COMPAQ

Professional Workstation 5100

Maintenance and Service Guide

Second Edition (January 1998)
Part Number 299349-002
Compaq Computer Corporation

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Preface
About This Guide

This *Maintenance and Service Guide* is a troubleshooting guide that can be used for reference when servicing the Compaq Professional Workstation 5100. Only authorized technicians trained by Compaq should attempt to repair this equipment.

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.

Compaq Computer Corporation reserves the right to make changes to the Compaq Professional Workstation 5100 without notice. This document contains the following chapters:

- **Chapter 1 - Illustrated Parts Catalog**
  This chapter provides an illustrated parts breakdown and a reference for spare parts for the Compaq Professional Workstation 5100.
- **Chapter 2 - Service Preliminaries**
  This chapter identifies the following service considerations: preliminary cautions and warnings, electrostatic discharge information, equipment symbols, tools and software requirements, and warranty information.
- **Chapter 3 - Removal and Replacement Procedures**
  This chapter provides subassembly/module-level removal and replacement procedures for the Compaq Professional Workstation 5100.
- **Chapter 4 - Diagnostic Tools**
  This chapter provides information on the following Compaq software and utilities to assist you when servicing the Compaq Professional Workstation 5100: Power-On Self-Test (POST), Compaq Setup and Diagnostics Utility, ROMPaq, Compaq Insight Manager, Compaq SSD for Microsoft Windows NT, and Microsoft Windows NT utilities.
- **Chapter 5 - System Security**
  This chapter identifies and explains the security features of the Compaq Professional Workstation 5100.
- **Chapter 6 - Jumper and Switch Information**
  This chapter provides jumper and switch information for the system board, disk drives, and graphics controller boards for the Compaq Professional Workstation 5100.
- **Chapter 7 - Physical and Operating Specifications**
  This chapter provides the physical and operating specifications for the Compaq Professional Workstation 5100.

- **Chapter 8 - External Connectors**
  This chapter contains the pin assignments for all external connectors.

Symbols

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

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

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

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.

Where to Go for Help

Major sources of additional information are as follows:

- Electronic services
- Compaq CDs
- Compaq website (http://www.compaq.com)
- Other information sources

Electronic Services

Users can download drivers, patches, and Compaq service updates from the following sources:

- Internet: Questions can be submitted to Compaq Technical Support staff using the electronic mail address: support@compaq.com. Compaq files can be accessed using the address: FTP.COMPAQ.COM. Enter "anonymous" for the user name at the log-in prompt and enter your full Internet electronic mail address for the password. You can access the Compaq website through the Uniform Resource Locator (URL): http://www.compaq.com.
- Online services, such as CompuServe, Prodigy, and America Online, can be used if you are a member. Use the keywords below to access Compaq materials:
  - CompuServe—The keywords are “GO COMPAQ.”
  - Prodigy—Choose the “Jump” navigation command, then enter the keyword “COMPAQ.”

- America Online—Enter the keyword “COMPAQ.”

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

Compaq CDs

Compaq SmartStart for Workstations CD

The Compaq SmartStart for Workstations CD is located in the SmartStart for Workstations CD binder and includes:

- Compaq utilities:
  - Compaq Setup for Workstations (Computer Setup)
  - Compaq Diagnostics for Workstations
  - Compaq Inspect for Workstations
- Support software
- Online help
- Microsoft Service Packs
- Graphics Controller installation guides

Compaq Management CD

Compaq Management CD is located in the SmartStart for Workstations CD binder and includes:

- Compaq Insight Manager
- Compaq Insight Management Agents for Microsoft Windows NT
- Compaq Insight Manager documentation
- Compaq Systems Management Toolkit
- Online help

Compaq Website

The latest product updates and Compaq information are available on the Internet at the Compaq website. You can access the site through the following address:

http://www.compaq.com

Other Information Sources

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

- User Documentation
- *Compaq Service Quick Reference Guide*
- Service Training Guides
- Compaq Service Advisories and Bulletins
- Compaq QuickFind
- Compaq Insight Manager
- Remote Management Administrator's Guide (available on http://www.compaq.com)
- Compaq Resource Paq CD—Cool Stuff for Microsoft Windows NT
- Hood Labels

Chapter 1
Illustrated Parts Catalog

This chapter provides an illustrated parts breakdown and a reference for spare parts for the Compaq Professional Workstation 5100.

Mechanical Parts

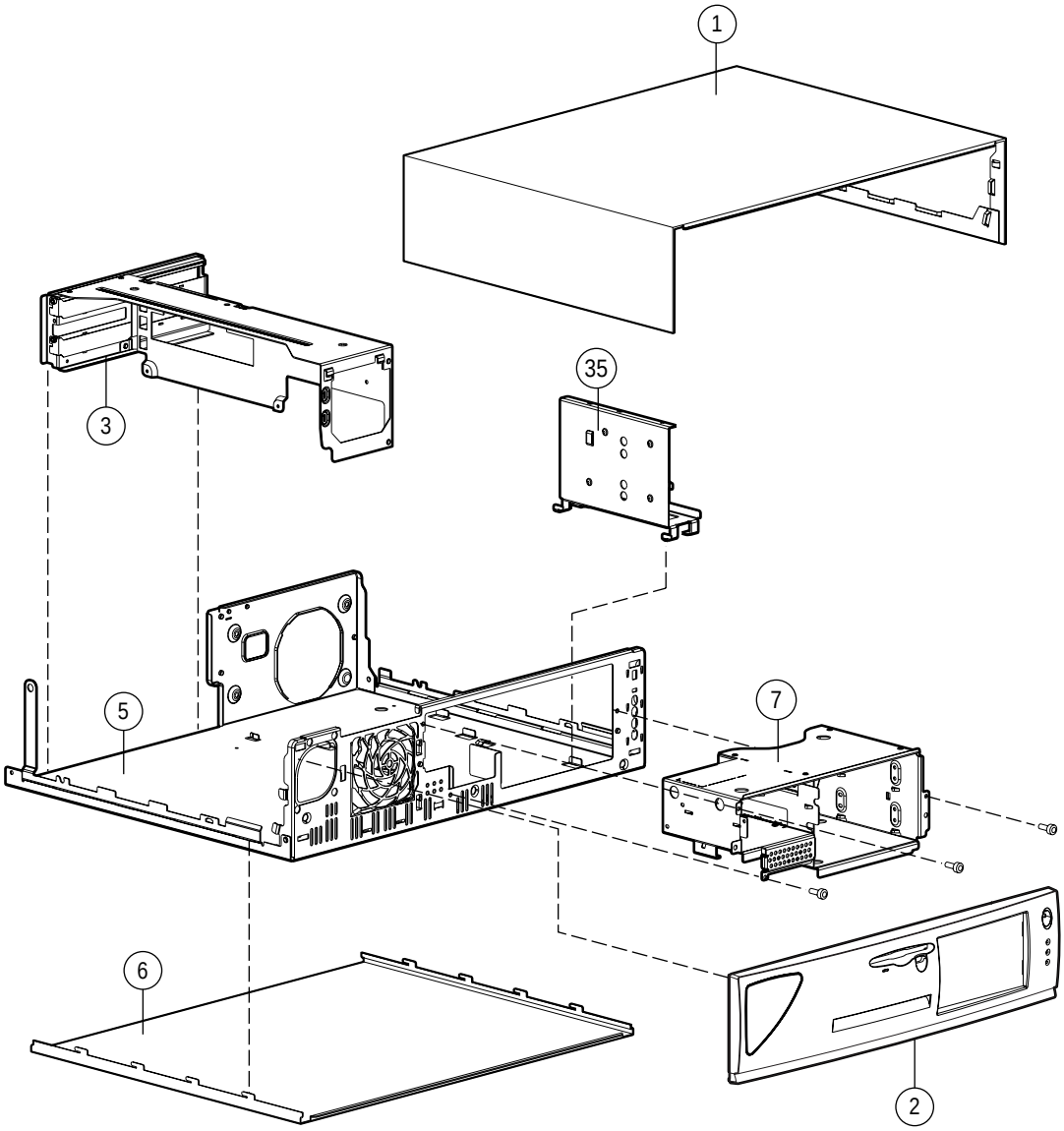


Figure 1-1. Exploded View of the Compaq Professional Workstation 5100 Mechanical Parts

System Components

Figure 1-2. Exploded View of the Compaq Professional Workstation System Components

Spares Parts List

Parts or components marked with an asterisk are *not* illustrated.

Table 1-1
Compaq Professional Workstation 5100
Spares Parts List

Reference	Description	Spares Part #
MECHANICAL		
1	Workstation Cover	297516-001
2	Front Bezel	299381-001
3	I/O Bracket	299383-001
4	Backplane Board	299309-001
5	Base Pan	297514-001
6	Base Pan Cover with Feet	269275-001
7	Drive Cage	297517-001
8	Speaker and Baffle	297572-001
SYSTEM		
9	System Fan	297515001
10	Power Supply, 280W	299312-001
11	System Board with Tray (266 MHz, 300 MHz, and 333 MHz)	269656-001*
12	System Board with Tray (266 MHz and 300 MHz)	299308-001
13	Intel Pentium II Processor, 266 MHz, 512K with heat sink	297510-001
14	Intel Pentium II Processor, 300 MHz, 512K with heat sink	297509-001*
15	Intel Pentium II Processor, 333 MHz, 512K with heat sink	298674-001*
16	Processor Power Module	299306-001
17	Terminator Board	333115-001
18	Lock Security Bracket	199109-001*
19	External Battery	160274-001
20	Slot Cover	141081-001
21	Power switch and LEDs with cable	297513-001
MEMORY		
22	16-MB Memory Module (ECC, EDO DIMM, 60 ns)	289746-001
23	32-MB Memory Module (ECC, EDO DIMM, 60 ns)	281857-001*

24	64-MB Memory Module (ECC, EDO DIMM, 60 ns)	281858-001*
25	128-MB Memory Module (ECC, EDO DIMM, 60 ns)	281859-001*
26	256-MB Memory Module (ECC, EDO DIMM, 60 ns)	281860-001*

Continued

Spares Parts List - Compaq Professional Workstation 5100 *Continued*

Reference	Description	Spares Part #
MASS STORAGE		
27	2.1-GB Wide-Ultra SCSI-3 Hard Drive	297918-001
28	4.3-GB Wide-Ultra SCSI-3 Hard Drive	269498-001
29	9.1-GB Wide-Ultra SCSI-3 Hard Drive	199886-001*
30	1.44-MB Diskette Drive	160788-201
31	24X MAX CD-ROM Drive (IDE)	278026-001
32	2/4-GB DAT Drive	142074-201*
33	4/8-GB DAT Drive	295163-001*
34	4/16-GB DAT Drive	199464-201*
35	Hard Drive Mounting Bracket (Bay 5)	299380-001
36	DDS1 DAT Cleaning Cartridge (2/4-GB)	131194-001*
37	DDS1 and DDS2 DAT Cleaning Cartridge (4/8- and 4/16-GB)	242618-001*
38	2-GB MagTape Cartridge (90 m)	131148-001*
39	1.3-GB MagTape Cartridge (60 m)	131167-001*
40	4.0-GB DAT Cartridge (120 m)	199496-001*
CABLE KITS		
41	Diskette Drive Cable	269412-001
42	CD-ROM Drive Cable	297512-001
43	CD-ROM Audio Cable	171139-001*
44	SCSI Cable, Wide	297511-001
45	SCSI Adapter, 50- to 68-Pin (internal)	189638-001*
46	Cable, Signal Video	299386-001*
KEYBOARD AND MICE		
47	Keyboard	247432-xxx*
48	2-Button Mouse	141189-401*
49	3-Button Mouse	269278-001*
50	4-Button Mouse	299367-001
MONITORS		
51	P70 Monitor	255652-xxx*
52	V70 Monitor	255609-xxx*
53	QVision 210 Monitor	210407-xxx*
54	P1610 Monitor	305710-001*
55	P110 Monitor	284959-001*

Continued

Spares Parts List - Compaq Professional Workstation 5100 *Continued*

Reference	Description	Spares Part #
56	P110 Monitor (INT)	284959-B23*
57	TFT 500: *Order TFT 500 spare part from the TFT 500 guide (PN 285012-001)*	
GRAPHICS		
58	GLoria-XL 3D Graphics Controller	297520-001
59	16-MB DRAM (GLoria-XL 3D)	297919-001*
60	GLoria Synergy Graphics Controller	298796-001*
61	MGA Millennium II Graphics Controller	270242-001
62	12-MB WRAM (MGA Millennium II)	270262-001*
63	4-MB WRAM (MGA Millennium II)	270260-001*
64	MVP Workstation Graphics Controller	269489-001*
65	MVP Workstation Daughter Card	297864-001*
66	FireGL 4000 Graphics Controller	270268-001*
67	FireGL 4000 Graphics Controller	298797-001*
CONTROLLERS		
68	Compaq SMART-2SL Array Controller	242777-001*
69	Wide-Ultra SCSI-3 Controller, PCI	272515-001*
70	Compaq SMART-2DH Array Controller	295243-001*
COMMUNICATIONS		
71	Netelligent Dual 10/100 TX PCI UTP Controller	242560-001*
72	Netelligent 10/100 TX PCI UTP Controller	169849-001*
73	Netelligent 10T PCI UTP Controller	242501-001*
74	Netelligent 10T ISA UTP Controller	265617-001*
75	Netelligent 16/4 TR ISA UTP/STP Controller	265436-001*
76	Netelligent 4/16 TR ISA UTP/STP Controller	268010-001*
77	Netelligent 10 T/2 PCI UTP/Coax Controller	292857-001*
78	Netelligent 10 T/2 ISA UTP/Coax Controller	265618-001*
79	Netelligent 100 FDDI PCI SAS Fiber-SC	242506-002*
80	Netelligent 100 FDDI PCI DAS Fiber-UTP	242506-003*
81	Netelligent 100 FDDI PCI SAS Fiber-MIC	242506-005*
82	Netelligent 4/16 TR PCI UTP/STP Controller	301210-001*

Continued

Spares Parts List - Compaq Professional Workstation 5100 *Continued*

Reference	Description	Spares Part #
83	33.6 Data/Fax Modem	259514-002*
84	56K Modem	294912-001*
SOFTWARE		
85	Magellan Driver CD	297863-001*
86	Spaceball Driver CD	298033-001*
87	Microsoft NT Workstation 4.0	275573-xxx*
88	Compaq SmartStart for Workstations CD	275574-xxx*
89	System ROMPaq	275595-001*
90	Compaq Setup and Compaq Diagnostics for Workstations Diskette	275575-xxx*
MISCELLANEOUS		
91	Magellan 3D Pointing Device (spacemouse)	297645-001*
92	Spaceball 3D Pointing Device	297644-001*
93	Compaq Multimedia Sound System (US)	294122-xxx*
94	Card Guide Bracket	297518-001
95	3.5-Inch to 5.25-Inch Hard Drive Bracket	243231-001
96	Heat Sink Bridge	297519-001*
97	Tower Stand	297817-001*
98	Country Kit	297818-001*
99	Shipping Box with Buns (US)	297789-001*
100	Shipping Box with Buns (INTL)	297789-002*
101	Miscellaneous Hardware and Plastics Kit	299382-001*
102	Blank Bezel	296172-001*
103	SCSI Adapter, 68- to 50-Pin (external)	270229-001*
104	External Infrared Transceiver	185963-001*
DOCUMENTATIO		
105	Maintenance and Service Guide	297744-002*
106	Illustrated Parts Map	297743-002*
107	Service Quick Reference Guide	162212-001*

*Not illustrated

Chapter 2
Service Preliminaries

This chapter identifies the following service considerations:

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

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

Preliminary Warnings and Cautions

The following should be noted when operating or servicing the Compaq Professional Workstation 5100:

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

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

WARNING: To reduce the risk of personal injury from hazardous energy levels, only authorized service technicians should attempt to repair this equipment. Because of the complexity of the individual boards and subassemblies, no one should attempt to make repairs at the component level or to make modifications to any printed wiring board. Improper repairs can create a safety hazard.

CAUTION: The power supply in the Compaq Professional Workstation 5100 has an auxiliary power section. This section is always active as long as the unit is plugged into a live AC outlet. Be sure to turn off the switch and unplug the power cord before performing any service work.

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

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

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

Electrostatic Discharge Information

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

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

Equipment Symbols

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

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

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

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

Tools and Software Requirements

To service the workstation, you might need:

- Torx T-10 screwdriver
- Torx T-15 screwdriver
- Flat-blade screwdriver
- Compaq Setup and Diagnostics Utility

IMPORTANT: Prior to servicing the workstation, be sure that the latest Compaq Support Software Diskette (SSD) for Windows NT drivers is installed. See Chapter 4 for installation procedures.

Warranty Information

The workstation comes *standard* with the following warranties:

- **Standard Warranty—**A three-year limited warranty that covers three years on parts, one year on labor, and one year of onsite service.
- **Prefailure Warranty—**A special warranty that extends the Compaq three-year limited warranty by applying it to critical system components before they fail. This warranty ensures that when you receive notification of a prefailure condition through Compaq Insight Manager or the Windows NT Event Log, the component is replaced under warranty.

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

  The Prefailure Warranty covers the following workstation components:

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

In addition to the above warranties, an optional Extended Warranty is available. If purchased, this warranty extends the Standard Warranty's one year coverage for labor and onsite service by two additional years.

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

Chapter 3
Removal and Replacement Procedures

This chapter provides subassembly/module-level removal and replacement procedures for the Compaq Professional Workstation 5100.

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

Serial Number

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

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

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

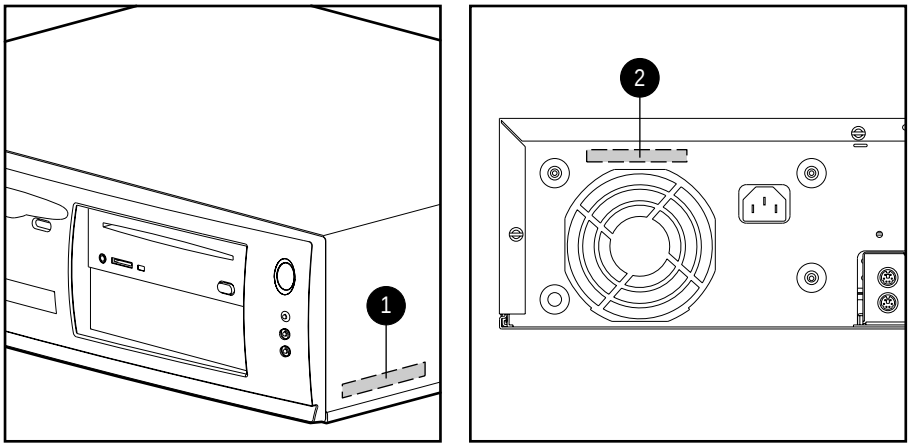


Figure 3-1. Serial Number Locations

Service Preparations

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

CAUTION: The power supply in the Compaq Professional Workstation 5100 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. Be sure you are properly grounded before beginning any installation procedure. Refer to "Electrostatic Discharge" in Chapter 2 for more information.

1. Turn off the workstation.
2. Disconnect the power cord from the electrical wall outlet and then from the workstation.
3. Turn off all peripheral devices and disconnect cables from the rear of the workstation.

NOTE: For more information on preparing the workstation for service, see Chapter 2.

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 prior to accessing internal components.

To remove the lock, complete the following steps:

1. Unlock and remove the cable lock and/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.

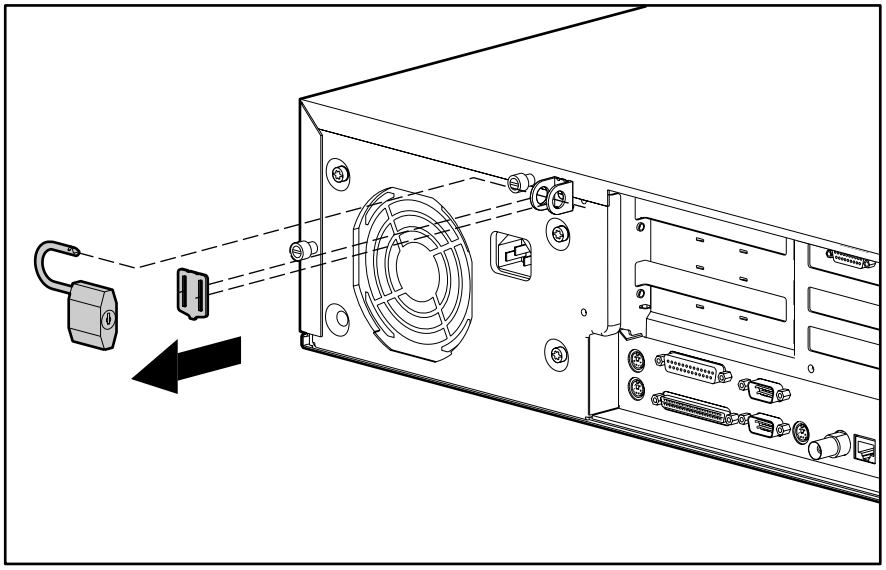


Figure 3-2. Removing the Padlock

Workstation Cover

To remove the workstation cover, complete the following steps:

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

1. Perform the service preparations on page 3-2.
2. If the cable lock mechanism is installed, remove it.
3. Loosen the three thumbscrews on the back of the workstation.

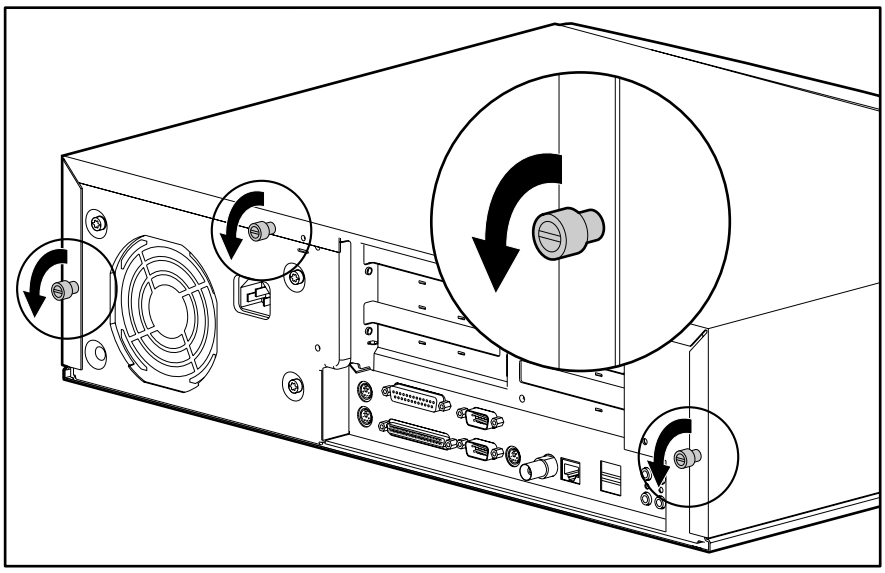


Figure 3-3. Loosening the Thumbscrews on the Workstation Cover loosening

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

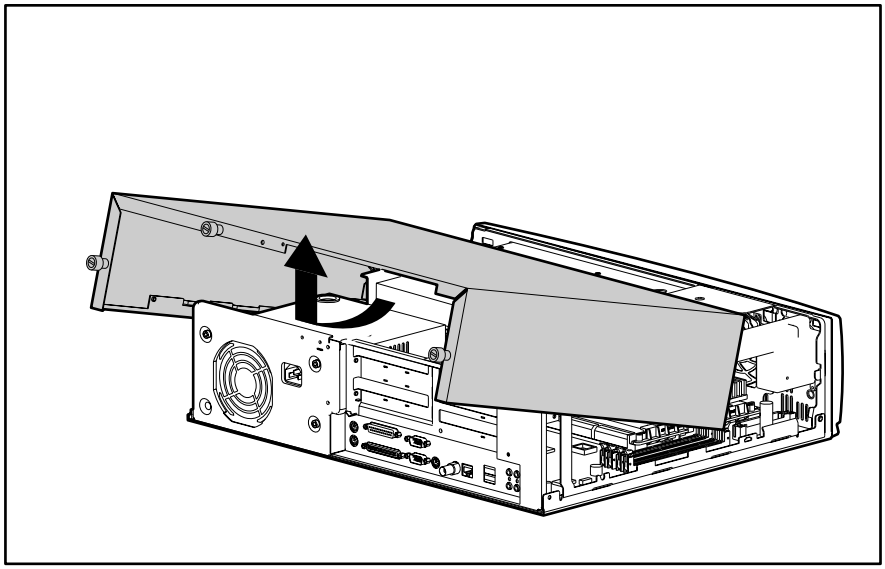


Figure 3-4. Removing the Workstation Cover

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

To replace the workstation cover:

1. Be sure all grounding clips and EMI gaskets (shielding strips) are in place.
2. Hold the cover in an almost vertical position, and hook the front lip of the cover behind the front bezel. Then, rotate the cover down onto the unit.
3. Tighten the thumbscrews on the rear of the workstation.

Front Bezel

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

To remove the front bezel, complete the following steps:

1. Perform the service preparations on page 3-2.
2. Remove the workstation cover.
3. From the inside of the unit, push up on the top release levers and push down on the bottom release levers.

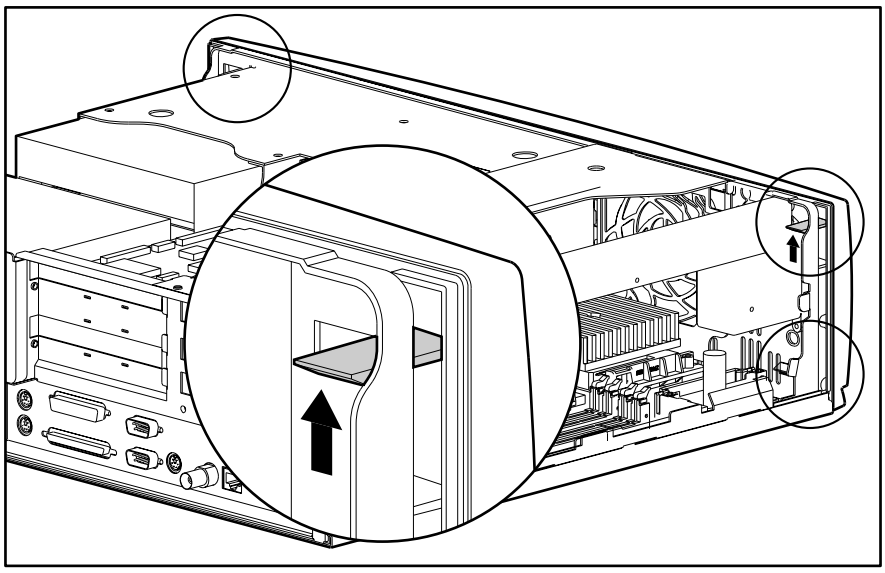


Figure 3-5. Locating the Front Bezel Release Levers

4. Pull the bezel straight out and away from the chassis.

IMPORTANT: When separating the bezel from the chassis, be sure to pull it straight out to avoid the push button on the diskette drive.

