



Professional Workstation AP200

Maintenance and Service Guide

First Edition (July 1998)
Part Number 352624-001
Compaq Computer Corporation

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About This Guide

This Maintenance and Service Guide is a troubleshooting guide that can be used for reference when servicing your Compaq Professional Workstation AP200.



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

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

Compaq Technician Notes



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



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



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

- Disconnect power from the computer by unplugging the power cord from either the electrical outlet or the computer.
 - Do not disable the power cord grounding plug. The grounding plug is an important safety feature.
 - Plug the AC adapter or power cord into a grounded (earthed) electrical outlet that is easily accessible at all times.
-



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

IMPORTANT: Any indication of repair at the component level or modification of a printed wiring board may void any warranty.

Where to Go for Additional Help

Major sources of additional information are listed below.

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 Management Workstation Agents
- Compaq Download Facility: Call 1-281-518-1418

Telephone Numbers

For the name of your nearest Compaq Authorized Reseller:

In the United States, call 1-800-345-1518

In Canada, call 1-800-263-5868

For Compaq technical support:

In the United States and Canada, call 1-800-386-2172

For Compaq technical support phone numbers outside the United States and Canada, visit the Compaq website at:

<http://www.compaq.com>.

Chapter 1

Illustrated Parts Catalog

This chapter provides an illustrated parts breakdown and a reference for spare parts for the Compaq Professional Workstation AP200.

Mechanical Parts

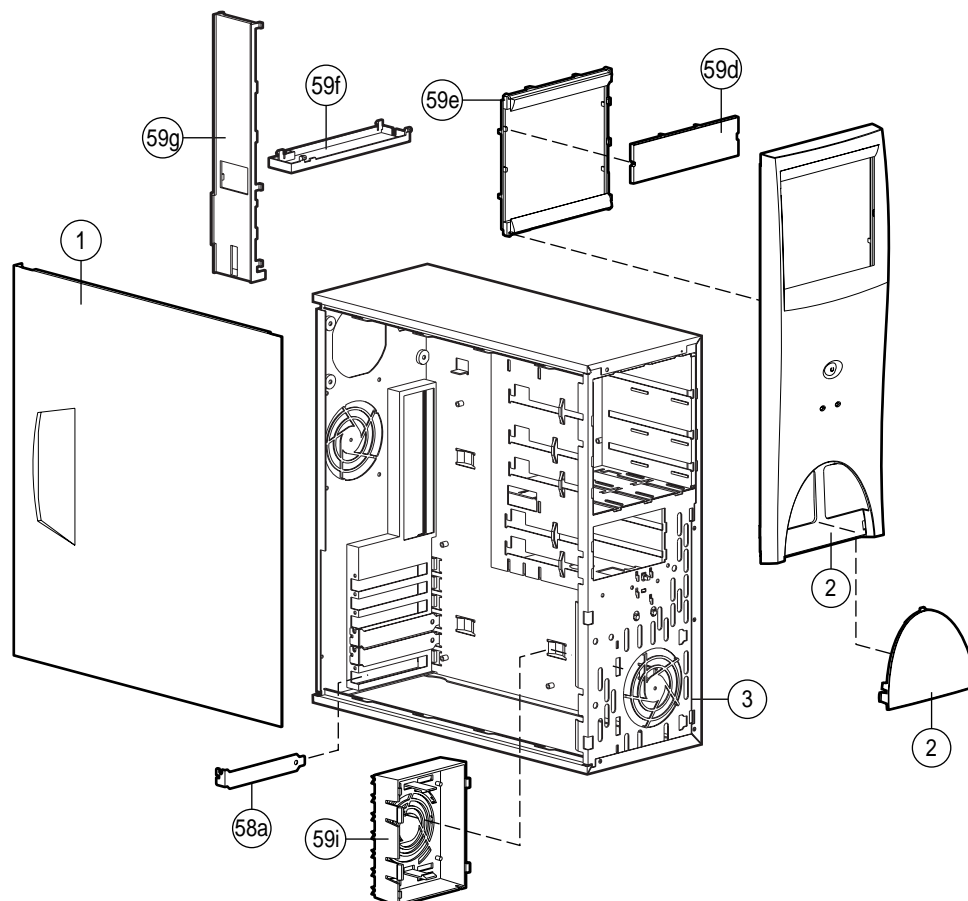


Figure 1-1. Exploded view of the Compaq Professional Workstation AP200 mechanical parts

