	16.7 million	100

Table 6-20
3Dlabs Oxygen GVX1 AGP Graphics Controller Color Support

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

Table 6-21
Matrox Productiva G100 Multi-Monitor Maximum Color Support

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

Table 6-22
Matrox Millenium G400 AGP Graphics Controller Maximum Color Support

Resolutions	Maximum Refresh Rate (Hz)	Memory	Interface	Output
2048 x 1536	85 Hz	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 6-23
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 Controllers

Table 6-24
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.

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