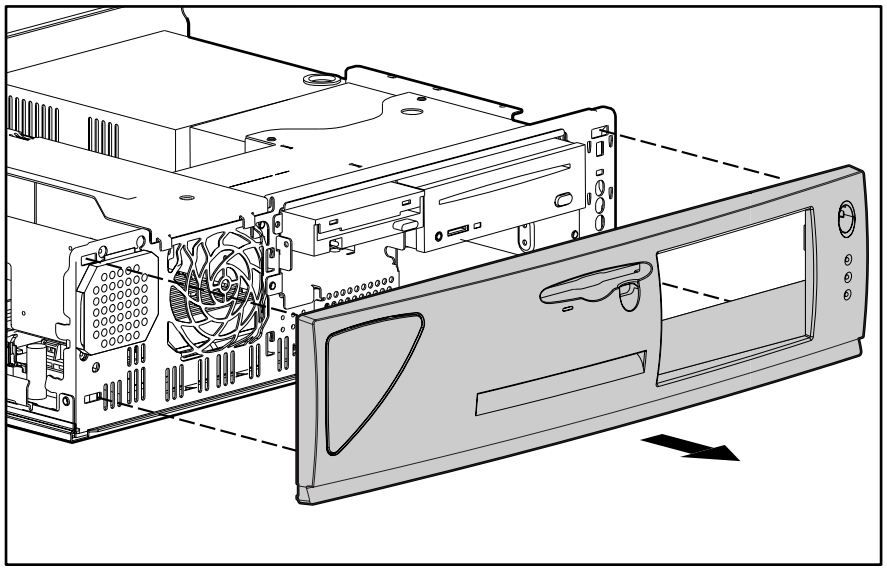


Figure 3-6. Removing the Front Bezel

To replace the front bezel:

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

Blank Bezel

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

1. Perform the service preparations on page 3-2.
2. Remove the following components:
   - ❑ workstation cover
   - ❑ front bezel
3. With the inside of the front bezel facing you, push the tab on the blank bezel to the right ❶.
4. Push the blank bezel out through the inside of the front bezel ❷.
5. Reverse steps 1 through 4 to replace the blank bezel and reassemble the workstation.

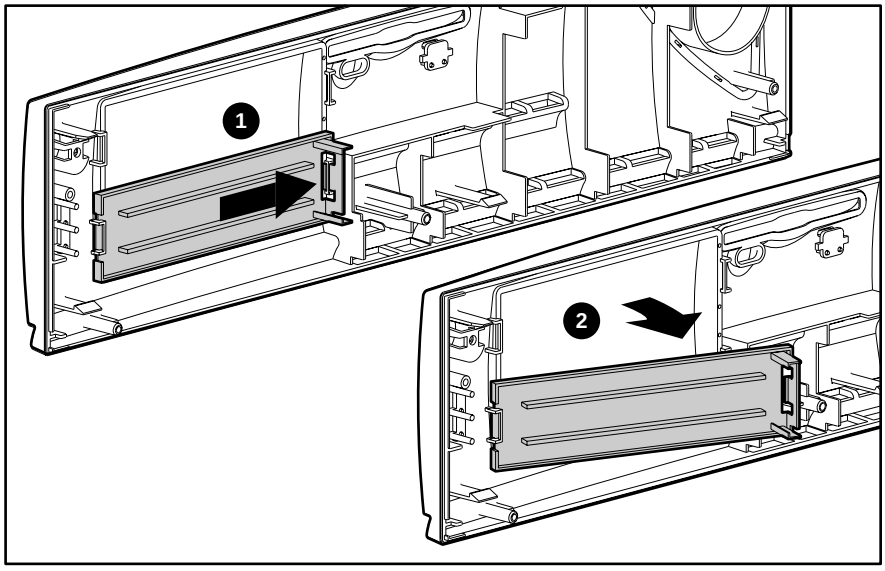


Figure 3-7. Removing the Blank Bezel

Speaker

To remove the speaker, complete the following steps:

1. Perform the service preparations on page 3-2.
2. Remove the following components:
   - ❑ workstation cover
   - ❑ front bezel
3. Remove the four T-10 screws securing the front of the speaker to the chassis.
4. Remove the T-10 screw from the rear of the speaker baffle.
5. Unplug the speaker connector from the system board.
6. Remove the speaker from the workstation by sliding it back, then lifting it up and out of the chassis.

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

7. Reverse steps 1 through 6 to replace the speaker and reassemble the workstation.

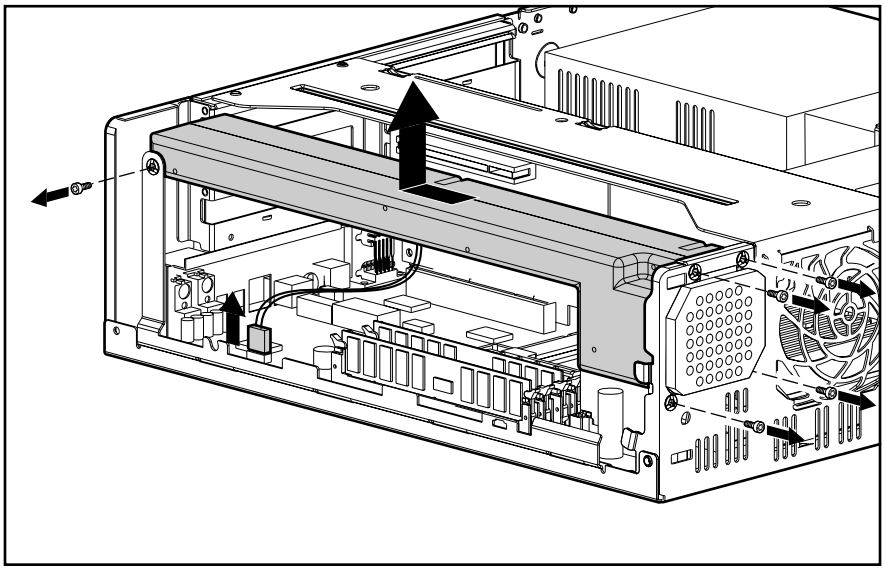


Figure 3-8. Removing the Speaker and Speaker Baffle

I/O Bracket Assembly

The I/O bracket assembly contains a backplane board, fan and card guide, graphics controller, and any expansion boards.

To remove the I/O bracket assembly, complete the following steps:

IMPORTANT: If you have a full-height ISA card installed in an ISA slot facing the speaker, you must remove the speaker first.

1. Perform the service preparations on page 3-2.
2. Remove the following components:
   - ❑ workstation cover
   - ❑ graphics controller
   - ❑ expansion boards (if installed)

CAUTION: The power supply in the Compaq Professional Workstation 5100 contains an auxiliary power section. Be sure the power switch is off and the unit is unplugged before removing the I/O bracket assembly in the next step.

3. Grasp the I/O bracket assembly and pull it up and out of the chassis.

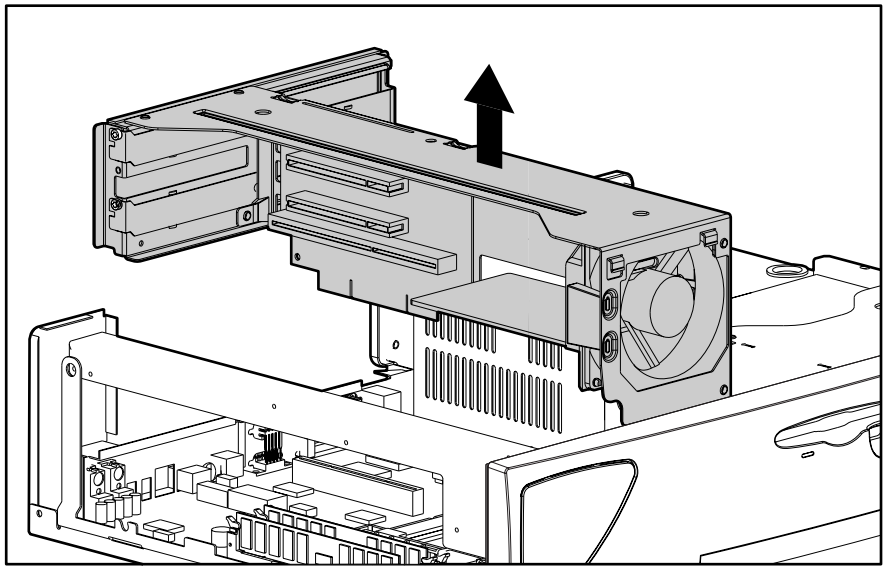


Figure 3-9. Removing the I/O Bracket Assembly

Important Guidelines for I/O Bracket Assembly Replacement

To replace the I/O bracket assembly, you **MUST** follow these steps:

1. Grasp the assembly and insert it into the chassis and connector on the system board. Press firmly on the I/O assembly, where the backplane is connected to the system board.
2. Plug in the power cord, but **DO NOT** turn on the power switch.

   The auxiliary power section of the power supply should now be active. When the auxiliary power is active and the I/O bracket assembly is seated properly, a green LED on the backplane board is lit. The LED can be viewed through a portal on top of the I/O bracket assembly. (See Figure 3-14 for the physical location of the LED.)

   If the LED is not lit, the I/O bracket assembly is not seated properly. Reseat the assembly. Once the assembly is seated properly, unplug the workstation before continuing with additional service.

WARNING: DO NOT turn on the power switch unless the I/O bracket assembly is seated properly. For safety, DO NOT turn on the power switch until the workstation is completely reassembled.

Graphics Controllers

The workstation ships standard with the MGA Millennium II, FireGL 4000, GLoria-XL 3D, GLoria Synergy, or MVP Workstation graphics controller. The graphics controller is located in one of the expansion slots on the backplane board.

MGA Millennium II Graphics Controller

To remove the MGA Millennium II graphics controller, complete the following steps:

NOTE: The following procedure is also applicable for the removal of an expansion board. If you are removing or installing a full-height ISA board from the side of the I/O bracket assembly illustrated below, you must remove the speaker assembly before removing the I/O bracket assembly.

1. Perform the service preparations on page 3-2.
2. Remove the following components:
   - ❑ workstation cover
   - ❑ I/O bracket assembly
3. Remove the retaining screw securing the graphics controller.

4. Slide the graphics controller out of the expansion slot.

> **CAUTION:** If you permanently remove the graphics controller or an expansion board, install a protective slot cover to ensure proper cooling.

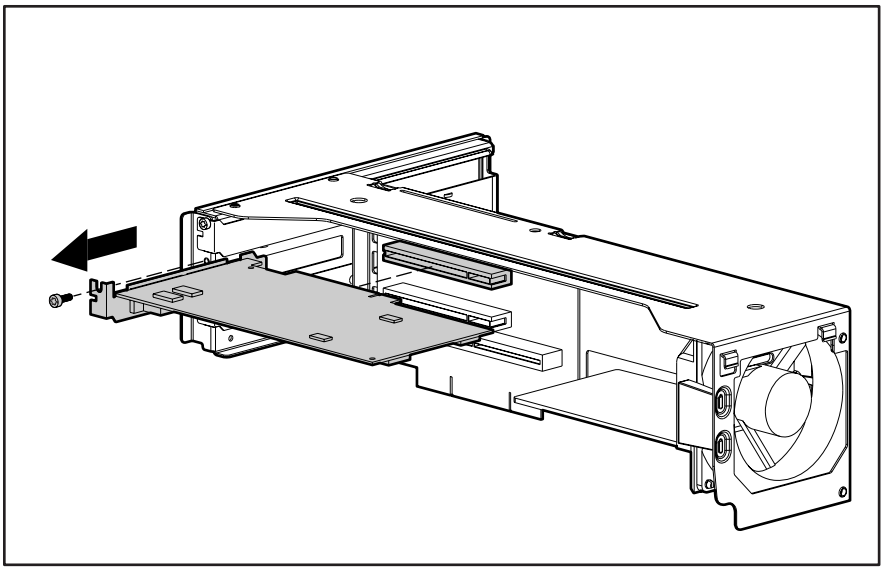


Figure 3-10. Removing the MGA Millennium II Graphics Controller

NOTE: The MGA Millennium II Graphics Controller ships in the first slot, however, for clarity, the graphics controller is shown being removed from the second slot.

5. Reverse steps 1 through 4 to replace the MGA Millennium II graphics controller and reassemble the workstation.

> **IMPORTANT:** Prior to replacing the I/O bracket assembly, read "Important Guidelines for I/O Bracket Assembly Replacement" earlier in this chapter.

FireGL 4000, GLoria-XL 3D, GLoria Synergy, and MVP Workstation Graphics Controllers

To remove the FireGL 4000, GLoria-XL 3D, GLoria Synergy, or MVP Workstation graphics controller, complete the following steps:

NOTE: The illustration below depicts the GLoria-XL 3D graphics controller only, but also applies to the removal of the GLoria Synergy, FireGL 4000, or MVP Workstation graphics controller.

1. Perform the service preparations on page 3-2.
2. Remove the following components:
   - ❑ workstation cover
   - ❑ I/O bracket assembly
3. Remove the retaining screw securing the graphics controller.
4. Slide the graphics controller out of the expansion slot.

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

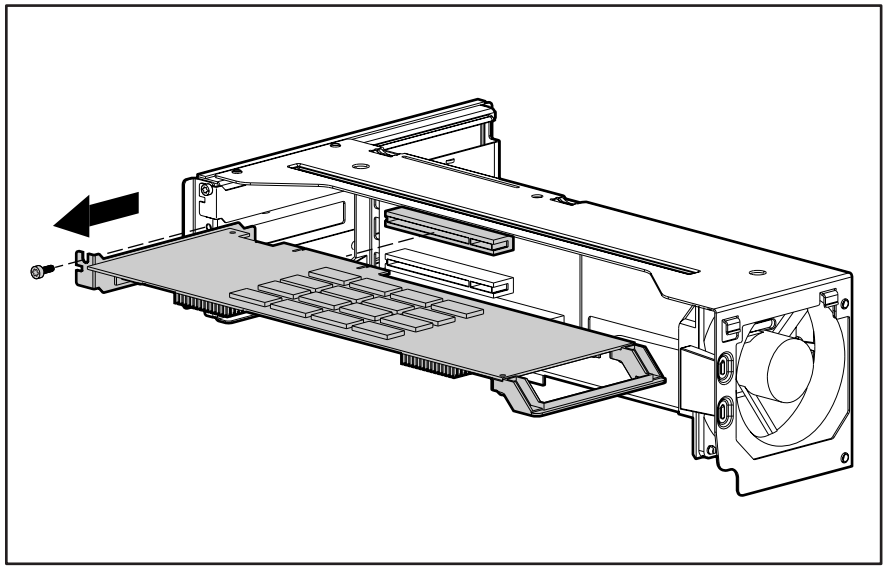


Figure 3-11. Removing the GLoria-XL 3D Graphics Controller

NOTE: The GLoria-XL 3D Graphics Controller ships in the first slot, however, for clarity, the graphics controller is shown being removed from the second slot.

5. Reverse steps 1 through 4 to replace the FireGL 4000, GLoria-XL 3D, GLoria Synergy or MVP Workstation graphics controller and reassemble the workstation.

   Be sure to engage the card guide located behind the fan when replacing a full-length graphics controller.

IMPORTANT: Prior to replacing the I/O bracket assembly, read "Important Guidelines for I/O Bracket Assembly Replacement" earlier in this chapter.

System Fan and Card Guide

To remove the system fan and card guide, complete the following steps:

1. Perform the service preparations on page 3-2.
2. Remove the following components:
   - ❑ workstation cover
   - ❑ I/O bracket assembly
   - ❑ graphics controller (required only if a full-length card is installed)
3. Disconnect the fan cable from the backplane board and disengage the cable from the clip on the backplane board.
4. Remove the T-10 screw connecting the fan and card guide to the I/O bracket assembly.
5. Pivot the fan and card guide as shown, easing the hinges out of the slots and away from the I/O bracket assembly.

6. Separate the fan from the card guide.

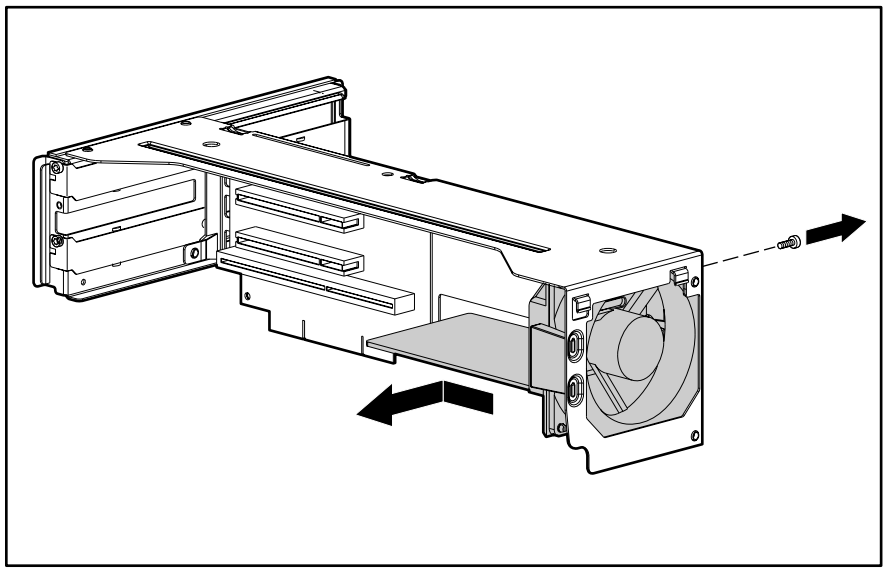


Figure 3-12. Removing the System Fan and Card Guide

7. Reverse steps 1 through 6 to replace the system fan and card guide and reassemble the workstation.

IMPORTANT: Prior to replacing the I/O bracket assembly, read "Important Guidelines for I/O Bracket Assembly Replacement" earlier in this chapter.

Backplane Board

The backplane board is attached to the I/O bracket assembly by retaining screws.

The backplane board contains six expansion slots, five of which are available at any one time. The following illustration identifies the physical location of slots 1-6. See the corresponding table for component names.

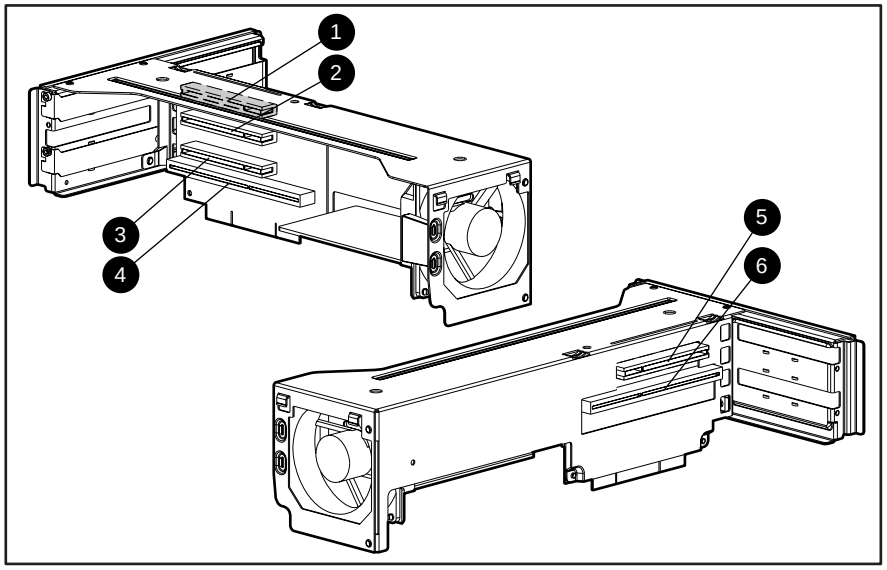


Figure 3-13. Overview of PCI/ISA Expansion Slots

Table 3-1
PCI/ISA Slots

Reference	
1	PCI slot
2	PCI slot
3 *	PCI slot
4 *	ISA slot
5	PCI slot
6	PCI slot

**Slots 3 and 4 are shared. They cannot be used simultaneously.*

To remove the backplane board, complete the following steps:

1. Perform the service preparations on page 3-2.
2. Remove the following components:
   - ❑ workstation cover
   - ❑ I/O bracket assembly
   - ❑ graphics controller
   - ❑ expansion boards (if installed)
   - ❑ fan cable
   - ❑ system fan and card guide
3. Remove the two screws that secure the backplane board to the I/O bracket assembly.
4. Remove the backplane board from the I/O bracket assembly.
5. Reverse steps 1 through 4 to replace the backplane board and reassemble the workstation.

When replacing the backplane board, align the top edge of the board with the slots in the I/O bracket assembly.

IMPORTANT: Prior to replacing the I/O bracket assembly, read "Important Guidelines for I/O Bracket Assembly Replacement" earlier in this chapter.

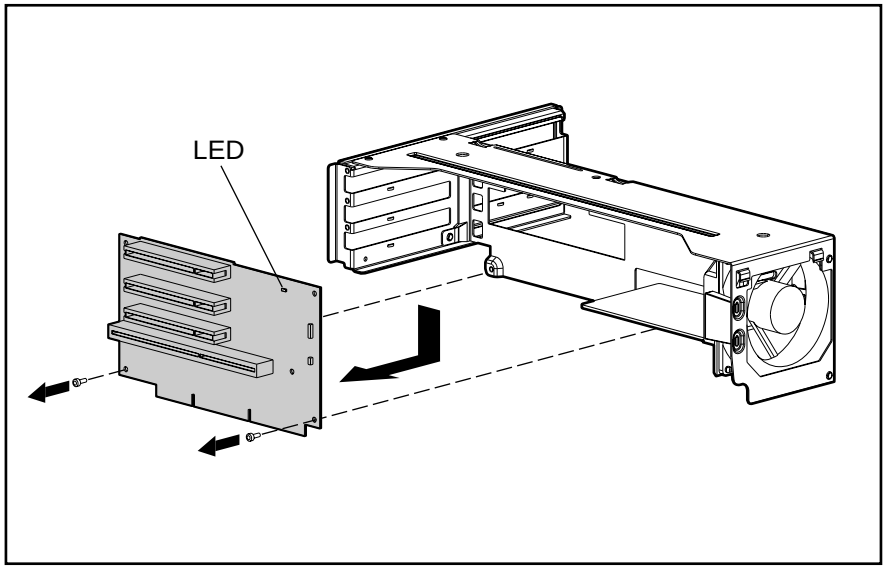


Figure 3-14. Removing the Backplane Board

Mass Storage Devices

This section discusses removal and replacement procedures for the mass storage devices supported on the Compaq Professional Workstation 5100.

Drive Positions

The Compaq Professional Workstation 5100 can house up to five mass storage devices. The following illustration identifies the physical drive locations. See the corresponding table for a list of the recommended drive configurations.

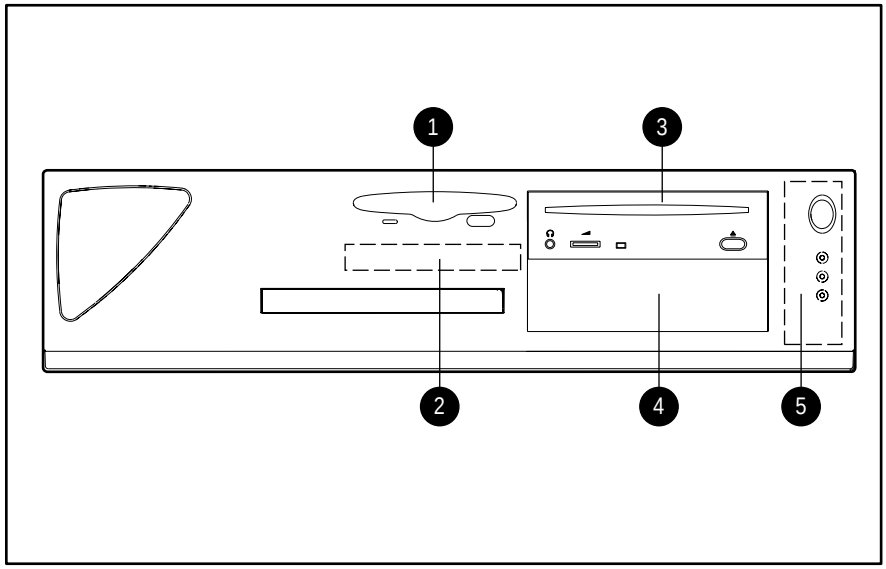


Figure 3-15. Drive Positions

Table 3-2
Drive Positions

Bay	Bay Width	Bay Height	Device Configurations
1	3.5-inch bay	Third-Height	Standard 1.44 MB diskette drive (1.0")
2	3.5-inch internal hard drive bay	Third-Height	Standard 2.1-GB or 4.3-GB hard drives (1.0")
3	3.5- or 5.25-inch bay	Third-Height or Half-Height	Standard CD-ROM drive (1.6")
4	5.25-inch bay	Half-Height	Optional 2.1-GB (1.0"), 4.3-GB (1.0"), or 9.1-GB (1.6") hard drive, tape drive, PD-CD drive, or CD-ROM drive
5	3.5- or 5.25-inch internal hard drive bay	Third-Height or Half-Height	Standard 2.1-GB (1.0"), 4.3-GB (1.0"), or 9.1-GB (1.6") hard drive*

*The 9.1-GB (1.6") Wide-Ultra SCSI-3 hard drive ships standard on some models and is optional on others.

CAUTION: If a drive is not installed in bays 3 or 4, be sure a blank bezel is installed to ensure proper airflow and cooling.

CD-ROM Drive

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

1. Perform the service preparations on page 3-2.
2. Remove the following components:
   - ❑ workstation cover
   - ❑ front bezel
3. Remove the three retaining screws securing the drive cage to the front of the chassis.
4. Extend the drive cage slightly from the chassis.

NOTE: It is not necessary to completely remove the drive cage to remove any drives.