System Components

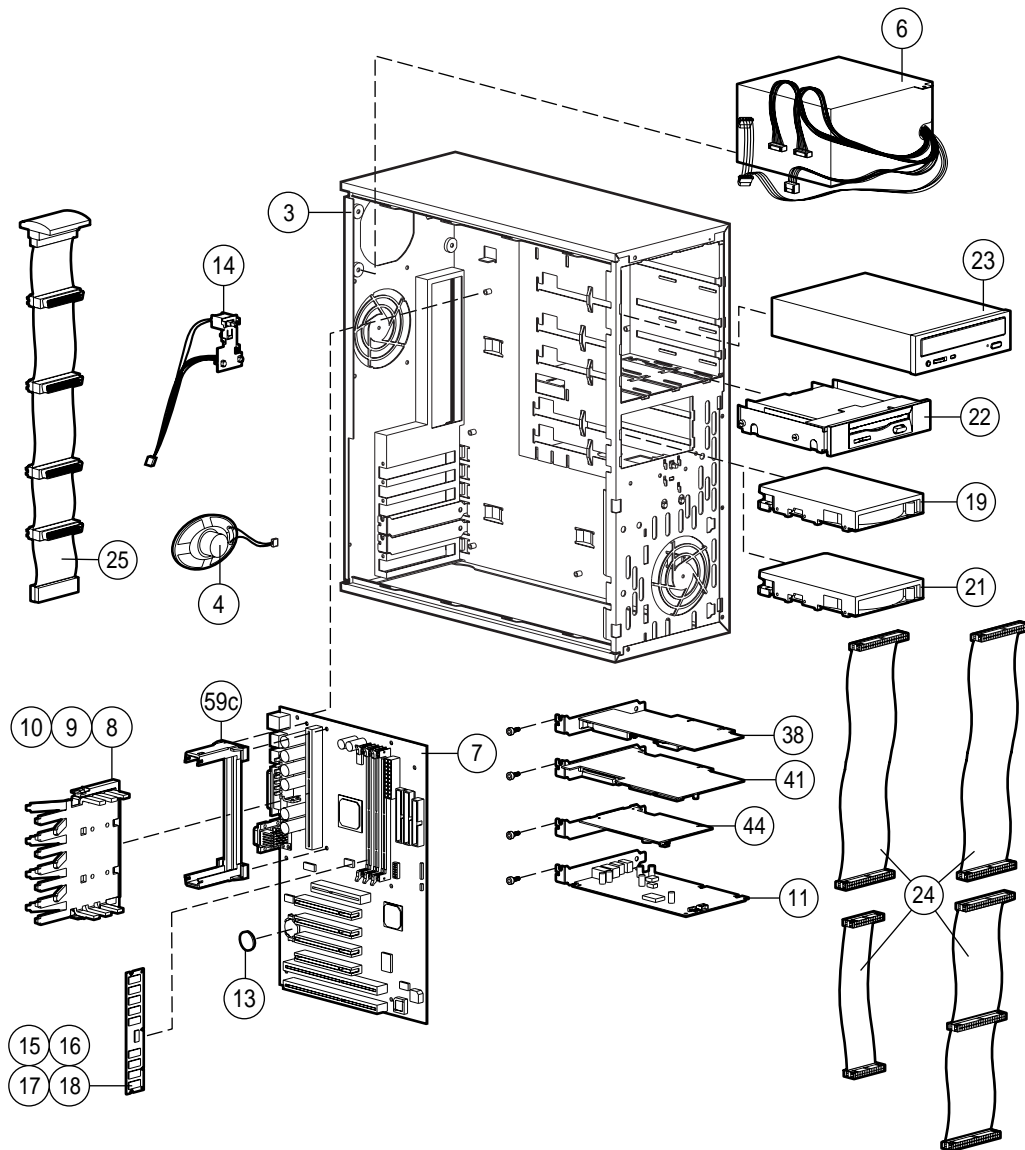


Figure 1-2. Exploded view of the Compaq Professional Workstation AP200 system components