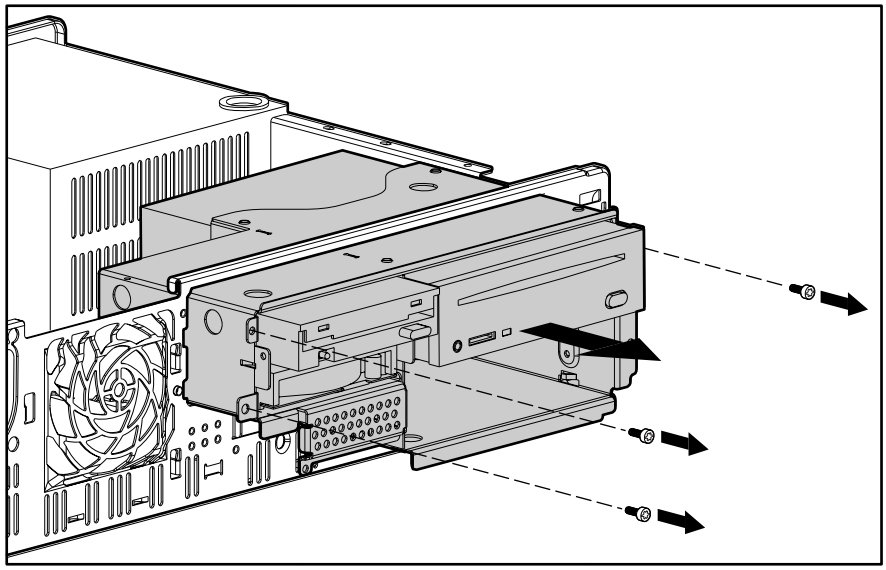


Figure 3-16. Extending the Drive Cage

5. Disconnect all cables from the rear of the CD-ROM drive.
6. Push the drive cage back into the chassis and replace the three retaining screws.

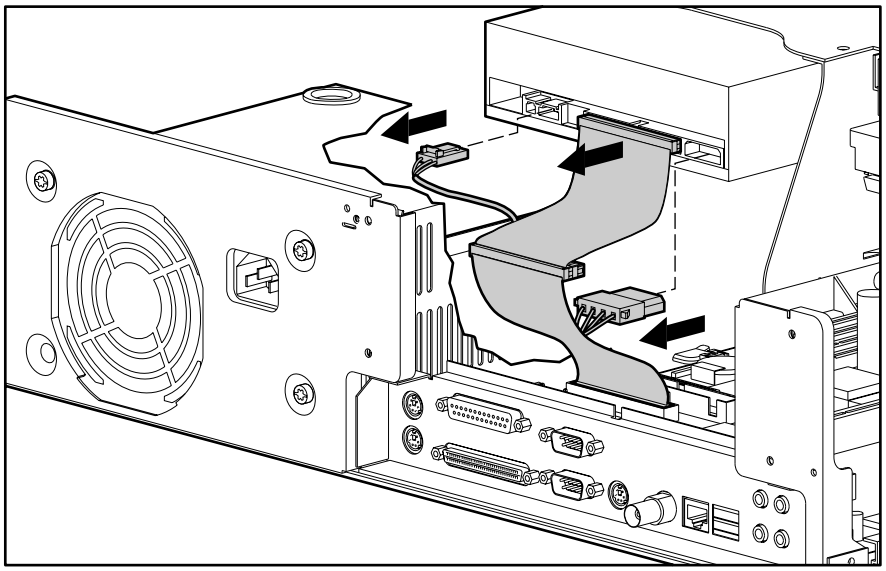


Figure 3-17. Disconnecting the Cables from the CD-ROM Drive

7. If there is a hard drive in bay 5, you must remove the drive to access and remove the retaining screws securing the CD-ROM drive.

   NOTE: For information on removing a hard drive from bay 5, see "Bay 5" later in this chapter.

8. Remove the two screws securing the right side of the CD-ROM drive.

9. Pull the CD-ROM drive straight out of the chassis.

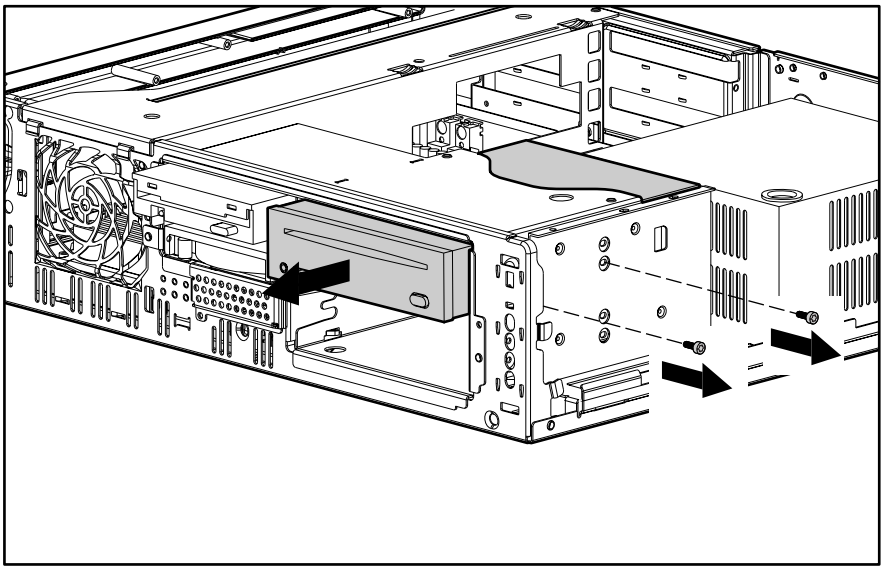


Figure 3-18. Removing the CD-ROM Drive

10. Reverse steps 1 through 9 to replace the CD-ROM drive and reassemble the workstation.

    Be sure to transfer the guide screw from the old drive to the new one. The screw is installed on the left front side of the drive.

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

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

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

Drive Cage

To remove the drive cage, complete the following steps:

1. Perform the service preparations on page 3-2.
2. Remove the following components:
   - ❑ workstation cover
   - ❑ front bezel
   - ❑ power and signal cables connected to drives in drive cage
   - ❑ CD-ROM drive

   NOTE: After removing the CD-ROM drive, leave the drive cage slightly extended from the chassis.
3. Rotate the drive cage down at a 45-degree angle and pull it out of the chassis.
4. Reverse steps 1 through 3 to replace the drive cage and reassemble the workstation.

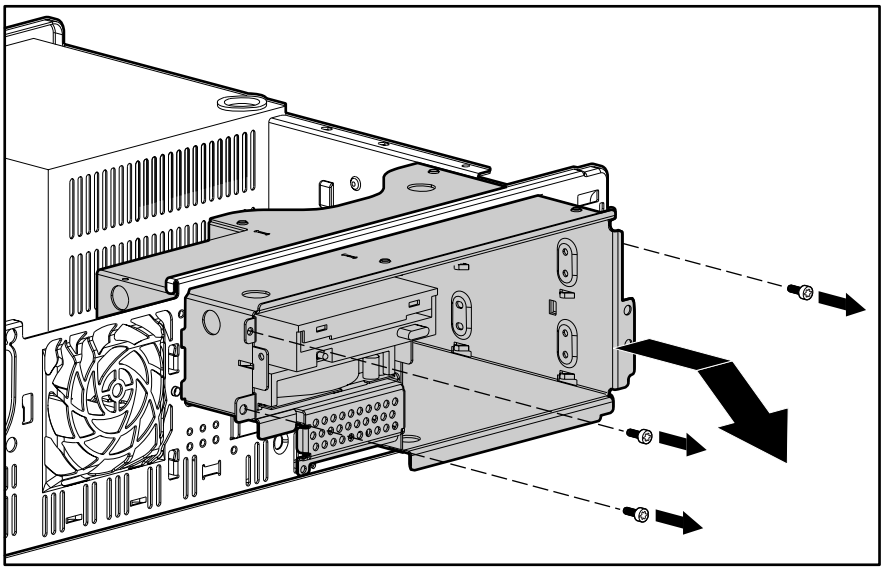


Figure 3-19. Removing the Drive Cage

Diskette Drive

Before beginning the removal procedure, make sure there is no diskette in the drive.

NOTE: A standard hard drive in bay 2 can be removed using the same steps used to remove a diskette drive.

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

1. Perform the service preparations on page 3-2.
2. Remove the following components:
   - ❑ workstation cover
   - ❑ front bezel
3. Disconnect the cables from the back of the diskette drive.

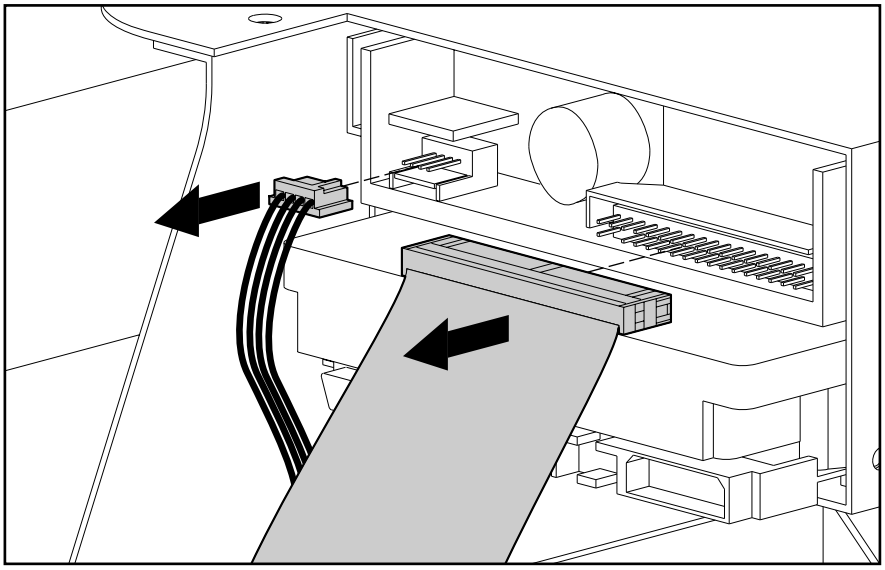


Figure 3-20. Disconnecting the Cables from the Diskette Drive

4. Remove the retaining screws on the diskette drive.
5. Remove the three screws connecting the drive cage to the front of the chassis.

6. Extend the drive cage slightly from the chassis, then remove the diskette drive front retaining screw.
7. Pull the diskette drive straight out of the drive cage.

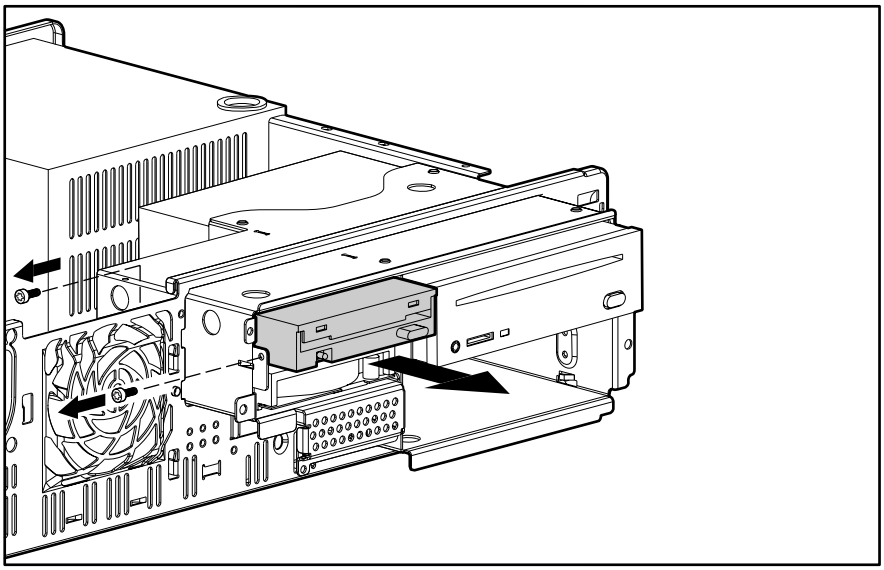


Figure 3-21. Removing the Diskette Drive

8. Reverse steps 1 through 7 to replace the diskette drive and reassemble the workstation.

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

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

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

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

Option Bay 4

Bay 4 supports both 3.5-inch and 5.25-inch optional devices. If you are installing a 3.5-inch device, a special bracket mounting is required.

Installing a 3.5-inch device

NOTE: This procedure describes the installation of a 3.5-inch hard drive. The same procedure can be used for installing any 3.5-inch device in bay 4.

To install an optional 3.5-inch drive in bay 4, complete the following steps:

1. Perform the service preparations on page 3-2.
2. Remove the following components:
   - ❑ workstation cover
   - ❑ front bezel
3. Insert the drive into the bracket mounting.
4. Insert the screws into the holes on each side of the bracket to secure the drive.

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

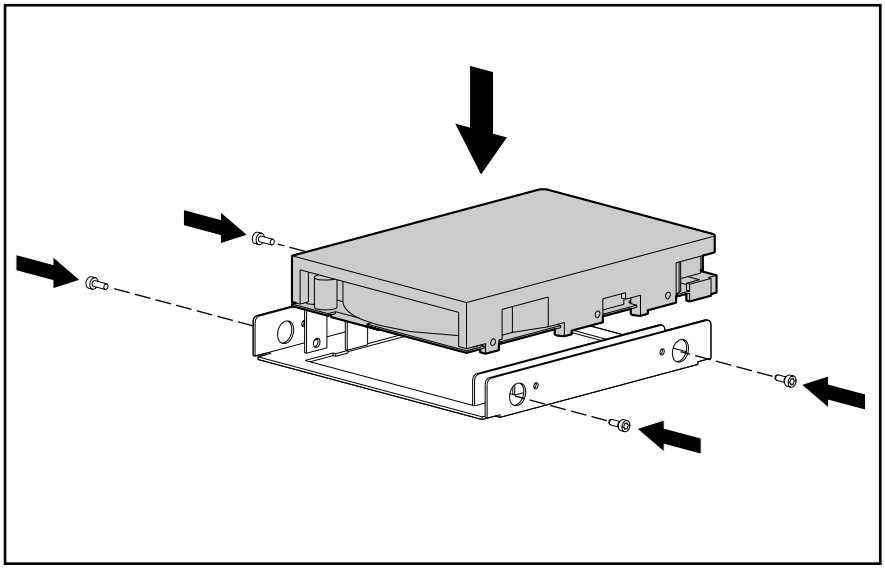


Figure 3-22. Installing the 3.5-Inch Hard Drive

5. Install one metric guide screw into the front hole on the left side of the bracket. The guide screw is used to align the bracket in the drive bay.
6. Insert the drive assembly into the drive bay. Ensure the guide screw aligns with the slot in the drive bay.
7. Secure the 3.5-inch device in the drive cage with two metric retaining screws on the right side of the device.

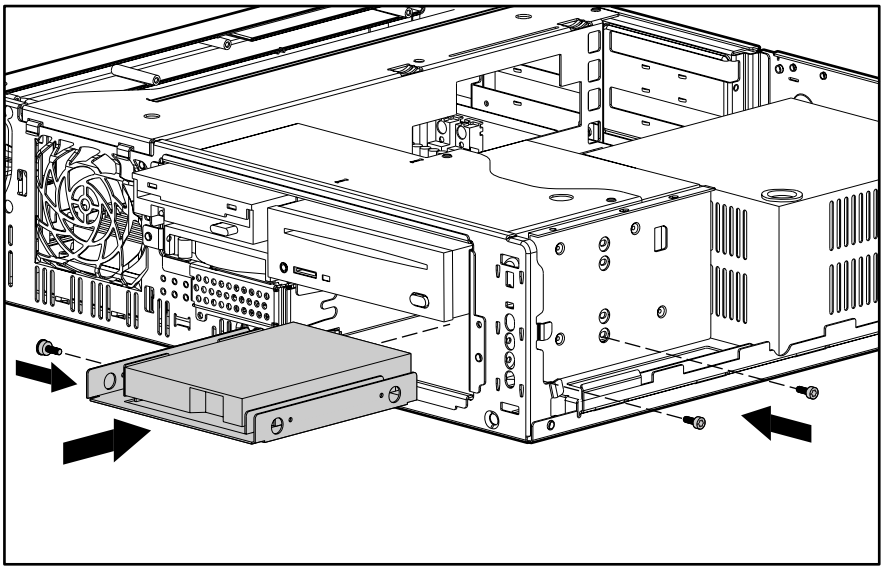


Figure 3-23. Installing the 3.5-Inch Hard Drive and Securing it with Retaining Screws

8. Extend the drive cage slightly from the chassis, then connect the cables to the rear of the drive.

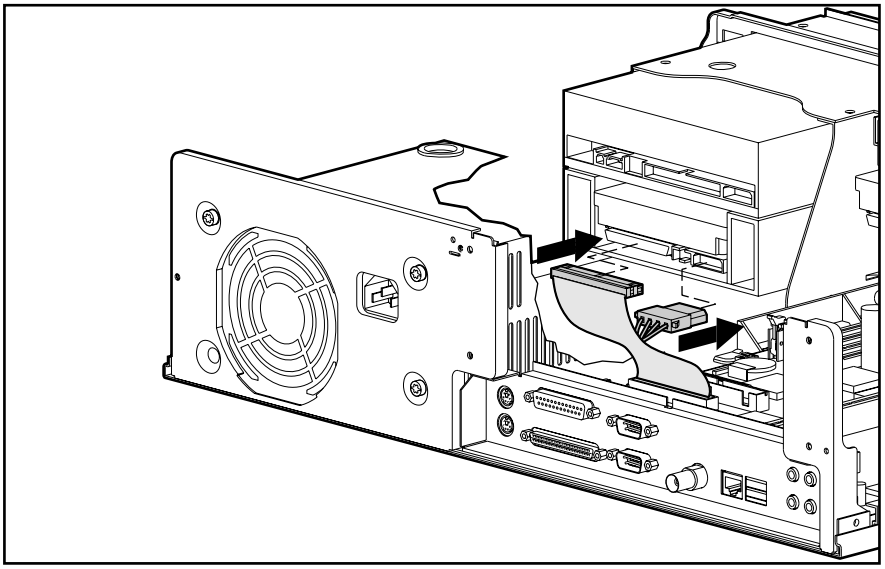


Figure 3-24. Connecting the Signal and Power Cables

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

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

9. Slide the drive cage back in and replace the three retaining screws to secure it.
10. Remove the blank bezel from the front bezel, if necessary. (If you are installing a hard drive, leave the blank bezel in place for proper cooling.)
11. Replace the front bezel and the workstation cover.

NOTE: The system recognizes a Compaq hard drive and automatically reconfigures the computer.

Installing a 5.25-inch device

To install an optional 5.25-inch device in Bay 4 (not illustrated), complete the following steps:

1. Perform the service preparations on page 3-2.
2. Remove the following components:
   - ❑ workstation cover
   - ❑ front bezel
3. Install one metric guide screw into the front hole of the left side of the device. The guide screw is used to align the device in the bay.
4. Insert the device into the bay. Ensure the guide screw aligns with the slot in the bay.
5. Secure the 5.25-inch device in the drive cage with two metric retaining screws on the right side of the device.

6. Extend the drive cage slightly from the chassis, then connect the cables to the rear of the drive.

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

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

7. Remove the blank bezel from the front bezel.
8. Replace the front bezel and the workstation cover.

Bay 5

Bay 5 is an internal bay (bracket) that supports third-height (1.0”) or half-height (1.6”) hard drives. Bay 5 is located inside the chassis to the right of the drive cage. Installation and removal procedures are unique for this bay.

To install a hard drive in bay 5, complete the following steps:

1. Perform the service preparations on page 3-2.
2. Remove the workstation cover.
3. Remove the screw securing the hard drive bracket to the chassis ❶.
4. Slide the bracket toward the rear of the workstation, then remove the bracket ❷.

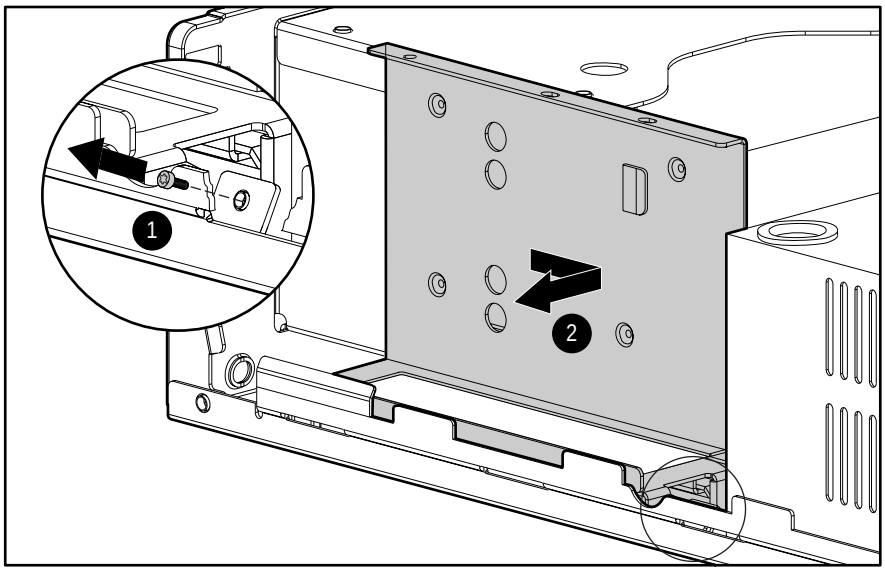


Figure 3-25. Removing the Hard Drive Bracket (Bay 5)

5. Place the hard drive in the bracket.
6. Secure the hard drive with the four screws provided.

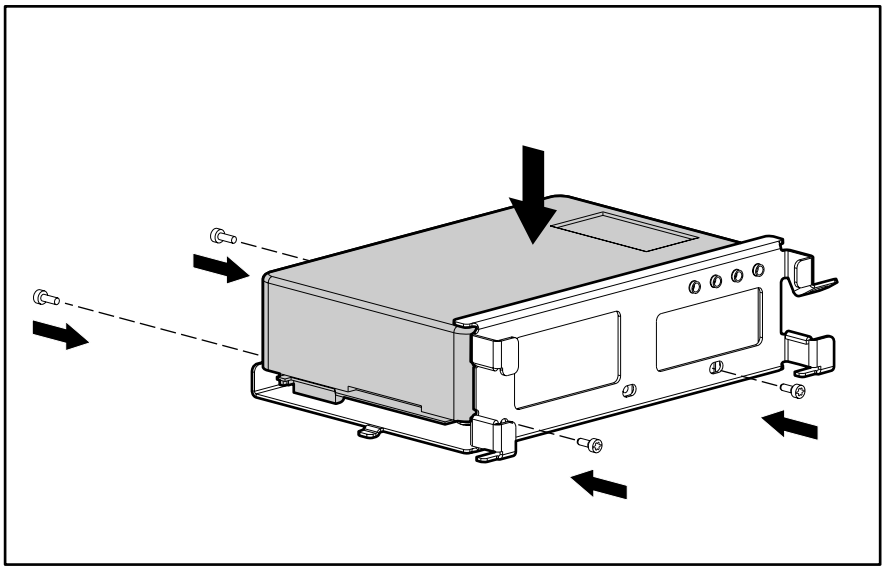


Figure 3-26. Installing a Hard Drive in the Hard Drive Bracket

7. Connect the drive power and signal cables to the back of the drive.

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

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

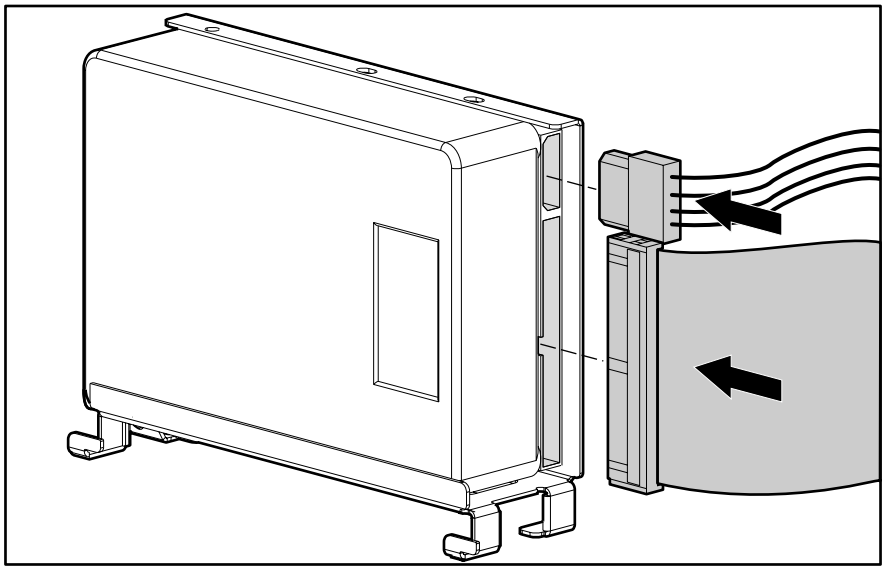


Figure 3-27. Connecting the Signal and Power Cables to a Hard Drive

8. Install the hard drive/bracket assembly by sliding it toward the front of the workstation ❶. Make sure to engage the tab on the back of the bracket in the slot provided on the side of the drive cage.
9. Secure the hard drive/bracket assembly to the drive cage with the screw provided ❷.
10. Replace the workstation cover.

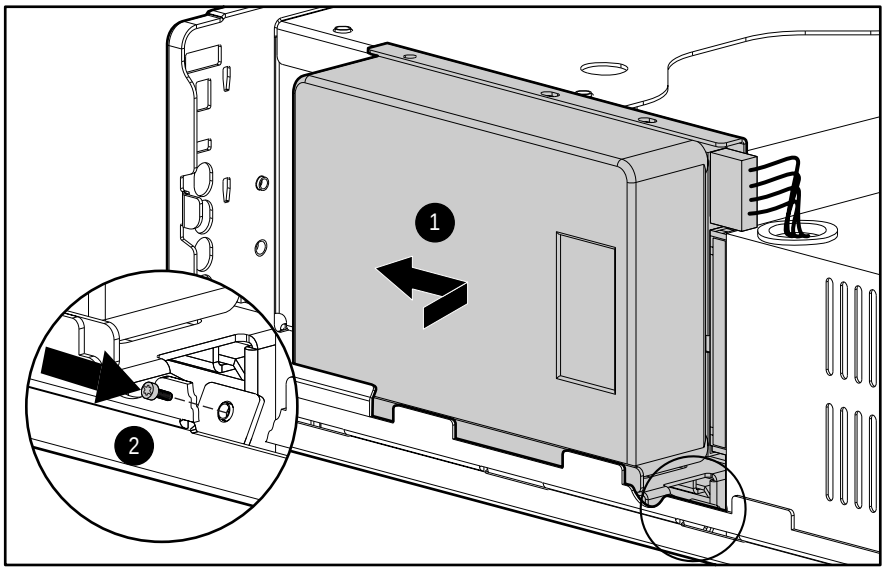


Figure 3-28. Installing a Hard Drive/Bracket Assembly

System Board Assembly

The system board assembly contains the system memory modules, Pentium II processor/heat sink, Processor Power Module, system board tray, and the external battery. Each of these components is spared separately.

It is not necessary to fully remove the system board from the chassis to replace system board components, but you must extend it from the chassis in order to access some components.

System Board Tray

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

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

1. Perform the service preparations on page 3-2.
2. Remove the following components:
   - ❑ workstation cover
   - ❑ I/O bracket assembly
3. Disconnect and remove all cables plugged into the system board.
4. Grasp the back edge of the system board tray and slide it out of the chassis.