Spares Parts List

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

Table 1-1
Compaq Professional Workstation AP200
Spares Parts List

Reference	Description	Spares Part #
MECHANICAL		
1	Access panel	166867-001
2	Front bezel with minitower logo	352649-001
3	Chassis/base pan	166880-001
SYSTEM		
4	Speaker	167029-001
5	Auxiliary fan (optional)	166922-001*
6	Power supply, 200W	166814-001
7	System board	352648-001
8	Intel Pentium II Processor, 350/100 MHz, 512K with heat sink	166874-001
9	Intel Pentium II Processor, 400/100 MHz, 512K with heat sink	166882-001
10	Intel Pentium II Processor, 450/100 MHz, 512K with heat sink	167032-001
11	Audio board	356081-001
12	Lock security bracket	199109-001*
13	Battery	234556-001
14	Power switch and LEDs with cable	166925-001
MEMORY		
15	16-MB memory module (Unregistered 100-MHz SDRAM)	166964-001
16	32-MB memory module (Unregistered 100-MHz SDRAM)	166968-001
17	64-MB memory module (Unregistered 100-MHz SDRAM)	166967-001
18	128-MB memory module (Unregistered 100-MHz SDRAM)	166965-001

Continued

Spares Parts List - Compaq Professional Workstation AP200 *Continued*

Reference	Description	Spares Part #
MASS STORAGE		
19	4.3-GB Wide-Ultra SCSI hard drive	179287-001
20	9.1-GB Wide-Ultra SCSI hard drive	179288-001*
21	6.4-GB Ultra ATA hard drive	166973-001
22	1.44-MB diskette drive	179161-001
23	32X Max CD-ROM drive (IDE)	327659-001
CABLE KITS		
24	Miscellaneous Cable Kit (166838-001, 288489-002, 247116-001, 242947-001)	166879-001
25	SCSI cable	297511-001
26	SCSI LED cable	247485-001*
27	NIC WOL cable	166974-001*
28	Power cord	121258-001*
KEYBOARD AND MOUSE		
29	Keyboard	269513-xxx*
30	3-button mouse	327716-001*
MONITOR		
31	P75	307815-xxx*
32	V75	307713-xxx*
33	V90	305602-xxx*
34	P1610 monitor	305708-xxx*
35	P110 monitor	284959-xxx*
36	P110 monitor (INT)	284959-xxx*
37	TFT 500: <i>Order TFT 500 spare part from the TFT 500 guide (PN 285012-001)</i>	

Continued

Spares Parts List - Compaq Professional Workstation AP200 *Continued*

Reference	Description	Spares Part #
GRAPHICS		
38	GLoria Synergy+ Graphics Controller (Accelerated Graphics Port or AGP)	327599-001
39	4 MB memory upgrade (GLoria Synergy+)	327600-001*
40	GLoria Synergy Graphics Controller	298796-001*
CONTROLLERS		
41	Wide-Ultra SCSI controller, PCI	179261-001
COMMUNICATIONS		
42	Netelligent 16/4 TR PCI UTP/STP controller	268010-001*
43	Compaq Fast Autosensing Ethernet NIC (NC3120)	317606-001*
44	Compaq Fast Autosensing Ethernet NIC (NC 3121)	323556-001
SOFTWARE		
45	Magellan Driver CD	297863-001*
46	Spaceball Driver CD	298033-001*
47	Microsoft Windows NT Workstation 4.0 CD	275573-xx1*
48	Compaq SmartStart for Workstations CD	275574-xx3/xx2(SP)*
49	System ROMPaq	275595-001*
MISCELLANEOUS		
50	Magellan 3D Pointing Device (spacemouse)	297645-001*
51	Spaceball 3D Pointing Device	297644-001*
52	3.5- to 5.25-Inch diskette drive mounting bracket with screws and brace for use in bay 3 only	166923-001*
53	3.5- to 5.25-inch hard drive mounting bracket	243231-001*
54	3.5- to 5.25-inch 1/2 height mounting bracket for use in bays 1 and 2 only	243230-002*
55	Country kit	352657-001*
56	Shipping box with buns (US)	166990-001*
57	Shipping box with buns (INTL)	166990-002*