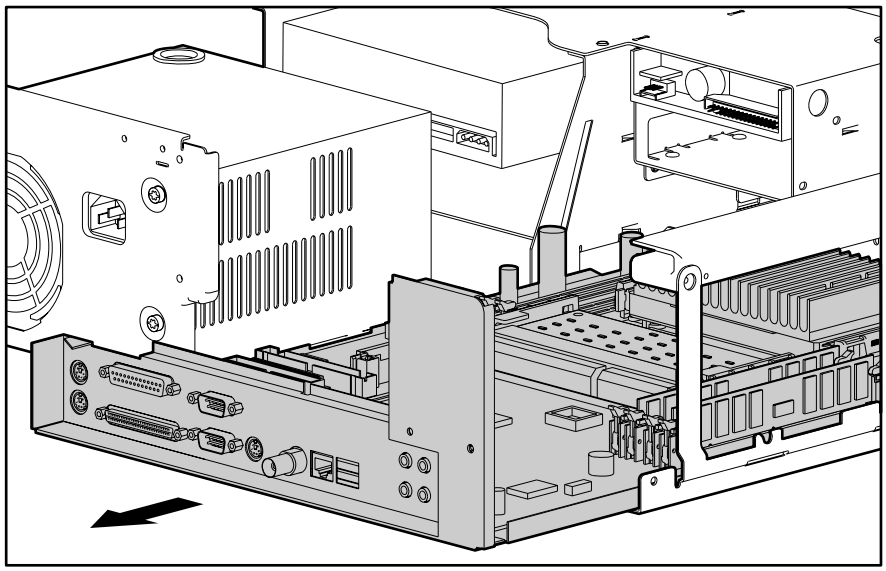


Figure 3-29. Removing the System Board Tray

To install a new system board tray:

1. Remove the following components from the system board tray:
   - ❑ DIMMs
   - ❑ processor(s)
   - ❑ Processor Power Module(s)
   - ❑ terminator board (if installed)
   - ❑ external battery (if installed)
2. Install the components on the new system board. Prior to reinstalling the DIMMs, see "Important Guidelines for DIMM Installation" later in this chapter.
3. Slide the new system board tray into the chassis.
4. Connect all cables to the system board.
5. Replace the I/O bracket assembly and the workstation cover.

IMPORTANT: Prior to replacing the I/O bracket assembly, read "Important Guidelines for I/O Bracket Assembly Replacement" earlier in this chapter.

Memory Modules

To remove a memory module, complete the following steps:

1. Perform the service preparations on page 3-2.
2. Remove the following components:
   - ❑ workstation cover
   - ❑ I/O bracket assembly
3. Extend the system board tray from the chassis slightly to gain access to the DIMM slots.
4. Press outward on both latches of the DIMM at the same time ❶. This releases the module and pushes it partially out of the socket.
5. Lift the module from the socket ❷.
6. Reverse steps 1 through 5 to replace a memory module and reassemble the workstation.

IMPORTANT: Prior to replacing the I/O bracket assembly, read "Important Guidelines for I/O Bracket Assembly Replacement" earlier in this chapter.

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

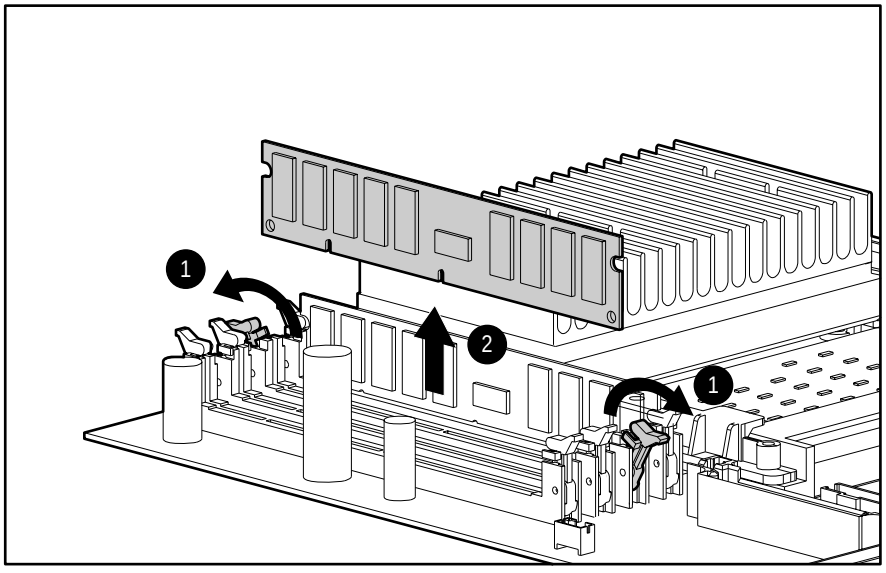


Figure 3-30. Removing a Memory Module

Important Guidelines for DIMM Installation

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

- Use only 16-, 32-, 64-, 128-, or 256-MB, ECC, EDO-buffered DIMMs. DIMMs should be 60-ns. The workstation will support DIMMs with a speed of 50-ns; however, it is recommended that only 60-ns DIMMs be installed. Since the memory timing registers can support only one configuration, the entire memory subsystem will operate at a 60-ns speed.
- Use only 3.3 volt, ECC, EDO-buffered DIMMs. Non-compatible DIMMs may adversely affect data integrity.
- A DIMM can be installed one way only. Be sure to match the two *key slots* on the DIMM with the tab on the DIMM slot. Push the DIMM down into the DIMM slot, ensuring that it is fully inserted and properly seated.
- When upgrading, do not exceed 512 MB total. Upgrades exceeding 512 MB will prevent the system from booting.
- DIMMs must be added in pairs and each DIMM in a pair must be the same size.
- **DO NOT INSTALL ANY ONE PAIR OF DIMMS IN ADJACENT DIMM SLOTS.**

IMPORTANT: The system will not boot if you install DIMMs in adjacent slots. DIMMs must be installed in alternating (every other) DIMM slots.

- Better performance can be achieved by alternating the installed DIMM pairs between DIMM slots. In doing so, both memory controllers are utilized by the system.

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

IMPORTANT: The DIMMs shipped with the workstation support error checking
and correcting (ECC). Do not install DIMMs that do not support ECC. DIMMs must also have a 4-KHz refresh rate.

DIMM Installation

IMPORTANT: Before installing additional DIMMs, read "Important Guidelines for DIMM Installation" earlier in this chapter.

The Compaq Professional Workstation 5100 supports 60-ns ECC, EDO-buffered, dual-inline memory modules (DIMMs). Additional DIMMs (16-, 32-, 64-, 128-, or 256-MB) are available to upgrade the memory. The workstation has eight DIMM slots located on the system board that support up to a maximum of 512 MB.

The following illustration identifies the physical location of all DIMM slots. See the corresponding table for the proper configuration when installing DIMM pairs.

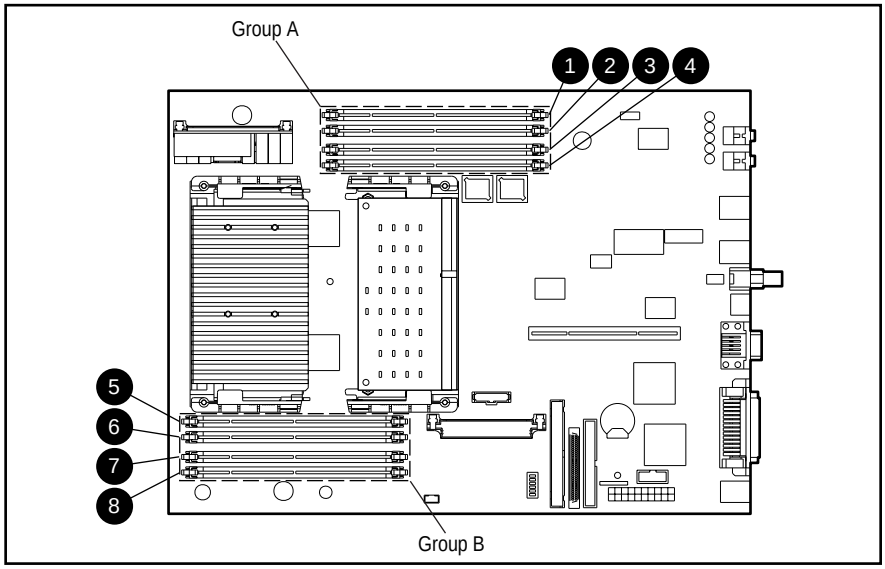


Figure 3-31. Overview of DIMM Slots

Table 3-3
DIMM Slot Configurations

	Group A (Slots 1-4)				Group B (Slots 5-8)			
DIMM Pair Installation	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
1st pair	X		X					
2nd pair	O		O		X		X	
3rd pair	O	X	O	X	O		O	
4th pair	O	O	O	O	O	X	O	X

X = Pair being installed

O = Existing Pair (previously installed)

The previous table illustrates a progressive installation of DIMMs that ensures optimal system performance. Based on this example, DIMM pairs are installed as follows:

- The first pair of DIMMs in slots 1 and 3 (Group A)
- The second pair of DIMMs in slots 5 and 7 (Group B)

NOTE: You can install the second pair in slots 2 and 4 (Group A), but it is not recommended. Optimal performance is achieved only when alternating DIMM pairs between Groups A and B.

- The third pair of DIMMs in slots 2 and 4 (Group A)
- The fourth pair of DIMMs in slots 6 and 8 (Group B)

Processor and Heat Sink

To remove the processor and heat sink, complete the following steps:

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

1. Perform the service preparations on page 3-2.
2. Remove the following components:
   - ❑ workstation cover
   - ❑ I/O bracket assembly
   - ❑ system board
3. Push in the latches on each side of the processor until you hear two clicks. This locks the tabs in the open position.

   NOTE: Clicking once releases the tabs; clicking twice locks the tabs open.

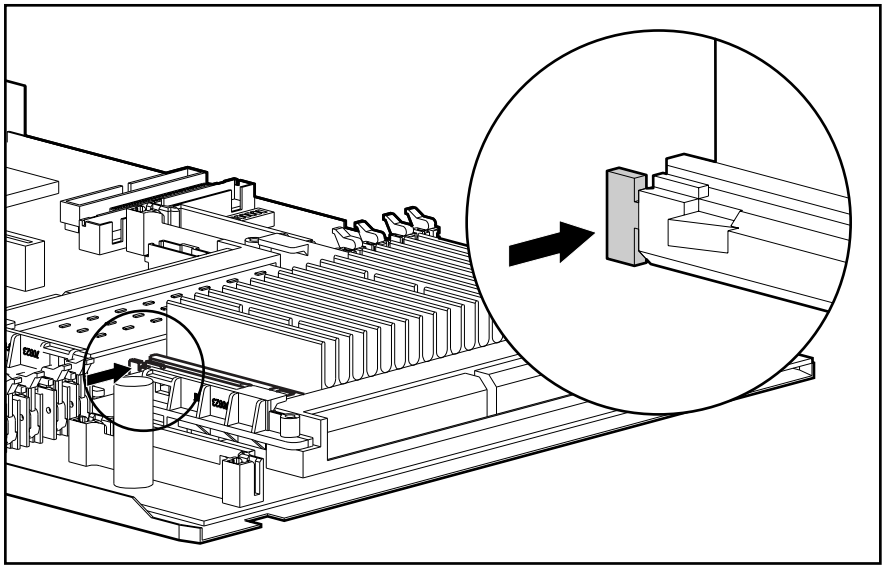


Figure 3-32. Pushing the Processor Tabs into the Open Position

NOTE: The Processor Power Module is not shown for clarity.

4. Slide out the processor.
5. Reverse steps 1 through 4 to replace the processor and heat sink and reassemble the workstation.

   When replacing the processor, push the processor tabs outward. The tabs will click twice, locking the processor to the system board.

CAUTION: When replacing the Pentium II processor, DO NOT touch the connector pins on the processor. **Bent connector pins could result in damage to the system board.**

IMPORTANT: Prior to replacing the I/O bracket assembly, read "Important Guidelines for I/O Bracket Assembly Replacement" earlier in this chapter.

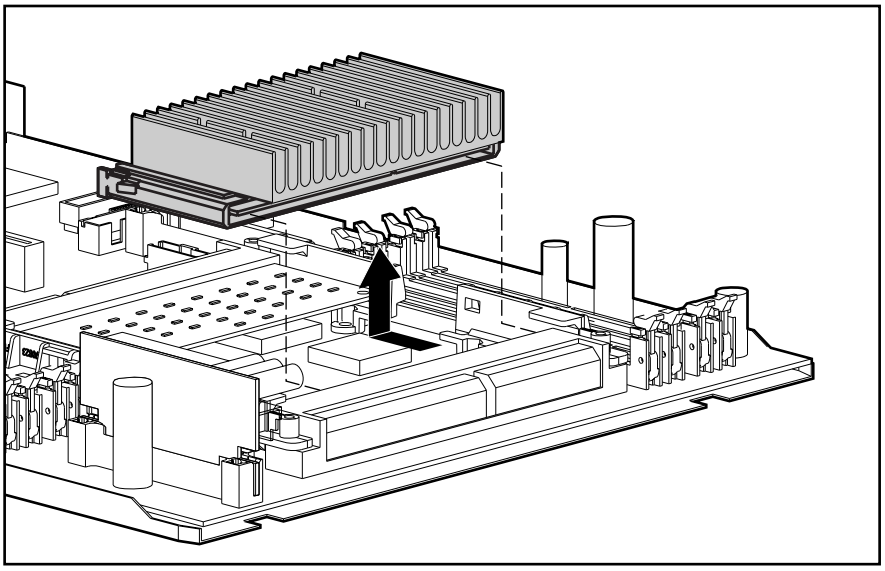


Figure 3-33. Removing the Processor and Heat Sink

Processor Power Module

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

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

1. Perform the service preparations on page 3-2.
2. Remove the following components:
   - ❑ workstation cover
   - ❑ I/O bracket assembly

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

NOTE: For better access to the processor power module, you might need to slide the system board out half way.

3. Press outward on both latches of the processor power module at the same time ❶, and lift it from the system board ❷.

4. Reverse steps 1 through 3 to replace the processor power module and reassemble the workstation.

IMPORTANT: Prior to replacing the I/O bracket assembly, read "Important Guidelines for I/O Bracket Assembly Replacement" earlier in this chapter.

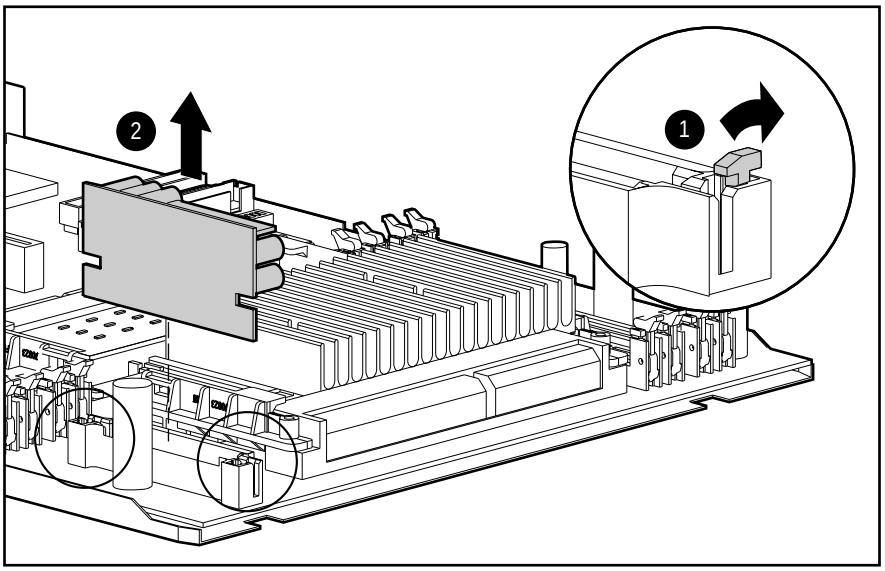


Figure 3-34. Removing the Processor Power Module

Terminator Board

A terminator board **MUST** be used in a single processor system. The terminator provides proper signal termination of the Pentium II bus.

To remove the terminator board, complete the following steps:

1. Perform the service preparations on page 3-2.
2. Remove the following components:
   - ❑ workstation cover
   - ❑ I/O bracket assembly
   - ❑ system board
3. Slide out the terminator board.
4. Reverse steps 1 through 3 to replace the terminator board and reassemble the workstation.

IMPORTANT: Prior to replacing the I/O bracket assembly, read "Important Guidelines for I/O Bracket Assembly Replacement" earlier in this chapter.

NOTE: If you are removing the terminator board to install an additional processor, store the terminator board for future use. If you should decide to revert back to a single processor system or temporarily remove the second processor board, you will need to reinstall the terminator board.

IMPORTANT: The 333 MHz Intel Pentium II processor (spare part number: 278308-002) is supported in a uniprocessor configuration only. If you are using a 266 or 300 MHz processor, your system has multiprocessor capabilities.

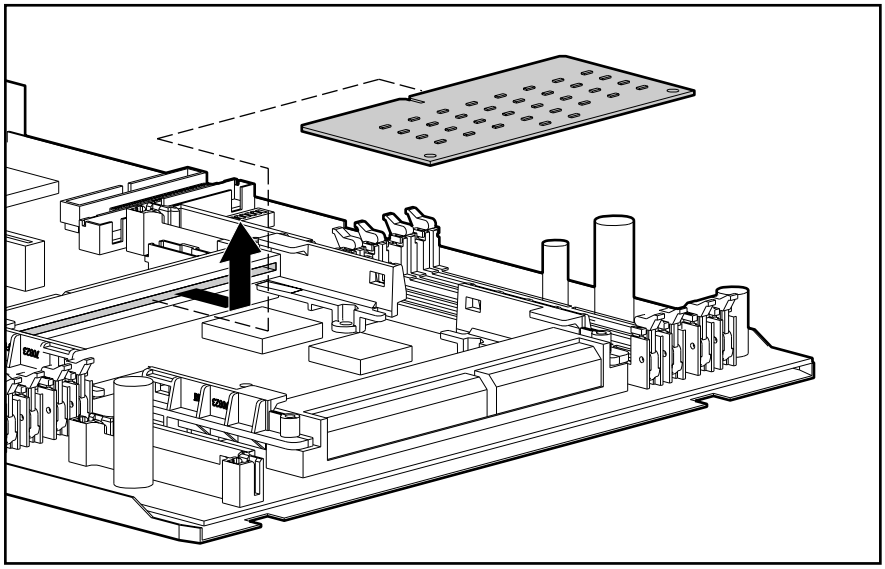


Figure 3-35. Removing the Terminator Board

NOTE: The Pentium II processor and Processor Power Module are not shown for clarity.

External Battery

The real-time clock battery that came with the workstation is not replaceable and is permanently installed on the system board.

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

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

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

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

1. Perform the service preparations on page 3-2.
2. Remove the following components:

- ❑ workstation cover
- ❑ I/O bracket assembly

3. Remove the backing from the adhesive on the hook-and-loop fastener strip and attach the battery near the J21 jumper.
4. Connect the battery to J21 pins 1 through 4 and move the jumper from pins 6 and 7 to pins 5 and 6.

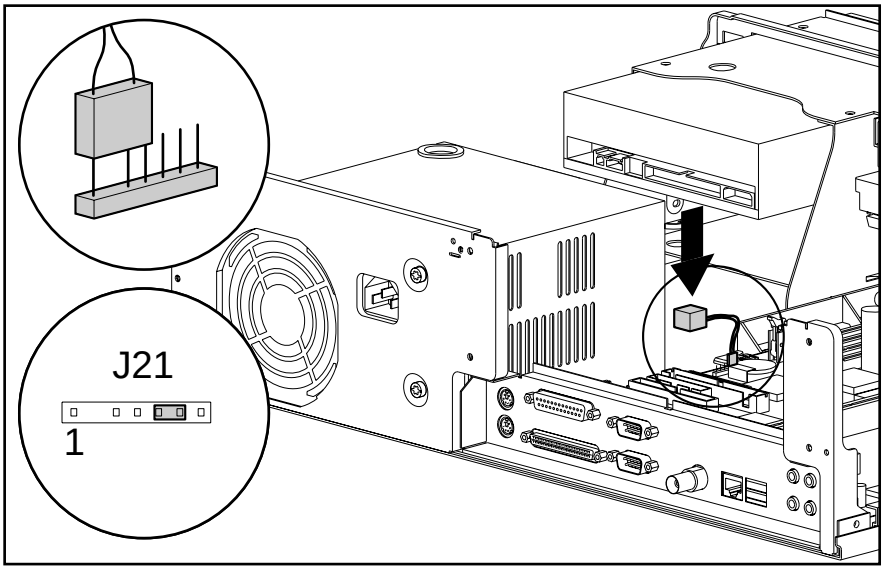


Figure 3-36. Installing the Replacement Battery

5. Replace the I/O bracket assembly and the workstation cover.

IMPORTANT: Prior to replacing the I/O bracket assembly, read "Important Guidelines for I/O Bracket Assembly Replacement" earlier in this chapter.

6. Place the sticker included with your battery kit on the back of the workstation above the power connector.
7. Plug in the workstation and reconnect any external devices.

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

8. Turn on the workstation.

Power Switch and LED with Cables

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

1. Perform the service preparations on page 3-2.
2. Remove the following components:
   - ❑ workstation cover
   - ❑ front bezel
   - ❑ hard drive bracket in bay 5

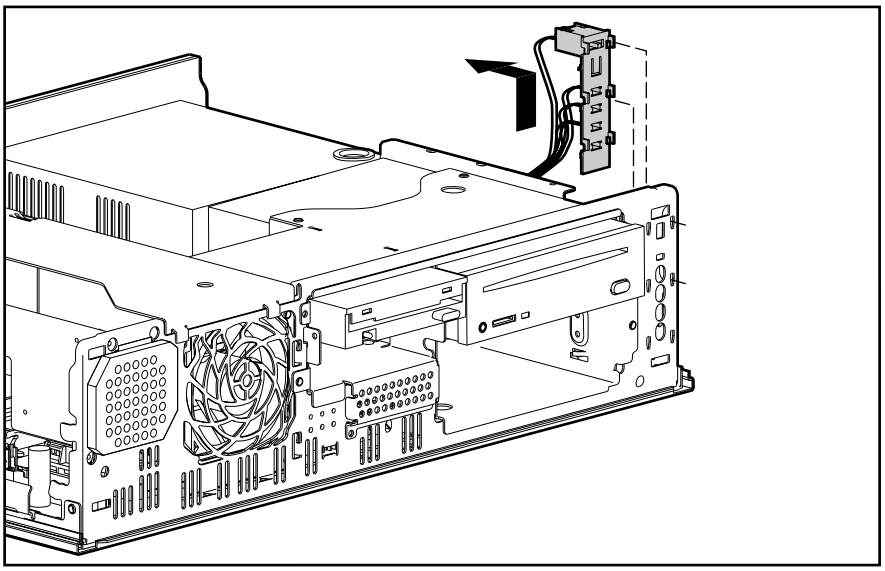


Figure 3-37. Removing the Plastic Switch Holder

3. Remove the power switch and LED with cables from the clips on the chassis.
4. Remove the connector from the system board.
5. Reverse steps 1 through 3 to install the power switch holder and reassemble the workstation.

Power Supply

To remove the power supply, complete the following steps:

1. Perform the service preparations on page 3-2.
2. Remove the workstation cover.
3. Disconnect all power cables.
4. If necessary, extend the drive cage slightly from the chassis.

   NOTE: To facilitate reassembly, note the orientation of each cable connector and the routing of each cable before you remove it.

5. Remove the three screws that secure the power supply to the back of the chassis.
6. Slide the power supply toward the front of the chassis; lift up to remove it.
7. Reverse steps 1 through 6 to replace the power supply assembly and reassemble the workstation.

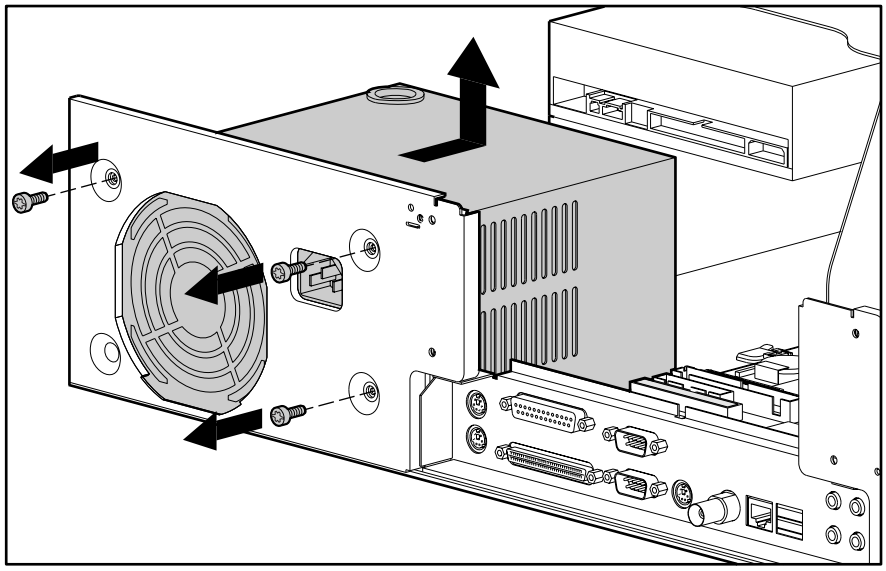


Figure 3-38. Removing the Power Supply

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

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.

Base Pan Cover

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

1. Perform the service preparations on page 3-2.
2. Remove the following components:
   - ❑ workstation cover
   - ❑ front bezel
3. Turn the workstation on its end, with the front bezel end up.
4. Locate the tab on the bottom of the base pan cover and lift it with a flat-head screwdriver.
5. Pull the base pan cover toward the front bezel until it stops.
6. Lift the base pan cover off the base pan assembly.
7. Reverse steps 1 through 6 to replace the base pan cover and reassemble the workstation.

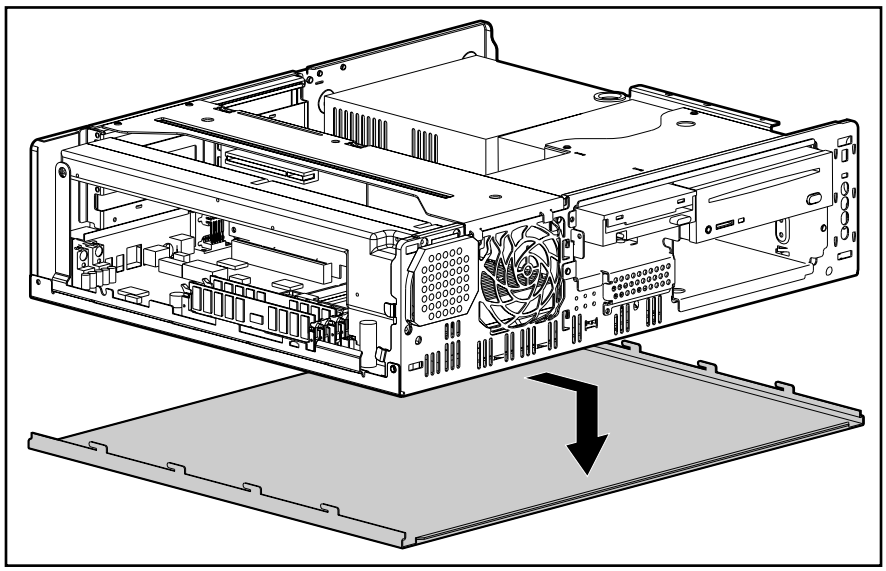


Figure 3-39. Removing the Base Pan Cover

Base Pan Assembly

The base pan assembly is essentially the chassis or the frame that is left after removing all components. To remove the base pan assembly, complete the following steps:

1. Perform the service preparations on page 3-2.
2. Remove components in the following sequence:
   - ❑ workstation cover
   - ❑ front bezel
   - ❑ I/O bracket assembly
   - ❑ hard drive bracket
   - ❑ CD-ROM drive
   - ❑ drive cage
   - ❑ system board assembly
   - ❑ power supply assembly
   - ❑ base pan cover
3. Reverse steps 1 through 2 to replace or install a new base pan assembly.

Chapter 4
Diagnostic Tools

This chapter provides the following information to assist you when servicing the Compaq Professional Workstation 5100:

- Power-On Self-Test (POST)
- Compaq Setup and Diagnostics Utility
- ROMPaq
- Compaq Insight Manager
- Compaq SSD for Windows NT
- Compaq Diagnostics for Windows NT

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

Power-On Self-Test (POST)

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

- Keyboard
- DIMMs
- Graphics controller
- Diskette drives
- IDE/CD-ROM drive
- Hard drives
- Power supply
- Processors
- Controllers

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

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

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

POST Messages

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

Table 4-1
POST Messages

Message	Beeps*	Probable Cause	Recommended Action
101-ROM Error	1L, 1S	System ROM checksum	1. Inspect the ROM placement. 2. Verify the correct ROM. 3. Replace the ROM.
101-Option ROM Checksum Error	1L, 1S	Option ROM checksum	1. Contact the third-party vendor. 2. Inspect the ROM placement. 3. Verify the correct ROM. 4. Replace the ROM to see if the installed expansion board may have a corrupted BIOS.
102-System Board Failure	None	DMA, timers, etc.	Replace the system board.
162-System Options Error	2S	No diskette drive or mismatch in drive type	Run Computer Setup or Windows NT utilities.
162-System Options Not Set	2S	Configuration incorrect	Run Computer Setup or Windows NT utilities.
163-Time & Date Not Set	2S	Invalid time or date in configuration memory	Set the date and time under Control Panel.
164-Memory Size Error	2S	Memory configuration incorrect	Run Computer Setup or Windows NT utilities.
172-1 Configuration Nonvolatile Memory Invalid	None	Invalid NVRAM Content	None
201-Memory Error	None	RAM failure	1. Run Computer Setup or Windows NT utilities. 2. Replace the DIMMs.
202-Memory Type Mismatch	None	Invalid memory configuration	1. Run Computer Setup or Windows NT utilities. 2. Replace the DIMMs.

*L = Long, S = Short

Continued

POST Messages *Continued*

Message	Beeps*	Probable Cause	Recommended Action
203-Memory Address Error	None	RAM failure	1. Run Computer Setup or Windows NT utilities. 2. Replace the DIMMS. 3. Replace the system board.
205-Memory Error	None	Cache memory error (Processor cache)	Run the Setup and Diagnostics utilities.
206-Secondary cache controller failure	None	Cache memory controller or RAM failure	Run the Setup and Diagnostics utilities.
207-ECC Failure	2S	Single Bit ECC error	Replace DIMM if error persists.
210-Invalid Memory Configuration Detected. Maximum of 512 Mbytes of Memory Supported. System Halted.	None	Too much memory installed	Reduce memory installed by removing a pair of DIMMs.
212-Failed Processor	1L	Processor has failed to initialize	Replace the processor and/or the Processor Power Module.
301-Keyboard Error	None	Keyboard failure	Reconnect keyboard with computer turned off.
301-Keyboard Error or Test Fixture Installed	None	Keyboard failure	Replace the keyboard.
303-Keyboard Controller Error	None	I/O board keyboard controller	1. Reconnect keyboard with computer turned off. 2. Replace the system board.
304-Keyboard or System Unit Error	None	Keyboard failure	1. Replace the keyboard. 2. Replace the system board.
40X-Parallel Port X Address Conflict	2S	Port address conflict.	Run Computer Setup or Windows NT utilities.
402-Monochrome Adapter Failure	1L, 2S	Monochrome display controller	Replace the monochrome display controller.

404-Parallel Port Address Conflict Detected	2S	Both external and internal ports are assigned to parallel port X	Run Computer Setup or Windows NT utilities.
501-Display Adapter Failure	1L, 2S	Video display controller	Replace the graphics controller.

*L = Long, S = Short

Continued

POST Messages *Continued*

Message	Beeps*	Probable Cause	Recommended Action
601-Diskette Controller Error	None	Diskette controller circuitry or floppy drive circuitry incorrect	1. Run Computer Setup. 2. Check and/or replace cables. 3. Replace diskette drive. 4. Replace the system board.
605-Diskette Drive Type Error	2S	Mismatch in drive type	Run Computer Setup or Windows NT utilities.
611-Primary Floppy Port Address Assignment Conflict	2S	Configuration error	Run Computer Setup or Windows NT utilities.
612-Secondary Floppy Port Address Assignment Conflict	2S	Configuration error	Run Computer Setup or Windows NT utilities.
1151-System Board COM Port 1 Address Assignment Conflict	2S	Both external and internal serial ports are assigned to COM1	Run Computer Setup or Windows NT utilities.
1152-System Board COM Port 2 Address Assignment Conflict	2S	Both external and internal serial ports are assigned to COM2	Run Computer Setup or Windows NT utilities.
1155-System Board COM Port Address Assignment Conflict	2S	COM port address conflict	Run Computer Setup or Windows NT utilities.
1610-Temperature Violation Detected	None	Internal temperature exceeds specification	Check that computer air vents are not blocked and cooling fan is running.
1611-Fan Failure Detected	None	Fan(s) not functional	Replace failing fan.
1720-IntelliSafe Hard Drive Detects Imminent Failure	None	IDE hard drive is about to fail	Backup contents and replace hard drive.
1720-SMART Hard Drive Detects Imminent Failure	None	SCSI hard drive is about to fail	Backup contents and replace hard drive.
1771-Primary Disk Port Address Assignment Conflict	2S	Internal and external IDE hard drive controllers are both assigned to the primary address	Run Computer Setup or Windows NT utilities.

1772-Secondary Disk Port Address Assignment Conflict	2S	Internal and external IDE hard drive controllers are both assigned to the secondary address	Run Computer Setup or Windows NT utilities.
1780-Disk 0 Failure	None	IDE Hard drive/format error	Run the Setup and Diagnostics utilities.
1781-Disk 1 Failure	None	IDE Hard drive/format error	Run the Setup and Diagnostics utilities.
*L = Long, S = Short			

Continued

POST Messages *Continued*

Message	Beeps*	Probable Cause	Recommended Action
1782-Disk Controller Failure	None	IDE Hard drive circuitry error	Run the Setup and Diagnostics utilities.
1790-Disk 0 Failure	None	IDE Hard drive error or wrong drive type	Run the Setup and Diagnostics utilities.
1791-Disk 1 Failure	None	IDE Hard drive error or wrong drive type	Run the Setup and Diagnostics utilities.
1792-Secondary Disk Controller Failure	None	IDE Hard drive circuitry error	Run the Setup and Diagnostics utilities.
1793-Secondary Controller or Disk Failure	None	IDE Hard drive circuitry error	Run the Setup and Diagnostics utilities.
XX000Y ZZ Parity Check 2	None	Parity RAM failure	Run the Setup and Diagnostics utilities.
A Correctable Memory error Occurred prior to this Power-Up	None	Single bit ECC error during previous POST	1. Run Computer Setup or Windows NT utilities. 2. Replace the DIMMs.
A Critical Error Occurred Prior to this Power-Up.	None	Critical Error (NMI) during previous POST	Determined by NMI source.
This Workstation has experienced an NMI (Hardware Error)	None	As indicated	
Fixed Disk Parameter Table or BIOS Error System Halted	3L	Configuration or hardware failure	Run the Setup and Diagnostics utilities.
Invalid Electronic Serial Number	None	Electronic serial number has become corrupted	Run Computer Setup.
Audible	2S	Power-on successful	None.
(RESUME = F1 KEY)	None	As indicated to continue	Press F1.

* L = Long, S = Short

Troubleshooting Minor Problems

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

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

In addition to the above checklist, see the next few sections for other possible solutions to:

- Power Problems
- Diskette Drive Problems
- Display Problems
- Printer Problems
- Hard Drive Problems
- Hardware Installation Problems
- IDE CD-ROM Drive Problems
- Memory Problems
- SCSI Problems
- Network Problems
- Audio Hardware Conflicts

Power Problems

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

Table 4-2
Solutions for Power Problems

Problem	Possible Solution
Computer will not turn on.	Make sure the workstation is connected to a power source. Make sure the processor(s) and terminator board are properly seated. Check to see if cables to the external power source are unplugged. Make sure cables connecting the workstation and the external source are plugged in properly. Make sure cables from the workstation's power supply are properly plugged in to the backplane board. A PCI or ISA card that has been installed is not seated properly or is defective. Make sure that the card is fully inserted, or remove the PCI or ISA card that was just installed.
Computer does not automatically display the date and time.	The real-time clock (RTC) battery may need to be replaced.
Computer powered off automatically.	The unit temperature may have been exceeded. Check the fan for function and blockage.

Diskette Drive Problems

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

Table 4-3
Solutions for Diskette Drive Problems

Problem	Possible Solution
Diskette drive light stays on.	1. Diskette might be damaged. In Windows NT, run Disk Administrator. At the Start menu, highlight Programs and select Administrator Tools. 2. Diskette could be installed incorrectly. Remove the diskette and reinsert. 3. Software program may be damaged. Check the program diskettes. 4. Drive button is not pushed in. Push in drive button. 5. Drive cable is not properly connected. Reconnect drive cable.
Diskette drive cannot write to a diskette.	1. Diskette is not formatted. Format the diskette. 2. Diskette is write-protected. Either use another diskette that is not write-protected or disable the write protection on the diskette. 3. Writing to the wrong drive. Check the drive letter in the path statement. 4. Not enough space is left on the diskette. Use another diskette to write the information. 5. Diskette write control is disabled. Check the security feature settings.
Diskette drive cannot read a diskette.	1. Diskette is not formatted. Format the diskette. 2. Using the wrong diskette type for the drive type. Use a diskette that is compatible with the drive. 3. Reading the wrong drive. Check the drive letter in the path statement. 4. Diskette drive has been disabled by Computer Setup Windows NT utilities. Run Computer Setup and enable the diskette drive.
A problem has occurred with a disk transaction.	The directory structure is bad or there is a problem with a file. Run Disk Administrator. At the Start menu, highlight Programs and select Administrator Tools.

Non-system disk message.	Remove the diskette from the drive.
Drive not found.	Check the cables for loose connections.

Display Problems

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

Table 4-4
Solutions for Display Problems

Problem	Possible Solution
Screen is blank.	1. Monitor is not turned on and the monitor light is not on. Turn on the monitor and check that the monitor light is on. 2. Screen save has been initiated. Press any key or move the mouse to light the screen. Wait a few seconds for the screen to be active. 3. Check the cable connection from the monitor to the workstation and check the electrical outlet. 4. The brightness needs adjusting. Adjust the brightness control. 5. The QuickBlank feature has been enabled through Security Management. Run Computer Setup and disable the QuickBlank feature. 6. The energy saver feature has been enabled. Press any key or type the password. Wait a few seconds for the screen to become active. 7. The RGB (Red, Green, Blue) input switch on the back of the monitor is incorrectly set. Set the monitor's input switch to 75 ohms. If there is a sync switch, set it to External. 8. If a fixed-sync monitor is used, be sure that the monitor can accept the same sweep rate as the resolution chosen. 9. Check that the graphics adapter is fully and properly inserted in the PCI slot.
Graphics colors are wrong.	1. If the BNC cable is used, make sure that the Red, Green, and Blue BNC cables are connected to the corresponding monitor connectors. 2. Be sure the monitor's RGB inputs are set to 75 ohms.
Characters are dim.	1. Adjust the monitor's brightness and contrast controls. 2. Check that the video cable is securely connected to the video card and monitor. 3. Set the RGB switch (and sync options, if available) to 75 ohms, with the sync set to External. Refer to the documentation included with the monitor.

Monitor does not function properly when used with the energy saver features.	A monitor without the energy saver feature is being used with energy saver features enabled. Disable the monitor energy saver feature.
Blurry display or requested resolution cannot be set.	If the graphics controller was upgraded, the correct display drivers may not be loaded. Install the correct display drivers on the diskette included in the upgrade kit.

Continued

Solutions for Display Problems *Continued*

Problem	Possible Solution
The picture is broken up; it rolls, jitters, or blinks.	1. Be sure the monitor cable is securely connected to the computer. 2. In a 2-monitor system or if another monitor is in close proximity, the monitors may interfere with each other's magnetic field. Move them farther apart.
Screen goes blank.	A screen blanking utility may be installed or energy saver features are enabled. Press any key or type password. Wait a few seconds for the screen to become active.
Monitor overheats.	There is not enough ventilation space for proper airflow. Leave at least 3 inches (7.6 cm) of ventilation space. Also, be sure there is nothing on top of the monitor to obstruct air flow.
Cursor will not move using the arrow keys on the numeric keypad.	The Num Lock key is on. Press the Num Lock key. The Num Lock light should not be on when you want to use the arrow keys.

Printer Problems

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

Table 4-5
Solutions for Printer Problems

Problem	Possible Solution
Printer will not print.	1. Printer is not turned on and online. Turn the printer on and make sure it is online. 2. The correct printer drivers for the application are not installed. Install the correct printer drivers for the application. 3. If the workstation is on a network, you may not have made the connection to the printer. Make the proper network connections to the printer.
Printer will not turn on.	The cables may not be connected properly. Reconnect all cables and check the power cord and electrical outlet.

Prints garbled information.	1. The correct printer drivers for the application are not installed. Install the correct printer driver for the application. 2. The cables may not be connected properly. Reconnect all cables.
Printer is off line.	The printer may be out of paper. Check the paper tray and refill it if it is empty. Select online.

Hard Drive Problems

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

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

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

Solutions for some typical hard drive problems are presented in the following table.

Table 4-6
Solutions for Hard Drive Problems

Problem	Possible Solution
Hard drive error occurs.	Hard disk has bad sectors or has failed. Use a utility to locate and block usage of bad sectors. If necessary, reformat the hard disk.
Disk transaction problem.	Either the directory structure is bad or there is a problem with a file. When using Windows NT, run Disk Administrator. At the Start menu, highlight Programs and select Administrator Tools.
Drive not found.	1. Cable could be loose. Check cable connections. 2. Check SCSI IDs to make sure they are not duplicated.
Nonsystem disk message.	1. The system is trying to start from a diskette that is not bootable. Remove the diskette from the diskette drive. 2. The system is trying to start from the hard drive but the hard disk has been damaged. Insert a bootable diskette into the diskette drive and restart the workstation. 3. Diskette boot has been disabled in Computer Setup. Run Computer Setup and enable diskette boot.

Hardware Installation Problems

This section identifies some quick checks for hardware problems.

Table 4-7
Solutions for Hardware Installation Problems

Problem	Possible Solutions
A new device is not recognized as part of the computer system.	1. The Computer Setup utility has not been run to configure the new device. Run the Computer Setup utility. 2. When the system advised you of changes to the configuration, you did not accept them. Reboot the workstation and follow the instructions for accepting the changes. 3. The system may not have automatically recognized the new device. Run Computer Setup and identify the new device. 4. A Plug-and-Play board may not automatically configure when added if the default configuration conflicts with other devices. Use Computer Setup to deselect the automatic settings for the board and choose a basic configuration that doesn't cause a resource conflict. 5. The cables for the new external device are loose or the power cables are unplugged. Check all cables. 6. The power switch for the new external device is not turned on. Turn off the workstation, turn on the external device, and then turn on the workstation to integrate the new device. 7. If the drive is a secondary drive that has just been installed on the same controller as the primary drive, verify that the jumpers for both drives are set correctly.

CD-ROM Drive (IDE) Problems

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

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

Problem	Possible Solution
Cannot read compact disc.	1. CD is not properly seated in the drive. Eject the CD, correctly seat it in the drive, then reload. 2. CD has been loaded upside down. Eject the CD, turn it over, then reload.
System will not boot from CD-ROM drive.	1. The CD-ROM boot is not enabled through the Computer Setup utility. Run the Computer Setup utility and set the drive priorities. 2. Make sure that drive cabling and jumpers are set correctly.
Cannot eject compact disc.	CD is not properly seated in the drive. Turn off the workstation, insert a thin metal rod into the emergency eject hole, and push firmly (a straightened paper clip can be used). Slowly pull the tray out from the drive until the tray is fully extended, then remove the CD.
CD-ROM device is not detected; driver is not loaded.	CD-ROM drive is not connected properly. Open the workstation. Check to see that the drive cable is connected properly.

Memory Problems

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

Table 4-9
Memory Problems

Problem	Possible Solution
Out of Memory error.	1. Run Performance Monitor. At the Start menu, highlight Programs and select Administrator Tools. 2. The workstation has run out of memory to run the application. Check the application documentation to determine the memory requirements.
Memory count during POST is wrong.	The DIMMs may not be installed correctly. Check that the DIMMs have been installed correctly in the DIMM slots then run the Computer Setup utility.
Insufficient memory error during operation.	The system has run out of memory for the application. Check the memory requirements for the application or install additional memory.

SCSI Problems

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

Table 4-10
SCSI Problems

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

Network Problems

This section provides some common causes and solutions for network problems. The process of debugging network cabling is not discussed.

Table 4-11
Network Problems

Problem	Cause	Solution
System does not detect a network controller.	1. Possible driver problem 2. Possible failed network controller	1. Load latest version of Compaq SSD for Windows NT. 2. Replace system board.
System Setup utility reports unprogrammed EPROM.	1. The network controller is defective. 2. Network drivers are not loaded.	1. Replace the controller or the system board. 2. Boot the workstation without the network drivers using a system boot diskette, and reconfigure the network controller.
Diagnostics reports a failure.	1. The cable is not securely connected. 2. The cable is attached to the incorrect connector. 3. There is a problem with the cable or a device at the other end of the cable. 4. The network controller is defective. 5. Network controller interrupt or memory overlaps the interrupt or memory of an expansion board.	1. Be sure the cable is securely attached to the network connector and that the other end of the cable is securely attached to the correct device. 2. Be sure that the cable is attached to the correct connector. 3. Be sure that the cable and device at the other end are operating correctly. 4. Replace the controller or the system board. 5. Run Computer Setup and modify the network controller memory value.

Diagnostics passes, but the system does not communicate with the network.	1. Network drivers are not loaded, or driver parameters do not match current configuration. 2. The network controller is not configured for the workstation. 3. The network controller interrupt or memory overlaps the interrupt or memory of an expansion board.	1. Make sure the network drivers are loaded and that the driver parameters match the configuration of the network controller. 2. Select the Network icon at the Control Panel. Reconfigure the driver if necessary, using the Network Setup found in the Control Center. 3. Run Computer Setup and modify the network controller memory value.

Continued

Network Problems *Continued*

Problem	Cause	Solution
Network controller stopped working when an expansion board was installed.	1. Network drivers are not loaded or driver parameters do not match the current configuration. 2. The cable is not securely connected. 3. The network controller interrupt or memory overlaps the interrupt or memory of another expansion board. 4. The network controller requires drivers. 5. The files containing the network drivers are corrupted.	1. Make sure that the network drivers are loaded and that the driver parameters match the configuration of the network controller using Network Setup found in the Control Center. 2. Be sure that the cable is securely attached to the network connector and that the other end of the cable is securely attached to the correct device. 3. Run Computer Setup and modify the network controller memory value. 4. Verify that the drivers were not accidentally deleted when the drivers for a new expansion board were installed. 5. Reinstall the network drivers using the backup diskettes and then run Computer Setup.
Network controller stopped working without apparent cause.	1. The files containing the network drivers are corrupted. 2. The cable is not securely connected. 3. The network controller is defective.	1. Reinstall the network drivers using the backup diskettes, then run Computer Setup. 2. Ensure that the cable is securely attached to the network connector and that the other end of the cable is securely attached to the correct device. 3. Replace the network controller or system board.

Audio Hardware Conflicts

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

- Base I/O address 220H
- OPL III I/O address 388-38Bh
- Interrupt IRQ 5
- 8-bit DMA Channel 1 and Channel 0 or 3

To resolve hardware conflicts:

1. Change the hardware settings of the audio card or the peripheral card in your system if the peripheral card is using the audio interface setting.
2. If you are unsure of the settings of the peripheral cards, you can isolate the source of the problem by temporarily removing all cards. After that, add the cards back one at a time until the card that is causing the conflict is found.

Compaq Setup and Diagnostics Utilities

The Compaq Setup and Diagnostics utilities are located on the system partition, not in the ROM. The utilities include:

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

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

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

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

NOTE: The partition containing these utilities can be recreated from the SmartStart for Workstations CD, or from the Computer Setup or Diagnostic diskettes. Additional utilities are in Windows NT under Administrative Tools and Control Panel.

Accessing the Setup and Diagnostics Utilities from the System Partition

If the system was installed using SmartStart for Workstations, the Compaq utilities will be available on the system partition. (The system partition could have also been created during a manual system installation.)

IMPORTANT: Do not attempt to access the Setup and Diagnostics utilities directly from the SmartStart for Workstations CD. The utilities will not be functional.

To display the Compaq Utilities menu:

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

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

NOTE: The memory check does not occur when performing a warm boot.

2. Press F10 as soon as the cursor moves to the upper-right corner of the screen.
3. If prompted, select the desired language.
4. Press Enter to bypass the Welcome to Compaq Utilities screen.
5. The Compaq Utilities menu appears.

NOTE: Procedures for running each Compaq Utilities menu option (Computer Setup, TEST, INSPECT) are included later in this chapter.

Accessing the Setup and Diagnostics Utilities from Diskette

The Setup and Diagnostics utilities are also accessible from the Computer Setup or Diagnostics diskettes.

To access Computer Setup:

1. Insert Computer Setup diskette 1 of 2 into drive A.
2. Turn on or restart the workstation. If Windows NT is running, click Start, Shut Down, Restart the computer.
3. When prompted, insert Computer Setup diskette 2 of 2 into drive A.

To access TEST or INSPECT:

1. Insert the Diagnostic diskette into drive A.
2. Turn on or restart the workstation. If Windows NT is running, click Start, Shut Down, Restart the computer.
3. If prompted, select the desired language.
4. Press Enter to bypass the Welcome to Compaq Utilities screen.

NOTE: Procedures for running each Compaq Utilities menu option (Computer Setup, TEST, INSPECT) are included later in this chapter.

Computer Setup

The Computer Setup utility is preinstalled on the system partition. This utility is also available on diskettes through SoftPaq, or by creating diskettes from the system partition. Computer Setup provides a snapshot of the workstation hardware configuration, aids in troubleshooting, and allows you to customize workstation features. Computer Setup recognizes a newly installed internal or external device and automatically updates the Computer Setup screen.

The following parameters are checked:

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

To run Computer Setup, follow these steps:

1. Access the Compaq Utilities menu.
2. Select Computer Setup.
3. When prompted, press any key to restart the system.

   NOTE: The system must restart prior to running Computer Setup.

4. Select the desired configuration settings, then save and exit.

Computer Checkup (TEST)

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

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

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

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

To run TEST:

1. Access the Compaq Utilities menu.
2. Select the Computer Checkup (TEST) option to display the TEST options menu.
3. Select the option to view the device list. After a few minutes, a list of installed hardware devices is displayed.
4. Verify that the TEST utility correctly detected the devices installed. If the list is correct, select OK. The test option menu is displayed again. If the list is incorrect, be sure that any new devices are installed properly.

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

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

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

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

6. Follow the instructions on the screen as the diagnostic tests are run on the devices. When the testing is complete, the test option menu is displayed again.
7. Exit to the Compaq Utilities menu.

View System Information (INSPECT)

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

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

To run INSPECT, follow these steps:

1. Access the Compaq Utilities menu.
2. Select one of the following options:
   - Print the inspect status.
   - Save the inspect status to a file.
   - Add comments to a parameter status.
   - Exit the utility.

Create a Diagnostics Diskette

This option allows you to create *both* Setup or Diagnostics diskettes from the diagnostics partition. To create the diskettes:

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

   Immediately after the workstation completes Power-On Self-Test (POST), which is indicated on the screen by the memory check, the system beeps twice and the cursor moves to the upper-right corner of the screen.
2. Press F10 as soon as the cursor moves to the upper-right corner of the screen.
3. If prompted, select the desired language.
4. Press Enter to bypass the Welcome to Compaq Utilities screen.
5. From the Compaq Utilities menu, select Create a Diagnostics Diskette. One diagnostic and two setup diskettes will be created.

NOTE: The Diagnostic and Setup diskettes can also be created by downloading the latest version from the Compaq website: http://www.compaq.com.

Manage the Diagnostics Partition

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

CAUTION: Creating a diagnostics partition involves performing a low-level format on the hard drive. Normally, this is only done to add diagnostics to a new replacement hard drive. If the diagnostics software is deleted, you will no longe. be able to access the Compaq Utilities menu.

Diagnostic Error Codes

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

Tables 4-12 through 4-25 list possible error codes, descriptions of each error condition, and actions required to resolve the error condition. For assistance in the removal and replacement of a particular subassembly, see Chapter 3.

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

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

1. Ensure proper ventilation. The workstation should have a 6-inch (15-cm) clearance at the rear of the chassis.
2. Turn off the workstation and peripheral devices.

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

3. Disconnect any peripheral devices other than the monitor and keyboard. Do not disconnect the printer if you want to test it or use it to log error messages.
4. Delete the Power-On Password, if set.

   If a key icon ( ) appears on the screen when POST completes, the Power-On Password is set. If this occurs, you must enter the password to continue. To delete the password, type the current password, then press Enter. If you do not have access to the password, you must disable it through the SW1-S2 switch on the system board.
5. Install loop-back and terminating plugs for complete testing.
6. Run the Diagnostics diskette.