Continued

Spares Parts List - Compaq Professional Workstation AP200 *Continued*

Reference	Description	Spares Part #
58	Miscellaneous hardware kit includes: a. slot cover (5) b. I/O panel* c. fan guard* d. screw, 6-32 pan head x 1/4 inch (4)* e. screw, M3 x 1/4 inch* f. thumb screw (2)* g. Plastite flathead screw (4)* h. plastic push lock fastener for fan assembly (4)*	166877-001
59	Miscellaneous plastics kit, minitower and desktop includes: a. diskette bezel* b. rubber feet (8)* c. processor retainer with pins d. blank bezel e. subpanel f. drivelock, minitower g. drivelock, desktop h. drivelock springs (2)* i. card guide j. desktop logo*	352656-001
DOCUMENTATION		
60	Maintenance and Service Guide	352658-001*
61	Illustrated Parts Map	352659-001*
62	Service Quick Reference Guide (revision -035)	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 AP200:



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 AP200 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
- Diagnostics diskette

IMPORTANT: Prior to servicing the workstation, be sure that the latest Compaq Support Software Diskette (SSD) for Windows NT Workstation 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 AP200.

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

Serial Number

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

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.

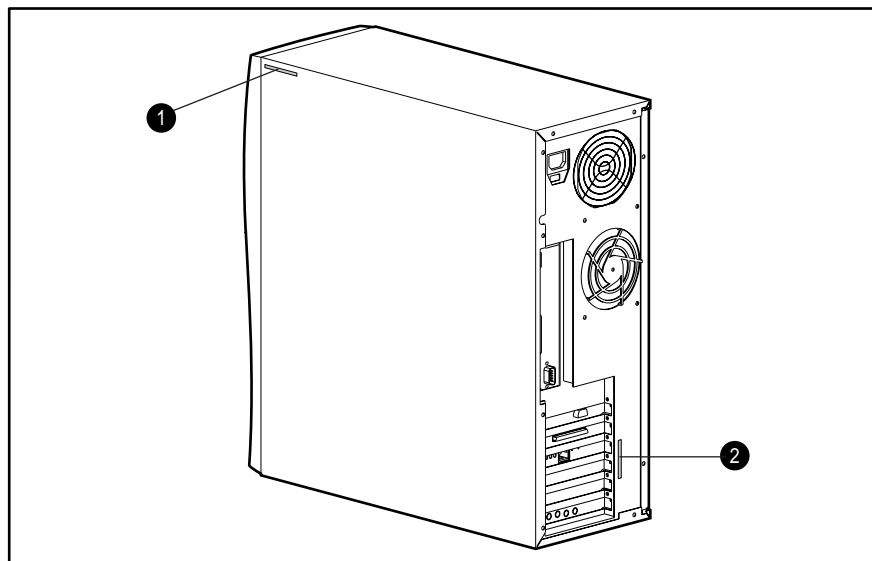


Figure 3-1. Serial number locations

Service Preparations

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



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

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

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

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

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

Logo Plate

To remove the logo plate, grasp the open side of the logo plate (left side if a desktop, bottom if a minitower) and pull outward.

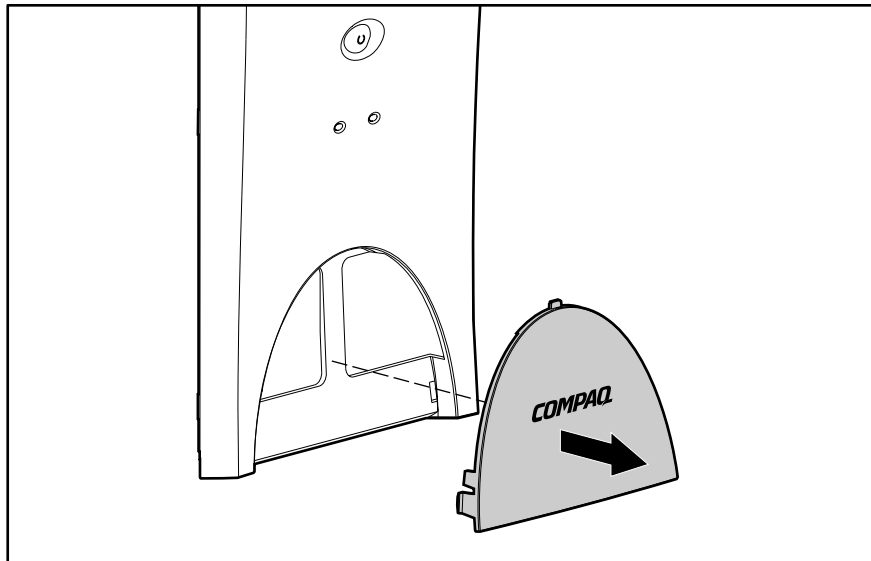


Figure 3-2. Removing the logo plate

To install a new logo plate, align the guide pins in the slots, then press into place.

NOTE: When replacing the logo plate, be sure the pins are properly placed in the front bezel before pressing the logo plate into position.

Cable Lock

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

To remove the lock:

1. Unlock and remove the cable lock 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.

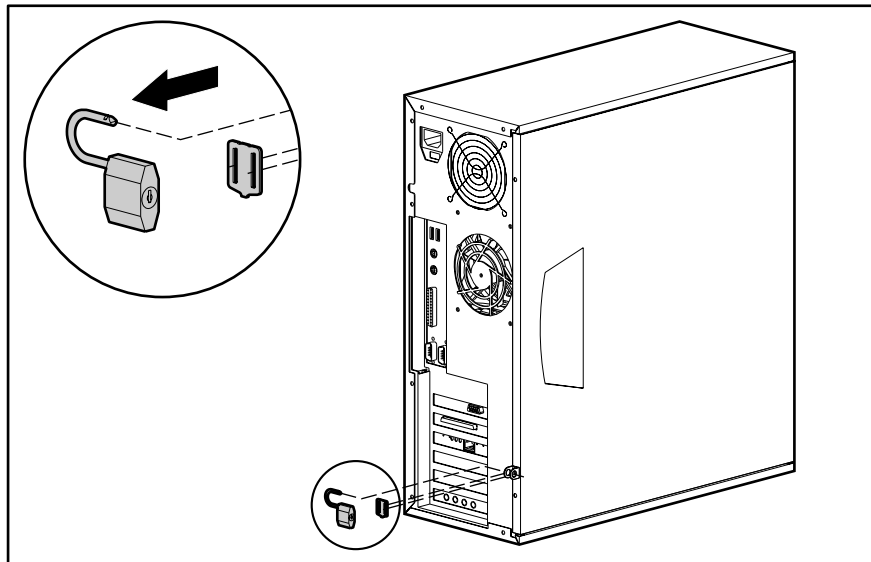


Figure 3-3. Removing the padlock

Access Panel

To remove the workstation access panel:



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

1. Perform the service preparations shown on page 3-2.
2. Remove the two thumb screws that secure the access panel to the workstation chassis.
3. Slide the access panel back about 1 inch (2.5 cm), then lift it off the workstation.

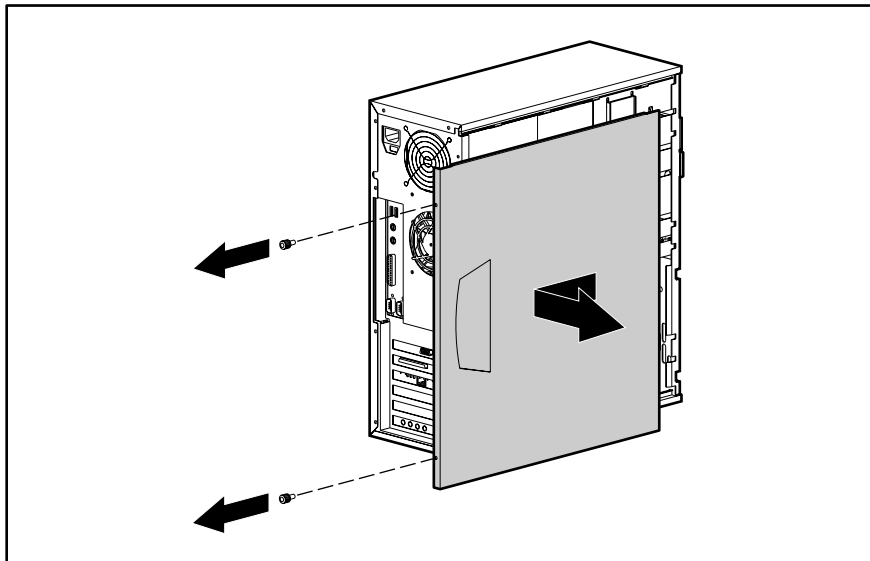


Figure 3-4. Removing the access panel



To replace the access panel, reverse the above procedure.