Microprocessor

Table 4-12
Microprocessor Test Error Codes

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

Memory

Table 4-13
Memory Test Error Codes

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

Keyboard

Table 4-14
Keyboard Test Error Codes

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

Printer

Table 4-15
Parallel Printer Test Error Codes

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

Diskette Drive

Table 4-16
Diskette Drive Test Error Codes

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

699-xx	Diskette drive/media error.	1. Replace media. 2. Run Computer Setup and Computer Checkup.

Serial Port

Table 4-17
Serial Test Error Codes

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

Modem

Table 4-18
Modem Communications Test Error Codes

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

Pointing Device

Table 4-19
Pointing Device Test Error Codes

Error Code	Description	
8601-xx	Mouse test failed.	The following steps apply for 8601-xx error codes:

8602-xx	Interface test failed.	1. Replace with a working pointing device and retest. 2. Replace the system board and retest.

CD-ROM Drive (IDE)

Table 4-20
CD-ROM Drive (IDE) Test Error Codes

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

Tape Drive

Table 4-21
Tape Drive Test Error Codes

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

1906-xx	Tape drive write/read/compare failed.

Video

Table 4-22
Video Test Error Codes

Error Code	Description	Recommended Action
501-xx	Graphics controller test failed.	The following error codes apply to error codes 501-xx through 516-xx:
502-xx	Video memory test failed.	1. Replace the monitor and retest.
503-xx	Video attribute test failed.	2. Replace the graphics controller.
504-xx	Video character set test failed.	
505-xx	Video 80 × 25 mode 9 × 14 character cell test failed.	
506-xx	Video 80 × 25 mode 8 × 8 character cell test failed.	
507-xx	Video 40 × 25 mode test failed.	
508-xx	Video 320 × 200 mode color set 0 test failed.	
509-xx	Video 320 × 200 mode color set 1 test failed.	
510-xx	Video 640 × 200 mode test failed.	
511-xx	Video screen memory page test failed.	
512-xx	Video gray scale test failed.	
514-xx	Video white screen test failed.	
516-xx	Video noise pattern test failed.	
2402-xx	Video memory test failed.	The following steps apply to error codes 2402-xx through 2456-xx:
2403-xx	Video attribute test failed.	1. Run the Setup and Diagnostics utilities.
2404-xx	Video character set test failed.	2. Replace the monitor and retest.
2405-xx	Video 80 × 25 mode 9 × 14 character cell test failed.	3. Replace the graphics controller and retest.
2406-xx	Video 80 × 25 mode 8 × 8 character cell test failed.	
2408-xx	Video 320 × 200 mode color set 0 test failed.	
2409-xx	Video 320 × 200 mode color set 1 test failed.	

2410-xx	Video 640 × 200 mode test failed.

Continued

Video Test Error Codes *Continued*

Error Code	Description	Recommended Action
2411-xx	Video screen memory page test failed.	The following steps apply to error codes 2402-xx through 2456-xx: 1. Run the Setup and Diagnostics utilities. 2. Replace the monitor and retest. 3. Replace the graphics controller and retest.
2412-xx	Video gray scale test failed.	
2414-xx	Video white screen test failed.	
2416-xx	Video noise pattern test failed.	
2418-xx	ECG/VGC memory test failed.	
2419-xx	ECG/VGC ROM checksum test failed.	
2421-xx	ECG/VGC 640 × 200 graphics mode test failed.	
2422-xx	ECG/VGC 640 × 350 16 color set test failed.	
2423-xx	ECG/VGC 640 × 350 64 color set test failed.	
2424-xx	ECG/VGC monochrome text mode test failed.	
2425-xx	ECG/VGC monochrome graphics mode test failed.	
2431-xx	640 × 480 graphics test failure.	
2432-xx	320 × 200 graphics (256 color mode) test failure.	
2448-xx	Advanced VGA Controller test failed.	
2451-xx	132-column Advanced VGA test failed.	
2456-xx	Advanced VGA 256 Color test failed.	
2458-xx	Advanced VGA Bit BLT test.	The following steps apply to error codes 2458-xx through 2480-xx: 1. Replace the graphics controller and retest. 2. Replace the system board and retest.
2468-xx	Advanced VGA DAC test.	
2477-xx	Advanced VGA data path test.	
2478-xx	Advanced VGA Bit BLT test.	
2480-xx	Advanced VGA Linedraw test.	

Audio

Table 4-23
Audio Test Error Codes

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

Network Interface

Table 4-24
Network Interface Test Error Codes

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

SCSI Error Codes

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

- Hard drives
- CD-ROM drives (or PD-CD drives)
- Tape drives

The SCSI error codes are written in the format AABB-CC and can be determined by looking up the respective parts of the code in the three corresponding tables numbered 4-25, 4-26, and 4-27.

- AA (Table 4-25) identifies the drive type being tested.
- BB (Table 4-26) identifies the type of test.
- CC (Table 4-27) identifies the exact error received.

For example, if you received a diagnostic error code of 6523-05, you would look at Table 4-25 to identify the meaning of the first two numbers, 65. This indicates a hard drive problem. The second set of two numbers, 23, refers to a random read, as shown in Table 4-26. The last two numbers, 05, indicate a seek failure, as listed in Table 4-27. When you combine this information, you know that the diagnostics program was testing the random-read functioning of the hard drive and received a seek failure. The device is faulty and must be replaced.

Table 4-25
SCSI Device Names

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

Table 4-26
SCSI Test Names

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

Table 4-27
SCSI Test Error Codes

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

XXXX-36	Invalid SCSI bus phase.	Replace the indicated device.
XXXX-39	Error status from drive.	Replace the indicated device.

Continued

SCSI Test Error Codes *Continued*

Error Code	Description	Recommended Action
XXXX-40	Target timed out.	Replace the indicated device.
XXXX-41	SCSI bus stayed busy.	Replace the indicated device.
XXXX-42	ACK/REQ lines bad.	Replace the indicated device.
XXXX-43	ACK did not deassert.	Replace the indicated device.
XXXX-44	Parity error.	Replace the indicated device.
XXXX-50	Data pins bad.	Replace the indicated device.
XXXX-51	Data line 7 bad.	Replace the indicated device.
XXXX-52	MSG, C/D, and/or I/O lines bad.	Replace the indicated device.
XXXX-53	BSY never went busy.	Replace the indicated device.
XXXX-54	BSY stayed busy.	Replace the indicated device.
XXXX-60	Controller CONFIG-1 register bad.	Replace the indicated device.
XXXX-61	Controller CONFIG-2 register bad.	Replace the indicated device.
XXXX-65	Media not unloaded.	Replace the indicated device.
XXXX-90	Fan failure.	1. Ensure fan(s) connected. 2. Replace nonfunctional fan(s).
XXXX-91	Over Temperature.	1. Ensure proper air flow. 2. Perform required maintenance and cleaning.
XXXX-99	Autoloader reported tapes not loaded properly.	1. Install tape(s) in autoloader tape drive according to test instructions. 2. Change autoloader magazine.

ROMPaq

FailSafe Boot Block ROM

The FailSafe Boot Block ROM allows for system recovery in the unlikely event of a system ROM failure. For example, a power failure could occur during a system ROM upgrade. The Boot Block is a write-protected section of the ROM that checks to validate the system ROM each time power to the system is turned on.

- If the system ROM is valid, the system starts normally.
- If the system ROM fails the validation check, the FailSafe Boot Block ROM provides enough support to start the system from a Flash Recovery diskette, which programs the system ROM with a valid image. The Flash Recovery diskette is a SoftPaq downloadable from the Compaq website (http://www.compaq.com).

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

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

Table 4-28
Keyboard Light Combinations

NUM LOCK	CAPS LOCK	SCROLL LOCK	Meaning and Required Action
OFF	ON	OFF	System requires setup password. Enter the setup password. The light remains on until a valid setup password is entered.
ON	OFF	OFF	System could not start from diskette because the ROMPaq diskette is no present, is bad, or the drive is not ready. Insert a valid ROMPaq diskette, turn the power off, then turn the power on.
OFF	OFF	ON	ROM upgrade failed. Try another ROMPaq diskette. If the light remains turned on, contact Compaq customer support.
ON	ON	ON	ROM upgrade successfully completed. Turn power off and back on to resume normal system operation.

To recover the system after hearing the FailSafe Boot Block beeps, complete the following steps:

1. Remove any diskettes from the diskette drive and turn off the power.
2. Insert the Flash Recovery diskette into the diskette drive.
3. Turn on power to the system. If a Setup Password has been established, the Caps Lock light will turn on.
4. Enter the Setup Password.

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

Remote ROM Flash

Compaq Professional Workstation 5100 offers Remote ROM upgrade capability. The following software is available for downloading on the Compaq website (http://www.compaq.com).

- Remote Management Setup (allows upgrading system ROM remotely)
- Remote Security Management (allows administrator to turn on PC remotely)

Local ROM Flash

The Compaq Professional Workstation 5100 comes with re-programmable system ROM. System ROM Lock, set to its default setting of OFF, protects the system ROM from being upgraded and the System BIOS from being updated. If the workstation does not have a Setup Password enabled, the ROM is not write-protected and unauthorized updates can occur.

To update the ROM, order the ROMPaq diskette from Compaq. To upgrade the ROM, follow these steps:

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

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

3. If prompted, enter the Setup Password.

4. If the password is entered correctly, the ROMPaq utility takes over and runs the flash ROM upgrade.

NOTE: If the Setup Password is entered incorrectly, the procedure terminates and no changes are made to the ROM.

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

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

Compaq Insight Manager

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

NOTE: Compaq Insight Manager requires the installation of Insight Agents for Windows NT on the Compaq Professional Workstations 5100, and the installation of the Insight Manager console on a computer used as a management console. If you have Windows NT, use only NT agents of the Compaq Management CD. The Agents and the console are provided on the Compaq Management CD. Before installing the Insight Agents on the Workstation, be sure to install SNMP service from the Microsoft NT CD. See installation instructions in the Software Installation and Licensing Guide provided with the SmartStart for Workstations CD.

Compaq Insight Manager provides the following features to help you support the Compaq Professional Workstations 5100:

- Remote alerts for Pentium Pro or Pentium II processor prefailure, ECC DIMM memory single-bit error prefailure, and SCSI disk drive prefailure notification
- Alerts logged to the local Windows NT Event Log (logged by the Insight Agents)
- Asset and configuration information collected into a database and accessed by the Insight Manager console for remote tracking of workstation assets and configurations
- Print configuration (similar to INSPECT) reports at the Insight Manager console for remote workstations
- Setting of performance thresholds on a workstation; you can receive an alert when a threshold is exceeded (such as PCI bus utilization threshold or disk volume usage threshold)
- Remote warm and/or cold reboot of a workstation
- Version Control to view versions of Compaq drivers, agents and system ROM currently running on a remote workstation; you can receive a recommendation on updates available from Compaq
- Alpha pager forwarding to provide workstation alerts to an alpha or numeric pager
- Ability to view health logs on remote workstations to see previous Power-on Self Test (POST) errors, critical errors, and ECC memory errors
- Environment alerts for workstations with a temperature out of the normal range; you can also be alerted when the hood is removed
- Out-of-band management via a modem using point-to-point protocol (PPP) for workstations not connected to a network

Compaq SSD for Windows NT

The Compaq SSD for Windows NT is a set of Compaq-specific drivers that enables the workstation to operate at optimum performance. The SSD is provided on the SmartStart for Workstations CD. Updates are available on the Compaq website (http://www.compaq.com) and also through subscription to the Compaq Support Software CD.

The SSD installation program automatically detects the components on the workstation and determines if the drivers need to be updated. The initial release of the SSD included with the workstation contains the following support software (drivers):

- Network controller driver
- SCSI controller driver
- Systems Management driver (required by Compaq Insight Agents for NT manager)
- Compaq HAL for Microsoft NT 3.51
- MGA Millennium II graphics controller driver
- GLoria-XL 3D graphics controller driver
- GLoria Synergy graphics controller driver
- ESS 1868 AudioDrive driver
- MVP Workstation graphics controller driver
- FireGL 4000 graphics controller driver

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

NT SSD V2.01 or later provides a new remove driver install or upgrade.

- **Remote capability** - allows the ability to install, remove, update, and configure components remotely via machine name (computer name). Supports distributed computing environment (DCE) perspectives.
- **New Silent Setup Command Line Interface** - provides the functionality of the GUI interface in a silent command line interface and provides execution output in a log file. Provides the ability to remotely install or update drivers on multiple remote machines at one time. Also useful for Microsoft Systems management Server Configurations.

Compaq Diagnostics for Windows NT

To use Compaq Diagnostics for Windows NT, complete the following steps:

1. Double-click the Compaq Diagnostics for Windows NT icon located in the Control Panel. The screen displays an overview of the computer hardware and software.
2. For specific hardware and software information, select a category from the Category menu or from the toolbar. As you move your cursor over the toolbar icons, the corresponding category names appear near the cursor.
3. To display more detailed information in a selected category, click More in the Information Level box.
4. Categories or items of information displayed by Compaq Diagnostics for Windows NT are similar to, but may vary slightly from the information presented in the View System Information (INSPECT).
5. Review, print, and, if necessary, discuss this information with your authorized Compaq reseller or service provider.
6. To print the information, click File, then select Print.
7. Select one of the following options:
   - Detailed Report (All Categories)
   - Summary Report (All Categories)
   - Current Category
8. Click OK to print the report you selected.
9. To exit Compaq Diagnostics for Windows NT, click File, then click Exit.

Chapter 5
System Security

This chapter identifies and explains the following:

- Security Features
- Advanced Security Management

Security Features

The Compaq Professional Workstation 5100 is equipped with features that secure valuable components and system integrity. The following table identifies and explains the security features.

Table 5-1
Security Features

Feature	Purpose	How It Is Established
Setup Password	Allows configuration to be changed.	Computer Setup
Power-On Password	Prevents use of the workstation when the workstation is restarted unless the power-on password is entered.	Computer Setup; SW1-S2
Windows NT Password	Prevents use of the computer when Windows NT starts up unless the password is entered.	Run User Manager by clicking Start, Programs, Administrator Tools
QuickLock/ QuickBlank	Disables keyboard and can blank the screen without exiting application; enabled with a power-on password.	Computer Setup
Serial Interface Control*	Prevents transfer of data through the integrated serial interface.	Computer Setup
Parallel Interface Control*	Prevents transfer of data through the integrated parallel interface.	Computer Setup
Removable Media Control	Prevents startup from the diskette drive.	Computer Setup
Smart Cover Sensor	Indicates when workstation cover has been removed. Can be set to require Setup Password after cover has been removed.	Computer Setup from the Compaq Utilities menu.

Cable Lock Provision	Inhibits access to the interior of the workstation to prevent unwanted configuration changes or component removal. Can also be used to secure the workstation to a fixed object.	Install a padlock with the security bracket to inhibit access to the interior of the workstation; add a cable lock to secure the workstation to a fixed object.

**Must be used in combination with the Power-On Password.*

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

Setup Password

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

Establishing a Setup Password

To establish a setup password, follow these steps:

1. Turn on the workstation.
2. When the cursor appears in the upper-right corner of the screen, press F10 to access Computer Setup.

   NOTE: The cursor displays in the upper-right corner of the screen for approximately two seconds. If you do not press F10 during this time, you must restart the workstation to access the utility.
3. Press Enter to bypass the welcome screens and display the Compaq Utilities menu.
4. From the main menu, select Computer Setup and press Enter.
5. From the Computer Setup main menu, select the Security Management feature under Built-In Devices.
6. Locate the Setup Password option and follow the instructions provided to enable it.
7. Save the configuration and exit the utility.

Entering the Setup Password

To enter the Setup Password, follow these steps:

1. Turn on the workstation.
2. When the cursor appears in the upper-right corner of the screen, press F10.

NOTE: The cursor displays in the upper-right corner of the screen for approximately two seconds. If you do not press F10 during this time, you must turn the workstation off, then on again to access the utility.

3. When the key icon ( ) appears, enter your current Setup Password carefully.

   NOTE: Be sure to enter the Setup Password, not the Power-On Password. Type carefully; for security reasons, the characters you type do not appear on the screen. If you enter the Setup Password incorrectly, a broken key icon ( ) appears. Try again. After three unsuccessful tries, you will be allowed to view the current computer settings, but you will not be able to edit or change the settings. If you only want to view the current computer settings, press Enter.

Changing a Setup Password

To change the Setup Password, follow these steps:

1. Turn on the workstation.
2. When the cursor appears in the upper-right corner of the screen, press F10.

   NOTE: The cursor displays in the upper-right corner of the screen for approximately two seconds. If you do not press F10 during this time, you must turn the workstation off, then on again to access the utility.

3. Enter the current Setup Password.

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

   Press Enter to bypass the welcome screens and display the main menu. When the key icon ( ) appears, type your current password, then a slash (/) or alternate delimiter character, your new password, another slash(/) or alternate delimiter character, and your new password: current password/new password/new password

   NOTE: The Setup Password may also be changed by using the Computer Setup utility. Follow the "Setup Password" procedure provided earlier in this chapter. Locate the Setup Password option and follow the instructions to change the Setup Password.

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

Deleting a Setup Password

To delete the Setup Password, follow these steps:

1. Turn on the workstation.
2. When the cursor appears in the upper-right corner of the screen, press F10.

   NOTE: The cursor displays in the upper-right corner of the screen for approximately two seconds. If you do not press F10 during this time, you must turn the workstation off, then on again to access the utility.

3. When the key icon ( ) appears, type your current password followed by a slash (/) or alternate delimiter character: current password/

This will delete the password until you establish a new one through Security Management.

NOTE: The Setup Password may also be deleted by using the Computer Setup utility. Follow the "Setup Password" procedure provided earlier in this chapter. Locate the Setup Password option and follow the instructions to delete the Setup Password. The Setup utility will provide an option to disable the Setup Password; disabling the Setup Password is the same as deleting it.

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

Clearing a Setup Password

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

To clear the Setup Password:

1. Turn off the workstation.
2. Remove the following components:
   - ❑ workstation cover
   - ❑ I/O bracket assembly

3. Locate the SW1 switch on the system board. The following figure shows the default switch setting for each switch on SW1.

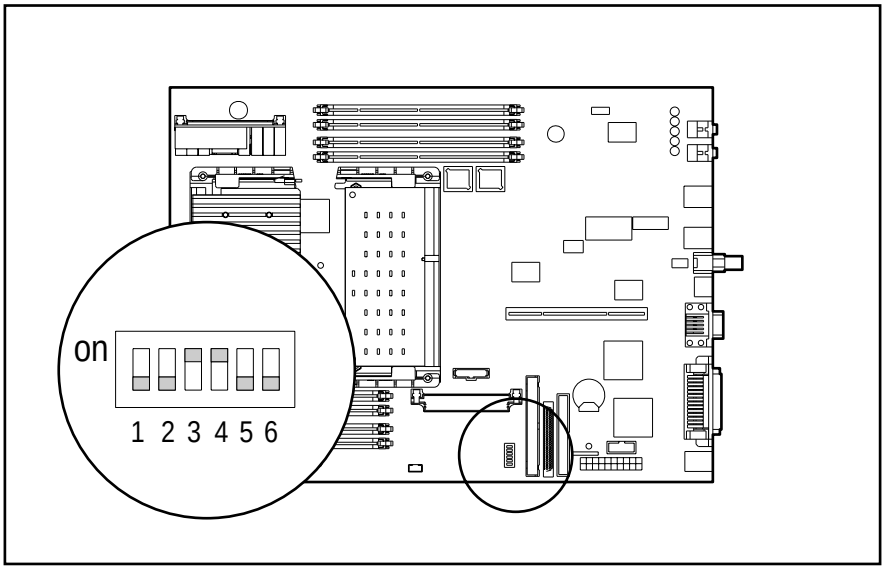


Figure 5-1. Locating the SW1 switch and identifying default settings

4. On SW1, move switch 1 to the ON position (not shown).

IMPORTANT: Switch 1 has a default setting of OFF. When the switch is OFF, your system is password-protected. To reenable password protection, you MUST return the switch to its *default* position later in this procedure.

---

5. Restart the workstation to erase your password from system memory.

   NOTE: Clearing the Setup Password will also clear the Power-On Password. Be sure to reestablish your Power-On Password after clearing the Setup Password.

6. Turn off the workstation once more.
7. Return switch 1 to its original default (OFF) position.
8. Reassemble and restart the workstation.
9. Establish a new Setup Password, if desired.

Power-On Password

The Power-On Password prevents unauthorized use of the workstation. When the power is turned on or when the workstation is restarted, the Power-On Password must be entered. If this security feature is enabled, a key icon ( ) appears on the screen when the workstation is powered on or restarted.

NOTE: The Power-On Password may only be established (for the first time) using the Computer Setup utility. Once established, the Setup utility cannot be used to change or delete the Power-On Password. To change or delete the Power-On Password, see "Changing a Power-On Passsword" or "Deleting a Power-On Password" in this chapter.

Enabling a Power-On Password

To establish a Power-On Password, follow these steps:

1. Turn on the workstation.
2. When the cursor appears in the upper-right corner of the screen, press F10 to access Computer Setup.

   NOTE: The cursor displays in the upper-right corner of the screen for approximately two seconds. If you do not press F10 during this time, you must restart the workstation to access the utility.

3. Press Enter to bypass the welcome screens and display the Compaq Utilities menu.
4. From the main menu, select Computer Setup, then press Enter.
5. From the Computer Setup main menu, select the Security Management feature under Built-In Devices.
6. Locate the Power-On Password option and follow the instructions provided to enable it.
7. Save the configuration and exit the utility.

Entering a Power-On Password

To enter the Power-On Password:

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

   NOTE: For security reasons, the characters you type will not appear on the screen. If the password is entered incorrectly, a broken key icon ( ) will appear. After three unsuccessful attempts, the workstation must be restarted before you can continue.

Changing a Power-On Password

To change the Power-On Password:

1. Turn on the workstation. (If the workstation is already on, you must turn it off and then on again.)
2. When the key icon ( ) appears, type: current password/new password/new password.

   NOTE: For security reasons, the characters you type will not appear on the screen. When entering the string above, the slash (/) may be substituted with an alternate delimiter character specific to the keyboard you are using. For a list of applicable delimiter characters, see "National Keyboard Delimiter Characters" later in this chapter.

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

Clearing a Power-On Password

If you forget your password, you cannot access the workstation. To clear the Power-On Password:

1. Turn off the workstation.
2. Remove the following components:
   - ❑ workstation cover
   - ❑ I/O bracket assembly

3. Locate the SW1 switch on the system board. The following figure shows the default switch setting for each switch on SW1.

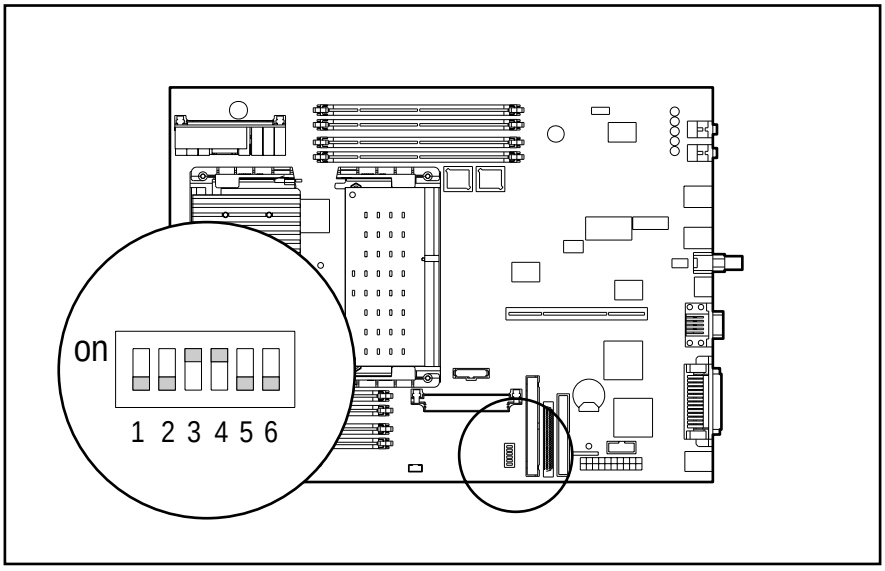


Figure 5-2. Locating the SW1 switch and identifying default settings

4. On SW1, move switch 1 to the ON position (not shown).

IMPORTANT: Switch 1 has a default setting of OFF. When the switch is OFF, your system is password-protected. To reenable password protection, you MUST return the switch to its *default* position later in this procedure.

5. Restart the workstation to erase your password from system memory.

   NOTE: Clearing the Power-On Password will also clear the Setup Password. Be sure to reestablish your Setup Password after clearing the Power-On Password.

6. Turn off the workstation once more.
7. Return switch 1 to its original default (OFF) position.
8. Reassemble and restart the workstation.
9. Establish a new Power-On Password, if desired.

Deleting a Power-On Password

To delete the Power-On Password:

1. Turn on the workstation.

   When the key icon ( ) appears, type: current password/,where the slash (/) may be substituted with an alternate delimiter character specific to the keyboard you are using.

2. Press Enter.

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

NOTE: For a list of applicable delimiter characters, see "National Keyboard Delimiter Characters" later in this chapter.

Bypassing the Power-On Password

To bypass and clear the Power-On Password, set the SW1-S1 switch on the system board to the ON position.

To re-establish the Power-On Password, set the S1 switch to the OFF position.

See Chapter 6, "Jumper and Switch Information," for additional information and illustrations.

Windows NT Password

To establish a password in Windows NT:

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

National Keyboard Delimiter Characters

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

Table 5-2
National Keyboard Delimiter Characters

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

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

Advanced Security Management

You can access the following security features through the Computer Setup option on the Compaq Configuration and Diagnostic menu.

- Storage (under Built-in Devices)
- Disable removable media boot ability
- Disable removable media write ability
- Communication (under Built-in Devices)
- Disable serial port
- Disable parallel port
- Security Management (under Built-in Devices)
- QuickLock/QuickBlank
- Smart Cover Sensor
- Cable Lock Provision

Re-enabling Diskette Boot or Diskette Write

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

1. Turn on the workstation.
2. When the cursor appears in the upper-right corner of the screen, press F10.

   NOTE: The cursor displays in the upper-right corner of the screen for approximately two seconds. If you do not press F10 during this time, you must turn the workstation off, then on again to access the utility.
3. Press Enter to bypass the welcome screens and display the main menu.
4. From the main menu, select Computer Setup, then press Enter.
5. From the Computer Setup main menu, select the Security Management feature under Built-In Devices.
6. Select Storage.
7. Under Removable Media, select the function you want to enable.
8. Save the configuration and exit the utility.
9. Reboot the workstation.

   NOTE: The FailSafe Boot Block ROM has ultimate control over the hardware. User-invoked security, i.e. a disabled feature such as Diskette Boot or Diskette Write, will be ignored to accommodate a FLASH recovery.