Front Bezel

To remove the front bezel:



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

1. Perform the service preparations shown on page 3-2.
2. Remove the access panel.
3. Press in on the two release tabs , then rotate the front bezel away from the chassis to remove it from the workstation .

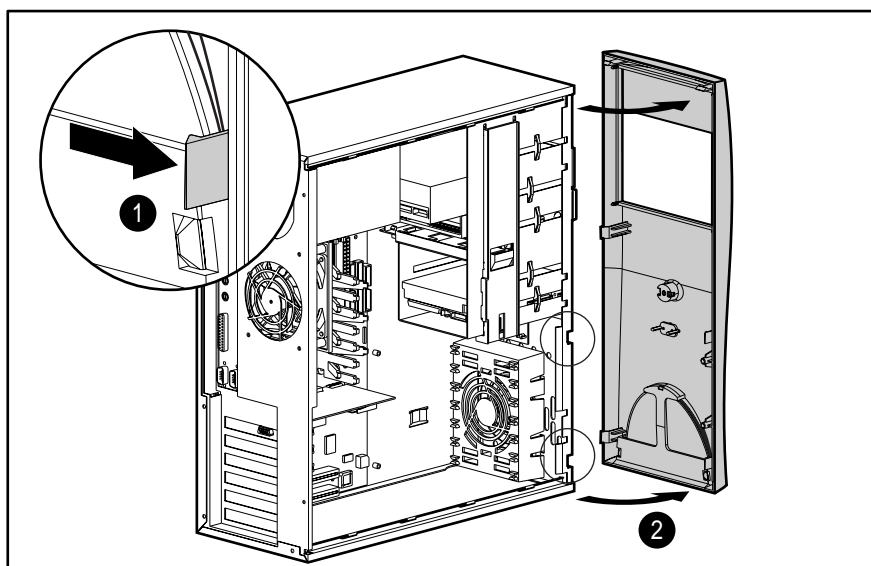


Figure 3-5. Removing the front bezel

To replace the front bezel, reverse the above procedure.

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

Subpanel and Bezel Blanks

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

To remove the bezel blank from the front bezel:



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

1. Perform the service preparations shown on page 3-2.
2. Remove the access panel.
3. Remove the front bezel.
4. Gently pull the subpanel, with the bezel blank secured in it, away from the front bezel, then remove the bezel blank.



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

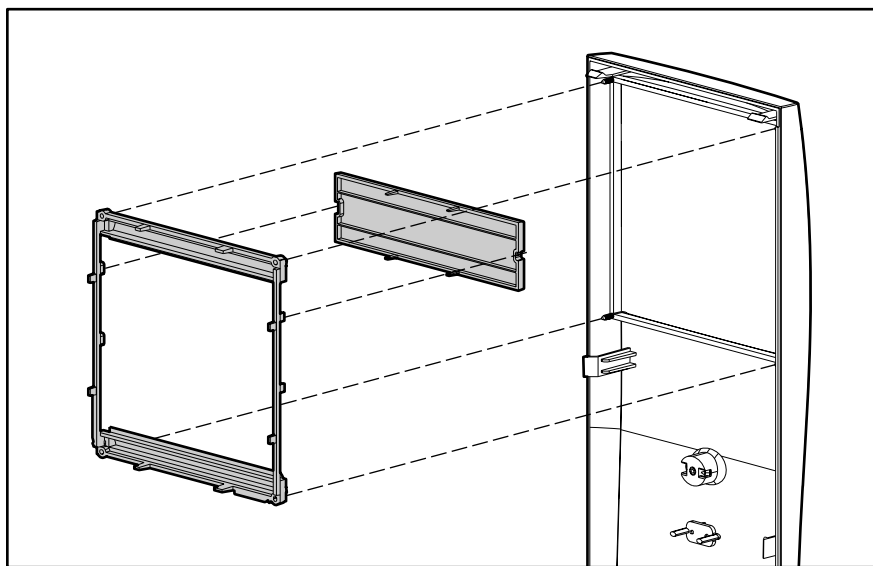


Figure 3-6. Removing the subpanel and bezel blanks

To replace the subpanel and bezel blanks, reverse the above procedure.



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

Mass Storage Devices

This section discusses removal and replacement procedures for the mass storage devices supported on the Compaq Professional Workstation AP200.