Re-enabling a Serial Port or Parallel Port

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

1. Turn on the workstation.
2. When the cursor appears in the upper-right corner of the screen, press F10.

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

4. From the main menu, select Computer Setup, then press Enter.
5. From the Computer Setup main menu, select Communications under Built-In Devices.
6. To re-enable a Serial Port:
   - ❑ Click on the down arrow of Available Serial Ports.
   - ❑ Under Settings, select Enable for Serial Port 1 or Serial Port 2.
7. To re-enable the Parallel Port:
   - ❑ Under Settings, click the down arrow to locate Parallel Port.
   - ❑ Select Enable.
8. Save the configuration and exit the utility.
9. Reboot the workstation.

QuickLock/QuickBlank

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

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

To re-enable the input device interface and access the application, you must enter the Power-On Password established in Security Management.

To enable the QuickLock and QuickBlank features from the Compaq Utilities menu, follow these steps:

1. Turn on the workstation.
2. When the cursor appears in the upper-right corner of the screen, press F10.

   NOTE: The cursor displays in the upper-right corner of the screen for approximately 2 seconds. If you do not press F10 during this time, restart the computer to access the utility.

3. Press Enter to bypass the welcome screens and display the Compaq Utilities menu.
4. Select Computer Setup, then press Enter.
5. Select Built-ins and press Enter.

6. Select the Security Management feature and press Enter.
7. When the steps in the Security Management screen display, select Enable QuickLock of the Keyboard.
8. Select QuickLock and/or QuickBlank.
9. Click OK to save the configuration.
10. On the Main screen, select Save and exit from the File menu.

Keyboard and Mouse Interface

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

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

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

Cable Lock Provision

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

Smart Cover Sensor

Smart Cover Sensor is a combination of hardware and software technologies that recognize the removal of the workstation cover. The following table describes three levels of protection that can be set.

Table 5-3
Smart Cover Sensor Protection Levels

Level	Setting	Description
Level 0	Disabled	Smart Cover Sensor is disabled.
Level 1	Notify User	When workstation is restarted, the screen displays a message indicating that the workstation cover has been removed.
Level 2	Setup Password	When workstation is restarted, the screen displays a message indicating that the workstation cover has been removed. You must enter the Setup Password to continue.

The behavior of the Smart Cover Sensor is determined by:

- SW1-S1 (switch 1 of switch block 1). Refer to the hood labels affixed to the underside of the workstation cover to locate the switch on the system board.
- The Setup Password. See "Setup Password" or "Clearing a Setup Password" in this chapter to enable or disable the Setup Password.
- The Smart Cover Sensor setting. Three settings are possible: disabled, notify user, and Setup Password. See "Setup Password" in this chapter to select the desired setting.

If the SW1-S1 switch is off, the Setup Password is enabled, and the "Setup Password" option for the Smart Cover Sensor setting is selected, the workstation is operating under maximum security. If the cover is removed for any reason while the maximum security setting is in effect, the workstation will pause during the startup process. The startup process will not continue unless the Setup Password is entered.

To service the workstation, you may want to disable the Smart Cover Sensor. (If the feature remains enabled, you may be required to enter a Setup Password upon restarting the workstation.)

To enable or disable the Smart Cover Sensor, see the following table.

Smart Cover Sensor

SW1-S1 Setting	Setup Password	Smart Cover Sensor	Cover Removed	Message Displayed
On	Enabled	Disabled	Yes	No message displayed. No Setup Password required.
On	Enabled	Disabled	No	No message displayed. No Setup Password required.
On	Enabled	Notify user	Yes	Cover removed message displayed. No Setup Password required. Press F1 to continue startup.
On	Enabled	Notify user	No	No message displayed. No Setup Password required.
On	Enabled	Setup Password	Yes	Cover removed message displayed. No Setup Password required. Press F1 to continue startup.
On	Enabled	Setup Password	No	No message displayed. No Setup Password required.
On	Disabled	Disabled	Yes	No message displayed. No Setup Password required.
On	Disabled	Disabled	No	No message displayed. No Setup Password required.
On	Disabled	Notify user	Yes	Cover removed messaged displayed. No Setup Password required. Press F1 to continue startup.
On	Disabled	Notify user	No	No message displayed. No Setup Password required.

Off	Enabled	Disabled	Yes	No message displayed. No Setup Password required.
Off	Enabled	Disabled	No	No message displayed. No Setup Password required.
Off	Enabled	Notify user	Yes	Cover removed message displayed. No Setup Password required. Press F1 to continue startup.
Off	Enabled	Notify user	No	No message displayed. No Setup Password required.

Continued

Smart Cover Sensor *Continued*

SW1-S1 Setting	Setup Password	Smart Cover Sensor	Cover Removed	Message Displayed
Off*	Enabled	Setup Password	Yes	Cover removed message displayed. Setup Password required. Press F1 to continue startup.
Off	Enabled	Setup Password	No	No message displayed. No Setup Password required.
Off	Disabled	Disabled	Yes	No message displayed. No Setup Password required.
Off**	Disabled	Disabled	No	No message displayed. No Setup Password required.
Off	Disabled	Notify user	Yes	Cover removed message displayed. No Setup Password required. Press F1 to continue startup.
Off	Disabled	Notify user	No	No message displayed. No Setup Password required.

* *Maximum security setting*
** *Default*

Chapter 6
Jumper and Switch Information

This chapter provides jumper and switch information for the system board and disk drives for the Compaq Professional Workstation 5100. The components on the system board, which is Pentium II-based, are illustrated in the following figure. Refer to the corresponding table for component names.

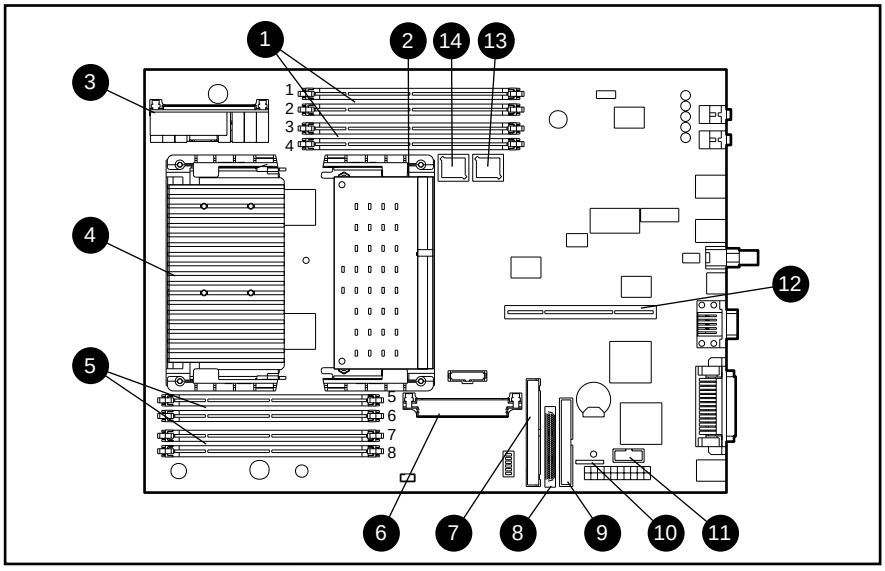


Figure 6-1. System Board Components

Table 6-1
System Board Components

Reference	Component
1	DIMM Slots (Bank A)
2	Second Processor Slot
3	Processor Power Module for Processor 1
4	Processor 1
5	DIMM Slots (Bank B)
6	Processor Power Module for Processor 2
7	IDE Drive Connector
8	SCSI Connector
9	Diskette Drive Connector
10	External Battery Jumper
11	Power Switch/LED Connector
12	I/O Bracket Connector
13	Boot Block ROM

14	System ROM

Jumpers

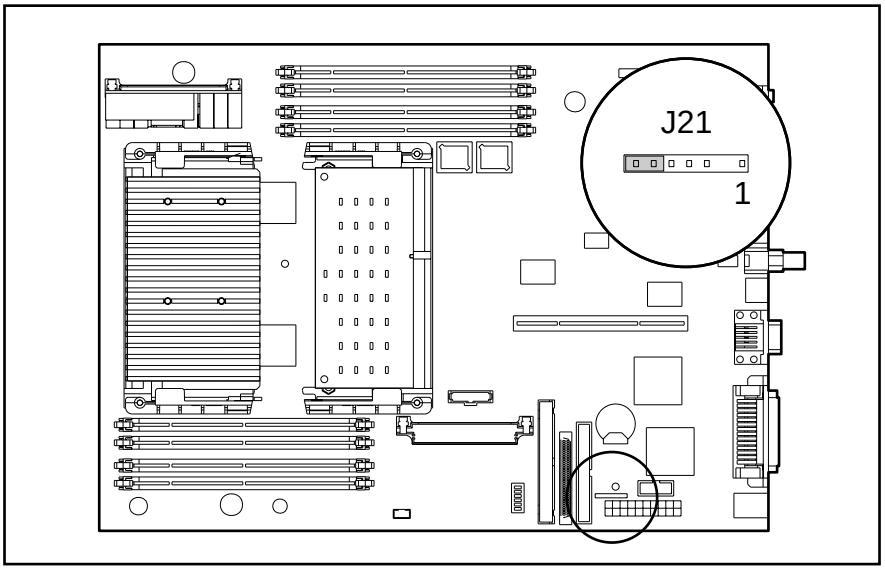


Figure 6-2. J21 Jumper Location

Table 6-2
System Board Configuration Jumper J21 Settings

Jumper	Setting	Function	Description
J21	1-4	Battery	External battery connection
	5-6	Battery	External battery jumper
	6-7	Battery	Internal battery jumper (default)

Switch Settings

The following illustration shows the location of Switch 1. Switch 1 controls the CPU/clock speed as well as the Power-On Password.

S1 on switch 1 enables the Power-On Password. The default is OFF. To reset the password, turn this switch ON.

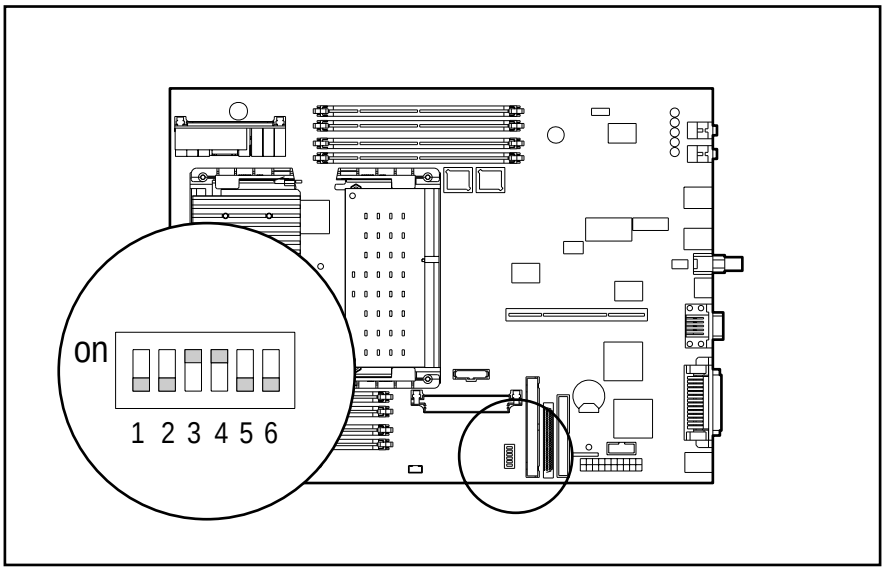


Figure 6-3. System Board SW1 Location

Table 6-3
SW1 Settings

	S1	S2	S3	S4	S5	S6
66/266 Mhz (Shown)	OFF	OFF	ON	ON	OFF	OFF
66/300 MHz	OFF	OFF	ON	OFF	OFF	OFF
66/333 MHz	OFF	OFF	OFF	ON	OFF	OFF
NOTE: S1 OFF = Password enabled (default)						

Hard Drives

Depending on the computer model, the Compaq Professional Workstation 5100 ships with a 2.1-, 4.3-, or 9.1-GB Wide-Ultra SCSI-3 hard drive.

2.1-GB Wide-Ultra SCSI-3 Hard Drives

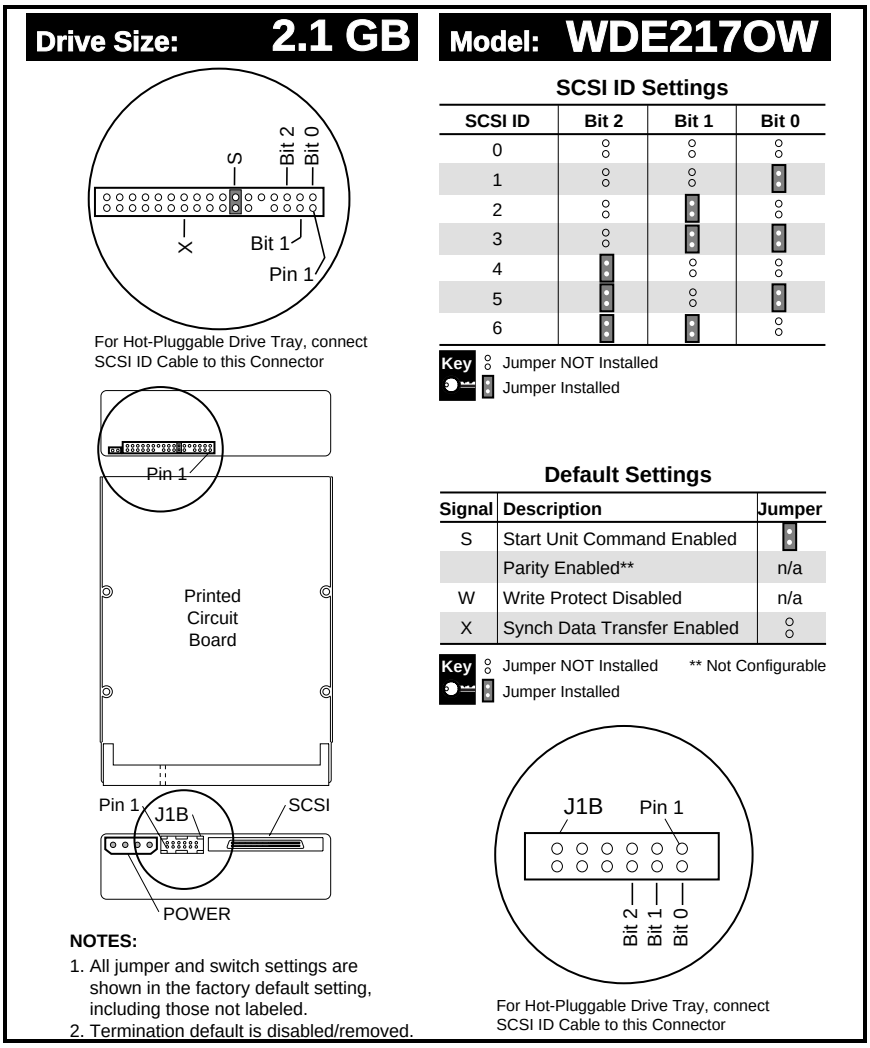


Figure 6-4. Jumper Positions for the 2.1-GB Hard Drive (WDE2170W)

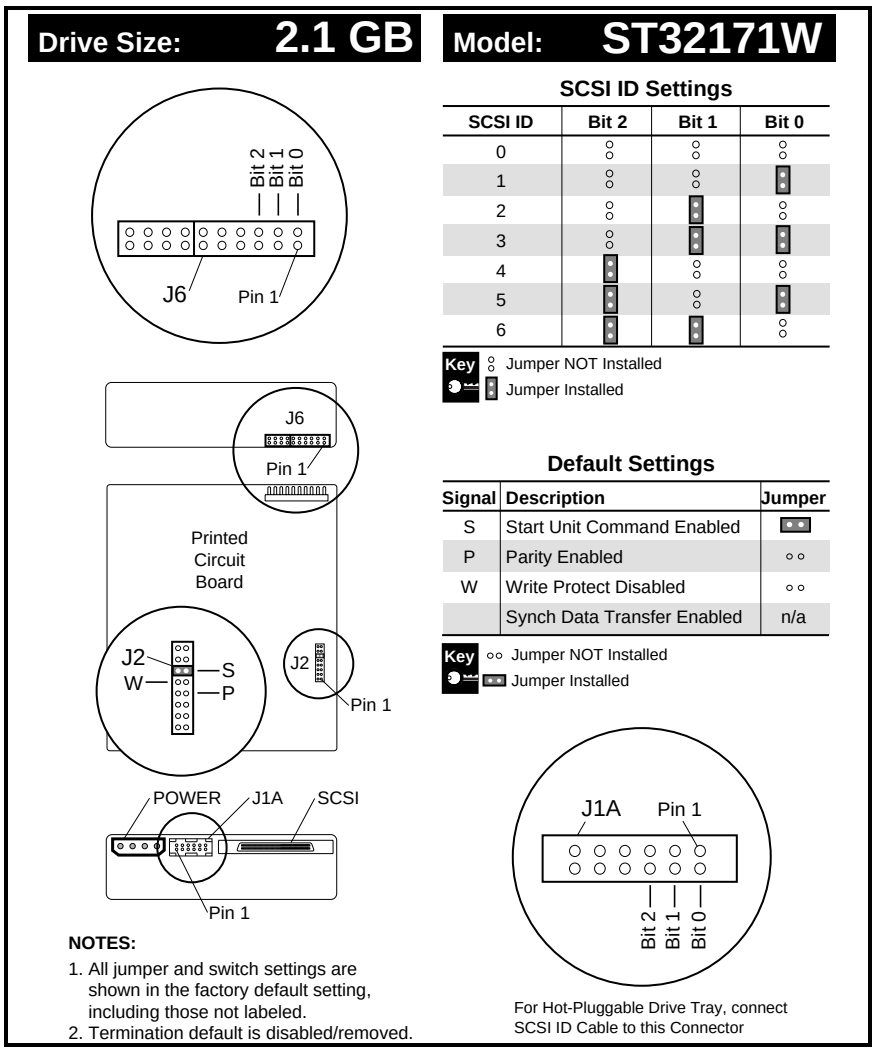
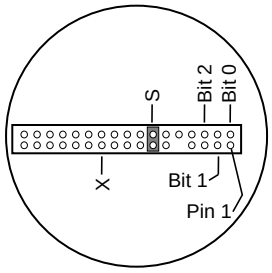


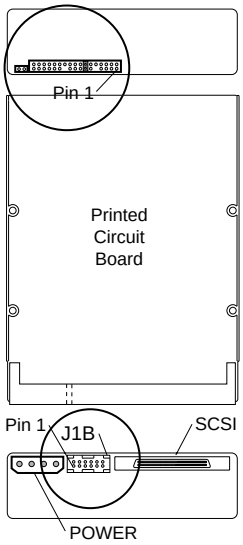
Figure 6-5. Jumper Positions for the 2.1-GB Hard Drive (ST32171W)

4.3-GB Wide-Ultra SCSI-3 Hard Drives

Drive Size: 4.3 GB **Model: WDE4360W**



For Hot-Pluggable Drive Tray, connect SCSI ID Cable to this Connector



SCSI ID Settings

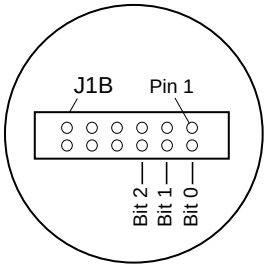
SCSI ID	Bit 2	Bit 1	Bit 0
0	○ ○	○ ○	○ ○
1	○ ○	○ ○	● ●
2	○ ○	● ●	○ ○
3	○ ○	● ●	● ●
4	● ●	○ ○	○ ○
5	● ●	○ ○	● ●
6	● ●	● ●	○ ○

Key ○ ○ Jumper NOT Installed
● ● Jumper Installed

Default Settings

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

Key ○ ○ Jumper NOT Installed ** Not Configurable
● ● Jumper Installed



For Hot-Pluggable Drive Tray, connect SCSI ID Cable to this Connector

NOTES:

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

Figure 6-6. Jumper Positions for the 4.3-GB Hard Drive (WDE4360W)

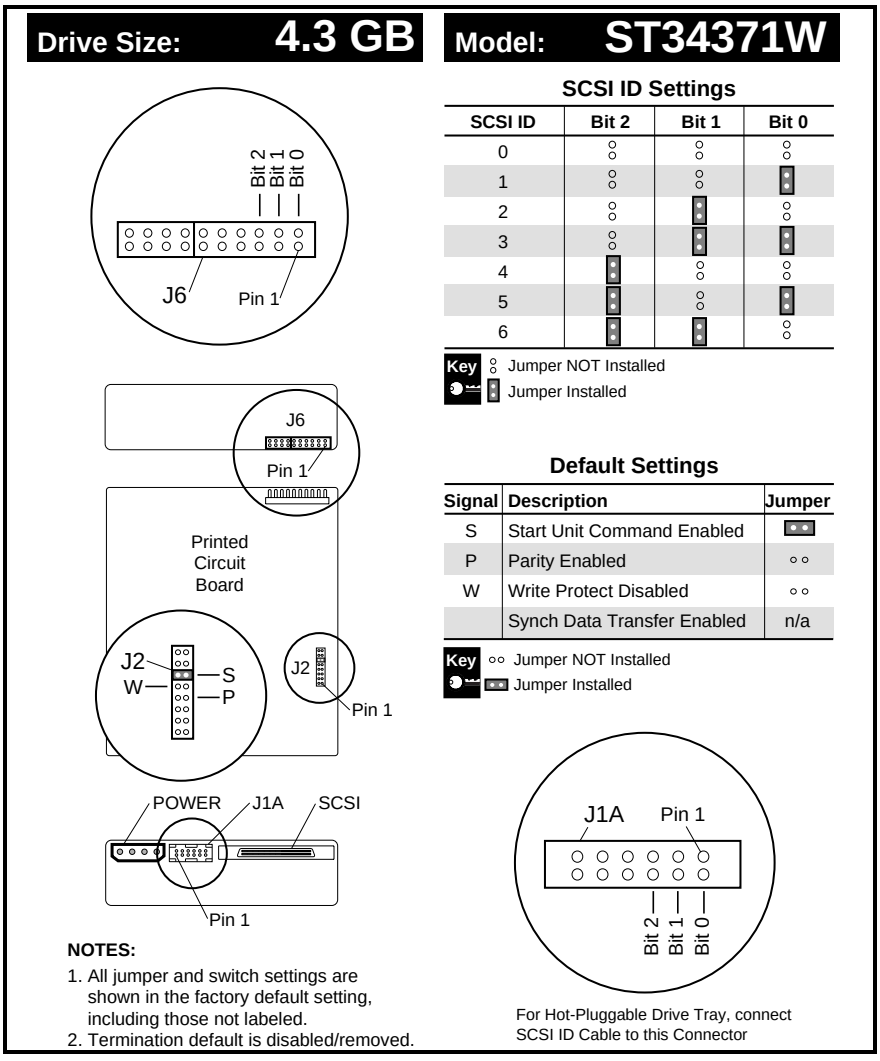


Figure 6-7. Jumper Positions for the 4.3-GB Hard Drive (ST34371W)

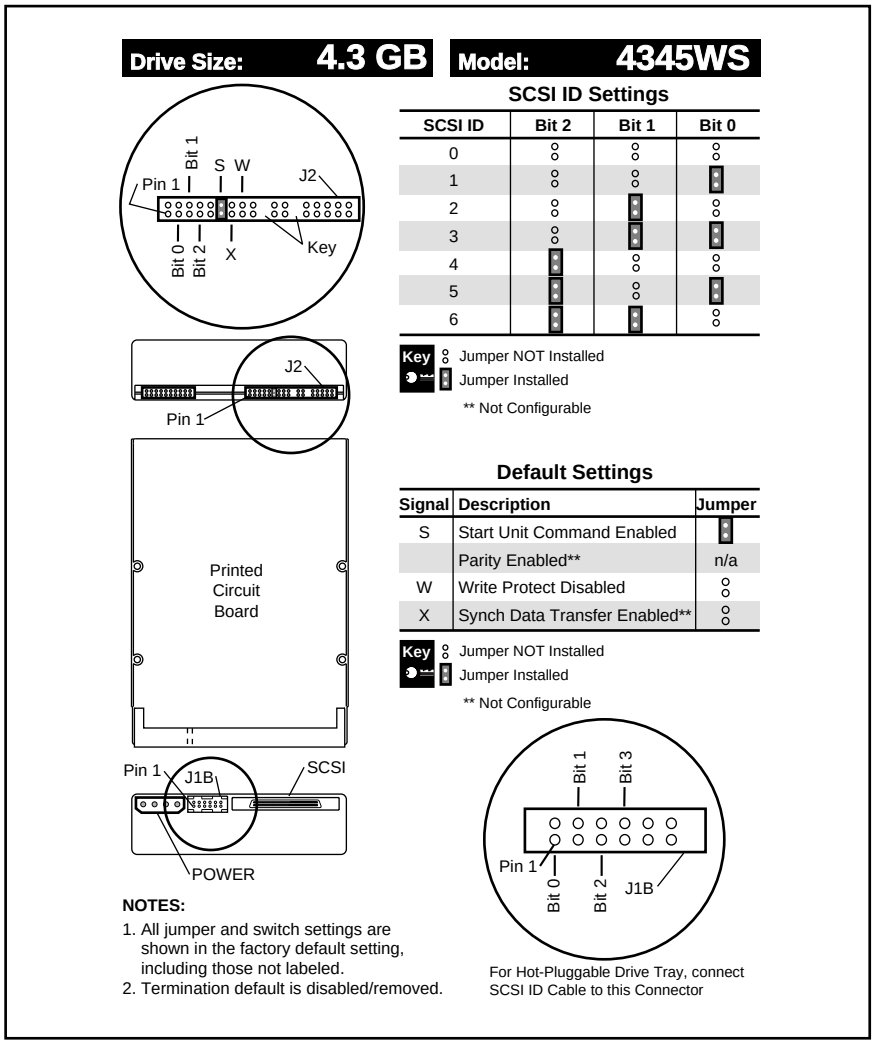


Figure 6-8. Jumper Positions for the 4.3-GB Hard Drive (4345WS)

9.1-GB Wide-Ultra SCSI-3 Hard Drive

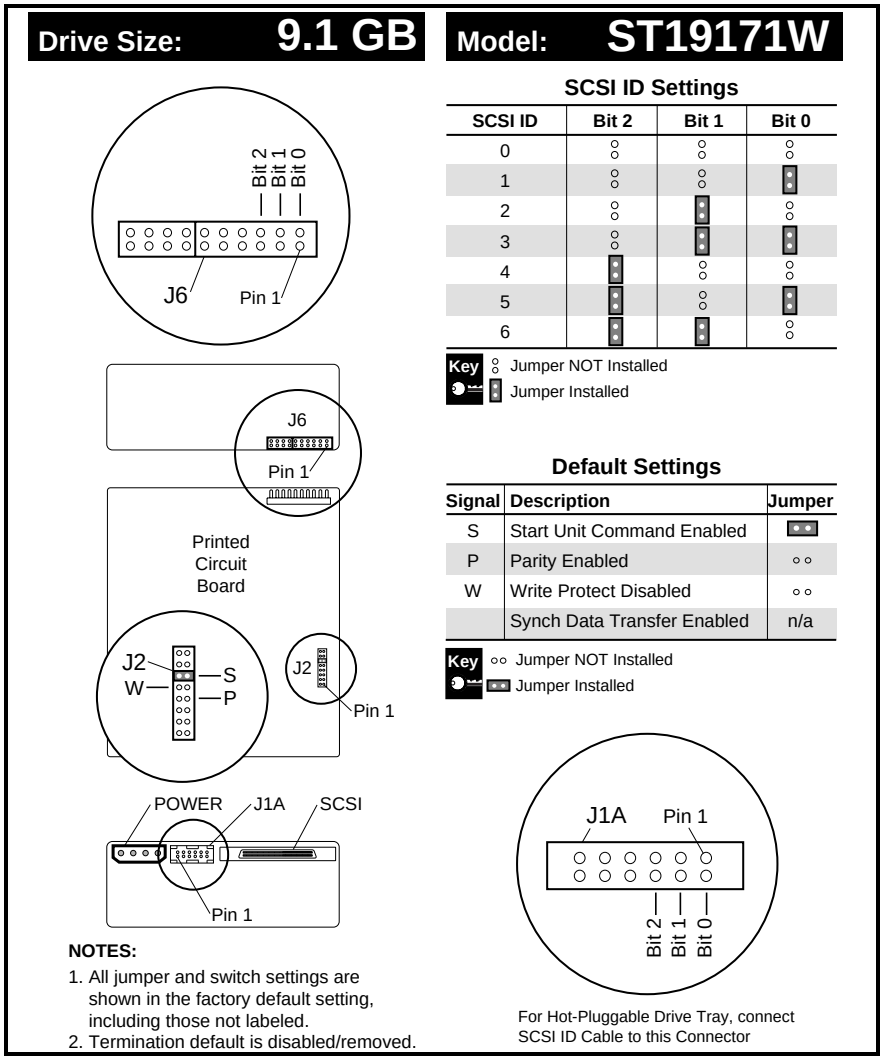


Figure 6-9. Jumper Positions for the 9.1-GB Hard Drive (ST19171W)

24X MAX CD-ROM Drive (IDE)

The jumper settings for the 24X MAX CD-ROM drive (IDE) are shown in the following illustration.

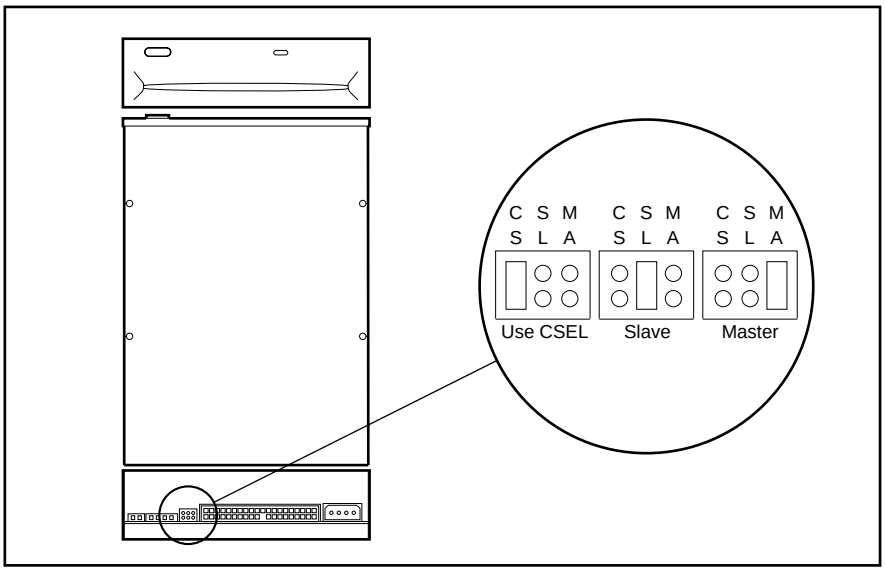


Figure 6-10. Jumper Positions for the 24X MAX CD-ROM Drive (IDE)

8X PDCD Drive (Optional)

The jumper settings for the optional 8X PDCD drive are shown in the following illustration. The default jumper setting is CABLE SELECT (CS) enabled.

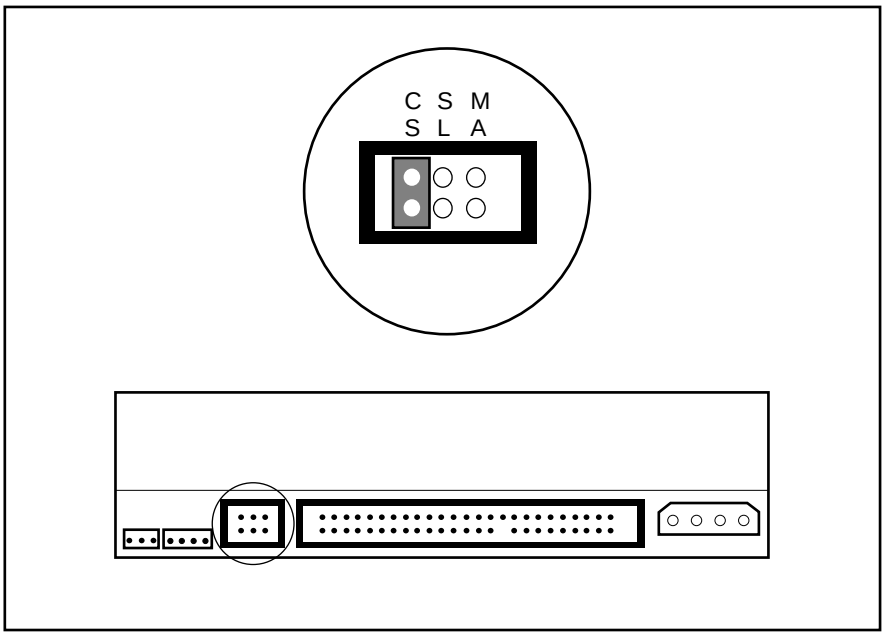


Figure 6-11. Jumper Positions for the 8X PDCD Drive

GLoria-XL 3D Graphics Controller

The switch settings for the GLoria-XL 3D graphics controller are shown in the following illustration.

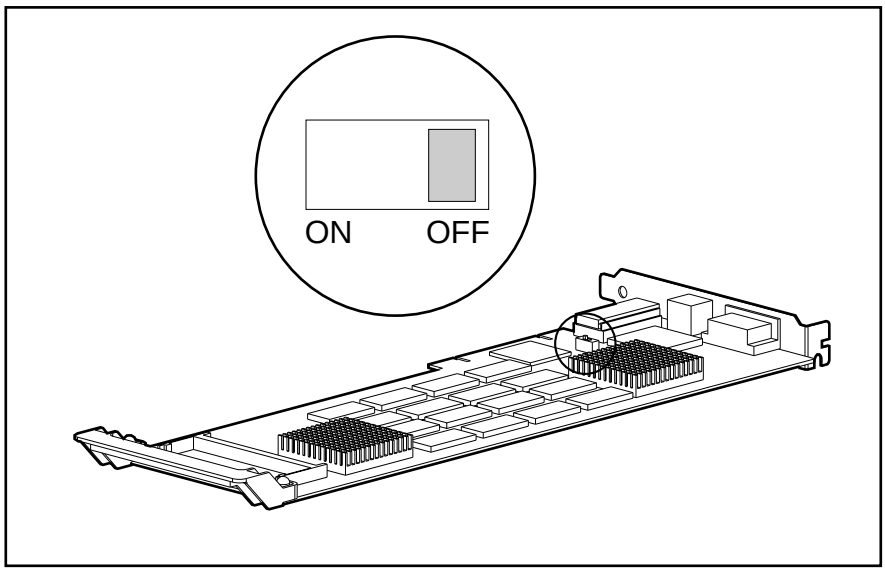


Figure 6-12. Switch Settings for the GLoria-XL 3D Graphics Controller

The GLoria-XL 3D graphics controller is shipped with the VGA enabled (Switch=OFF [or 1]). When the switch is ON, VGA is disabled.

FireGL 4000 Graphics Controllers

The jumper settings for the FireGL 4000 graphics controllers are shown in the following illustration.

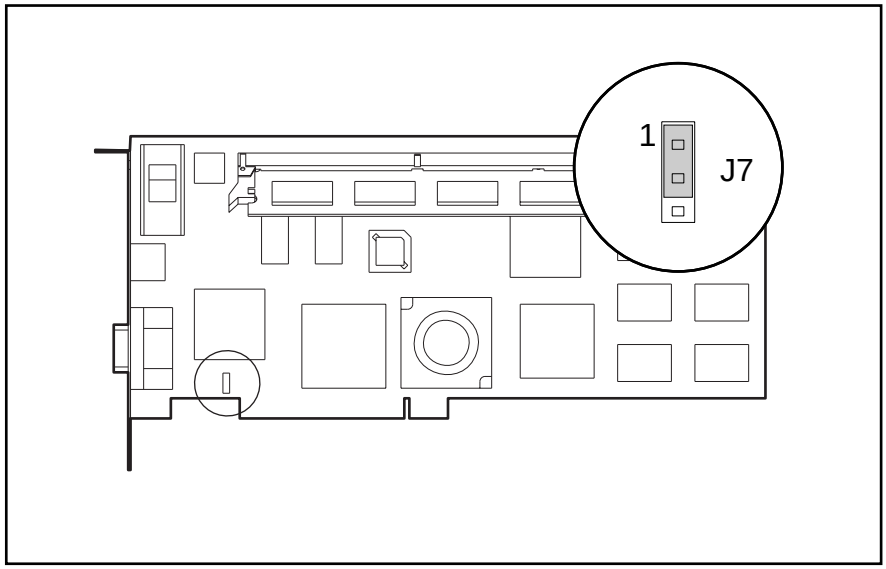


Figure 6-13. Jumper Positions for the FireGL 4000 Graphics Controllers

Table 6-4
FireGL 4000 Graphics Controllers
Jumper Settings

Jumper	Pins 1-2	Pins 2-3
J7	On-board VGA enabled (Default)	On-board VGA disabled*

**Required only if using a separate VGA/EGA controller.*

Chapter 7
Physical and Operating Specifications

This chapter provides operating and performance specifications for the following Compaq Professional Workstation 5100 hardware:

- System Unit
- Power Supply
- Diskette Drive
- CD-ROM Drive
- PDCD Drive
- Hard Drives
- Audio System
- Keyboard
- Mice (2-button, 3-button, and 4-button)
- Graphics Controllers
- Network

System Unit

Table 7-1
System Specifications

	U. S.	Metric
Desktop Dimensions		
Height	5.25 in	13.34 cm
Width	19.25 in	48.90 cm
Depth	15.69 in	39.85 cm
Weight (approximate)	35.65 lb	12.85 kg
Power Supply		
Operating Voltage Range	90-132 VAC	180-264 VAC
Rated Voltage Range	100-120 VAC	220-240 VAC
Rated Line Frequency	50 - 60 Hz	50 - 60 Hz
Rated Input Current (maximum)	5 A	5 A
Power Output	280 W	280 W
Environmental Requirements		
Temperature		
Operating	50° to 95°F	10° to 35°C
Shipping	4° to 140°F	-20° to 60°C
Relative Humidity (noncondensing)		
Operating	8% to 90%	8% to 90%
Nonoperating	5% to 95%	5% to 95%
Maximum Altitude (unpressurized)		
Operating	10,000 ft	3048 m
Nonoperating	30,000 ft	9144 m
Heat Dissipation (nominal)	770 Btu/hr	3.23 kg-cal/min

Table 7-2
System Interrupts

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

Table 7-3
System Direct Memory Access (DMA)

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

Table 7-4
System I/O

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

Continued

System I/O *Continued*

I/O Address (Hex)	System Function (Shipping Configuration)
1F0 - 1F7	Fixed Disk Controller
1F8 - 1FF	Unused
200	Unused
201	Unused
202 - 21F	Unused
220 - 22F	Business Audio (Default; Alter =230h, 240h, 250h)
230 - 277	Unused
278 - 27F	Reserved Parallel Port
280 - 2E7	Unused
2E8 - 2EF	Reserved Serial Port
2F0 - 2F7	Unused
2F8 - OFF	Modem (COM 2)
300 - 317	Unused
318 - 319	Unused
31A - 36F	Unused
370 - 377	Reserved (2nd Diskette Drive)
378 - 37F	Parallel Port (Primary)
380 - 387	Unused
388 - 38B	FM Synthesizer - OPAL
38C - 397	Unused
398 - 399	Super AI/O Index/Data (Default; Alt = 26Eh, 15Ch, 02Eh)
39A - 3AF	Unused
3B0 - 3BB	MDA, EGA/VGA
3BC - 3BF	Reserved (Parallel Port)
3C0 - 3DF	EGA/VGA
3E0 - 3E7	Unused
3E8 - 3EF	Reserved (Serial Port)
3F0 - 3F7	Diskette Controller
3F8 - 3FF	Serial Port (Primary)

Memory Address	Size	System Function
FFFFFFFFh to FFFC0000h	64 KB	System ROM (alias at 000C0000h - 000FFFFFh)
FFFBFFFFh to 81000000h	2,080,512 KB	PCI Memory Expansion
80FFFFFFh to 80000000h	16,384 KB	ISA Memory Mapped I/O Devices
7FFFFFFFh to 10000000h	1,835,008 KB	PCI Memory Expansion

Continued

System I/O *Continued*

Memory Address	Size	System Function
0FFFFFFFh to 01000000h	245,760 KB	HOST or PCI Memory Expansion
00FFFFFFh to 00100000h	15,360 KB	HOST, PCI, or ISA Memory Expansion
000FFFFFh to 000F0000h	64 KB	System ROM
000EFFFFh to 000E0000h	64 KB	Extended System ROM
000C0000 to 000DFFFFh	16 KB	Option ROM
000BFFFFh to 000A0000h	128 KB	Video RAM
0009FFFFh to 00000000h	640 KB	Base Memory

1 KB = 1024 bytes. All memory above the first 172 MB is non-cacheable. All PCI is non-cacheable.

280W Power Supply

Table 7-5
280W Power Supply Specifications

Input Specifications		
Rated Input Voltage	100 to 120 VAC	220 to 240 VAC
Rated Input Current	6A	3A
Rated Input Frequency	50 to 60 Hz	50 to 60 Hz
General Specifications		
Power Factor	>0.95	>0.95
Input Power	500W	500W
Range Input Line	90 to 255 VAC	90 to 255 VAC
Holdup Time	16 ms from zero crossing at 120 VAC	16 ms from zero crossing at 240 VAC
Full Output Rating	To 45°C and 5,000 ft.	
	To 32°C and 10,000 ft. (derate linearly)	
Minimum Load	3A on + 5V output; 0.1A on +5Vaux output	
Ambient Temperature Range		
Operating	41° to 113°F	5° to 45°C
Storage	-40° to 185°F	-40° to 85°C
Safety Standard	UL 1950 3rd Edition; CSA 22.2 No. 950 3rd Edition, EN 60 950	
EMI	3 dB below CISPR Publication 22 Class B; 6 dB below BMPT - AmtsblVfg 243/1991 limits; 6 dB below CFR 47, Part 15 Class B limits.	
Immunity	IEC 801-2, 801-3, 801-4	
Input Transient Susceptibility:		
Common and Differential Mode (superimposed on AC line) Differential Mode	2500V, 1 µs, damped sinusoid 600V, 10 µs pulse 20% step change in AC input voltage	

Diskette Drive

Table 7-6
1.44-MB Diskette Drive

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

CD-ROM Drive

Table 7-7
24X MAX CD-ROM Drive (IDE)

Disk	
Diameter	12 cm
Capacity	
Mode 1	540 MB
Mode 2	650 MB
Disk Thickness	1.2 mm
Track Pitch	1.6 µm
Performance	
Access Time	
Random Seek	<85 ms
Full Stroke Seek	<150 ms
Data Transfer Rate	
Sustained	150 KB/s
Burst	1500 to 3600 KB/s (10x to 24x variable)
Bus Rate	4.0 MB/s
Cache/Buffer	128 KB/s
Start-Up Time	
Single	<7 s
Multisession	<30 s
Stop-Time	< 4 s
Error Rates	
Soft error	10^{-9}
Hard error	10^{-12}
Seek error	10^{-6}
Dimensions	
Height	42.9 mm
Width	150.1 mm
Depth	208.0 mm
Weight	1200 g
Audio Interface	
Line Out Connector	
RMS Output Voltage	0.7 Vrms
S/N Ratio	80 dB
Channel Separation	65dB
THD and Noise	0.1%
Frequency Response	20 to 20 kHz

Continued

24X MAX CD-ROM Drive (IDE) *Continued*

Digital Audio Out Connector	2 pin digital audio out connector described in the ATAPI spec., 2.6, section 11.1 must be included. This serial digital audio out must conform to the IEC0958 EIAJ Cp-1201 format.
Electrical	
DC Power Requirements	
5 VDC +/-5%	100 mV ripple p-p
12 VDC +/-5%	200 mV ripple p-p
DC Current	
5 VDC +/-5% (typical)	450 mA
5 VDC =/-5%	1800 mA
(maximum)	600 mA
12 VDC +/-5%	1800 mA
(typical)	
12 VDC =/-5%	
(maximum)	
Total Drive Power (Stand-by Mode)	< 1 Wf

PDCD Drive

Table 7-8
8X PDCD Drive (IDE)

Disc	
Application Disc	
CD-ROM	Mode 1 & 2, CD-DA,
CD-XA	Mode 2, Form 1 & 2
CD-I	Mode 2, Form 1 & 2
CD-I Ready	CD-Bridge
Photo CD	Single & Multi-session
CD-WO	Fixed and Variable packets
Block Size	
CD-ROM	
Mode 0	2352 (bytes)
Mode 1	2352, 2340, 2336, 2048, (bytes)
Mode 2	2648, 2646, 2352, 2340, 2336, 2048, (bytes)
PD	512 bytes
Capacity	
CD-ROM	
Mode 1 (12 cm)	550 MB
Mode 2 (12 cm), (8 cm)	640 MB, 180 MB
PD	650 MB, ZCAV
Diameter	12 cm, 8 cm (CD-ROM only)
Thickness	1.2 mm
Track Pitch	1.6 µm (CD) 1.2 µm (PD)
Laser Parameters	
Output Power	13.5 mW
Type	Semiconductor Laser GaA1As
Wave Length	790 +/- 25 nm
Performance	
Access Time	
Random	<150 ms (8X CD-ROM mode)
	<200 ms (PD mode)
Full Stroke	<350 ms (8X CD-ROM mode)
	<350 ms (PD mode)
Cache/Buffer	512 KB
Data Transfer Rate	150 Kbytes/s (sustained, 1X CD-ROM mode)
	300 Kbytes/s (sustained, 2X CD-ROM mode)
	1200 Kbytes/s (sustained, 8X CD-ROM mode)
	500-1100 Kbytes/s (sustained PD mode)
ATAPI Bus Rate	3.3 MB

Continued

8X PDCD Drive *Continued*

Performance (cont'd)		
Error Rates		
Soft error	10^{-9}	
Hard error	10^{-12}	
Seek error	10^{-6}	
Indicators		
Busy LED	Green/Amber	
Mode LED	Amber = PD, Green = CD	
Reliability	35,000 POH, 25% (MTBF)	
	30 minutes (MTTR)	
	5 years (service life)	
	>20,000 drawer in/out cycles	
	$>3 \times 10^{6}$ full stroke seeks	
Startup Time	<10 seconds (typical)	
Stop Time	<2 seconds (typical)	
Environmental Conditions	**Operating**	**Storage**
Temperature	5 to 45°C	-30 to 60°C
Temperature Gradient	10°C/hr	20°C/hr
Relative Humidity	10 to 80%	5 to 90%
Maximum Wet Bulb Temperature	30°C	40°C
Altitude	0 to 3500 m	0 to 13,600 m
Noise Pressure Output	<45 dBa	N/A
Dimensions		
Height	41.8 mm	
Width	146.0 mm	
Depth (includes bezel)	208 mm	
Weight	<1250 g	

Hard Drives

Table 7-9
2.1-GB Wide-Ultra SCSI-3 Hard Drive

Capacity	2.14 GB
Transfer Rate	
Media	7.3 to 11.4 MB/s
Asynchronous	5.0 MB/s
Synchronous	Up to 40.0 MB/s
Seek Time (typical)	
Single Track	1.9 ms
Average	9.5 ms
Full Stroke	18.5 ms
Disk Rotation Speed	7200 rpm
Cylinders	5178
Data Heads/Cylinder	5
Sectors/Track	119 to 186 (11 zones)
Buffer Size	512 KB

Table 7-10
4.3-GB Wide-Ultra SCSI-3 Hard Drive

Capacity	4.35 GB
Transfer Rate	
Media	7.3 to 11.4 MB/s
Asynchronous	5.0 MB/s
Synchronous	Up to 40.0 MB/s
Seek Time (typical)	
Single Track	1.9 ms
Average	9.5 ms
Full Stroke	18.5 ms
Disk Rotation Speed	7200 rpm
Cylinders	5178
Data Heads/Cylinder	10
Sectors/Track	119 to 186 (11 zones)
Buffer Size	512 KB

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

Table 7-11
9.1-GB Wide-Ultra SCSI-3 Hard Drive

Capacity	9.10 GB	
Transfer Rate		
Media	7.7 to 12.2 MB/s	
Asynchronous	5.0 MB/s	
Synchronous	Up to 40.0 MB/s	
Seek Time (typical)	**Read**	**Write**
Single Track	1.2 ms	1.4 ms
Average	8.2 ms	9.7 ms
Full Stroke	19.2 ms	20.2 ms
Disk Rotation Speed	7200 rpm	
Cylinders	5273	
Data Heads/Cylinder	20	
Sectors/Track	126 to 199 (7 zones)	
Buffer Size	512 KB	

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

Audio System

Table 7-12
Audio System

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

Keyboard

Table 7-13
Compaq Enhanced Keyboard

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

Mice

Table 7-14
2-Button Mouse

	U.S.	Metric
Dimensions		
Height	1.34 in	3.4 cm
Length	4.45 in	11.3 cm
Width	2.36 in	6.0 cm
Weight	4.59 oz	130 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 10 kV; No hard errors through 15 kV; specific performance depends on host system	

Table 7-15
3-Button Mouse

	U.S.	Metric
Dimensions		
Height	1.42 in	3.6 cm
Length	4.17 in	10.7 cm
Width	2.87 in	7.4 cm
Weight	5.20 oz	150 g
Base Resolution	400 dpi	
Tracking Speed (maximum)	10 in/sec	25 cm/sec
Temperature		
Operating	32°F to 104°F	0°C to 40°C
Storage	-4°F to 140°F	-20°C to 60°C
Lifetime		
Mechanical	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	

Table 7-16
4-Button Mouse

U.S.	Metric	
Dimensions		
Height	1.77 in	4.5 cm
Length	5.12 in	13.0 cm
Width	2.52 in	6.4 cm
Weight	6.52 oz	185 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 3 million operations	Exceeds 3 million operations
Relative Humidity	10% to 90%, noncondensing	
ESD	No soft errors through 8 kV; no hard errors through 10 kV; specific performance depends on host system	

Graphics Controllers

Table 7-17
MGA Millennium II
Maximum Color Support

	Double Buffer Mode						Single Buffer Mode		
	16-Bit Z Buffer			32-Bit Z Buffer					
Resolution	**4 MB**	**8 MB**	**16 MB**	**4 MB**	**8 MB**	**16 MB**	**4 MB**	**8 MB**	**16 MB**
1800 x 1440	-	-	65,536	-	-	256	256	65,536	65,536
1920 x 1200	-	-	65,536	-	-	256	256	16.7M	16.7M
1920 x 1080	-	256	65,536	-	-	65,536	65,536	16.7M	16.7M
1920 x 1034 I*	-	256	65,536	-	-	65,536	65,536	16.7M	16.7M
1600 x 1200	-	256	65,536	-	-	65,536	65,536	16.7M	16.7M
1600 x 1024	-	256	16.7M	-	-	65,536	65,536	16.7M	16.7M
1280 x 1024	-	65,536	16.7M	-	256	16.7M	16.7M	16.7M	16.7M
1152 x 864	256	65,536	16.7M	-	65,536	16.7M	16.7M	16.7M	16.7M
1024 x 768	256	16.7M	16.7M	-	65,536	16.7M	16.7M	16.7M	16.7M
800 x 600	65,536	16.7M	16.7M	65,536	16.7M	16.7M	16.7M	16.7M	16.7M
640 x 480	16.7M	16.7M	16.7M	16.7M	16.7M	16.7M	16.7M	16.7M	16.7M

I = interlaced screen mode*

Table 7-18
FireGL 4000 Graphics Controllers
Maximum Color Support

Resolutions	Colors
640 x 480	16.7M
800 x 600	16.7M
1024 x 768	16.7M
1280 x 1024	16.7M

True color (16.7 M simultaneous colors) - 32 bit

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Table 7-19
GLoria Synergy Graphics Controller
Maximum Color Support

Resolutions	Colors
1920 x 1200	32,768
1920 x 1280	32,768
1600 x 1280	32,768
1600 x 1200	32,768
1600 x 1000	16,777,216
1536 x 1152	32,768
1280 x 1024	16,777,216
1152 x 864	16,777,216
1024 x 768	16,777,216
800 x 600	16,777,216
640 x 480	16,777,216

Table 7-20
GLoria-XL 3D Graphics Controller
Maximum Color Support

Resolution	Single Buffer Mode	Double Buffer Mode
1920 x 1200	32,768	32,768
1920 x 1080	16.7M	16.7M
1600 x 1280	16.7M	16.7M
1600 x 1200	16.7 M	16.7M
1280 x 1024	16.7 M	16.7M
1152 x 864	16.7 M	16.7 M
1024 x 768	16.7 M	16.7 M
800 x 600	16.7 M	16.7 M

Table 7-21
MVP Workstation Graphics Controller
Maximum Color Support

Resolutions	Colors		
640 x 480	256	65,536	16.7M
800 x 600	256	65,536	16.7M
1024 x 768	256	65,536	16.7M
1152 x 864	256	-	-
1280 x 1024	256	65,536	-
1600 x 1200	256	-	-

Network

Table 7-22
Ethernet Network Interface Controller (NIC)

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

Network Cable Specifications

The RJ-45 and the BNC connectors require different cables. Specifications for the cable required for each type of connector follow.

Cable for RJ-45 Connections

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

Cable for BNC Connections (available in select geographic regions)

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

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