Drive Positions

The Compaq Professional Workstation AP200 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.

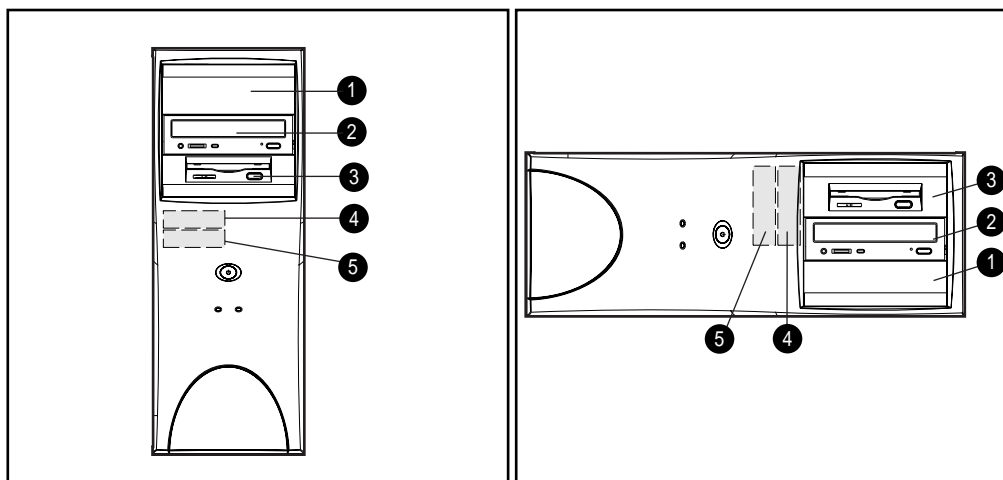







Figure 3-7. Drive positions

Table 3-1
Drive Positions

Bay	Bay Width	Bay Height	Device Configurations
	5.25-inch bay	Half-Height	Optional drive*
	5.25-inch bay	Half-Height	CD-ROM/optional drive (1.6-inch)
	3.5-inch bay	Third-Height	Standard 1.44 MB diskette drive (1.0-inch) (High density diskette drive is mounted with a drive adapter into a 5.25-inch bay.)
	3.5-inch bay	Third-Height	Optional hard drive (1.0-inch)
	3.5-inch bay	Third-Height	Standard hard drive

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

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

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

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

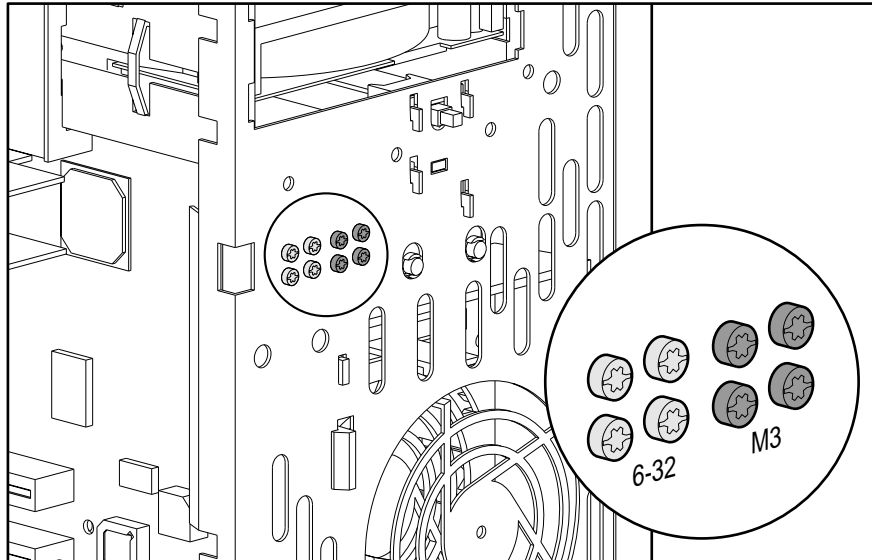




Figure 3-8. Identifying the metric screws

3.5-Inch Hard Drive

To remove a 3.5-inch hard drive:



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

1. Perform the service preparations shown on page 3-2.
2. Remove the access panel.
3. Remove the front bezel.
4. Disconnect the power  and data  cables from the back of the hard drive.

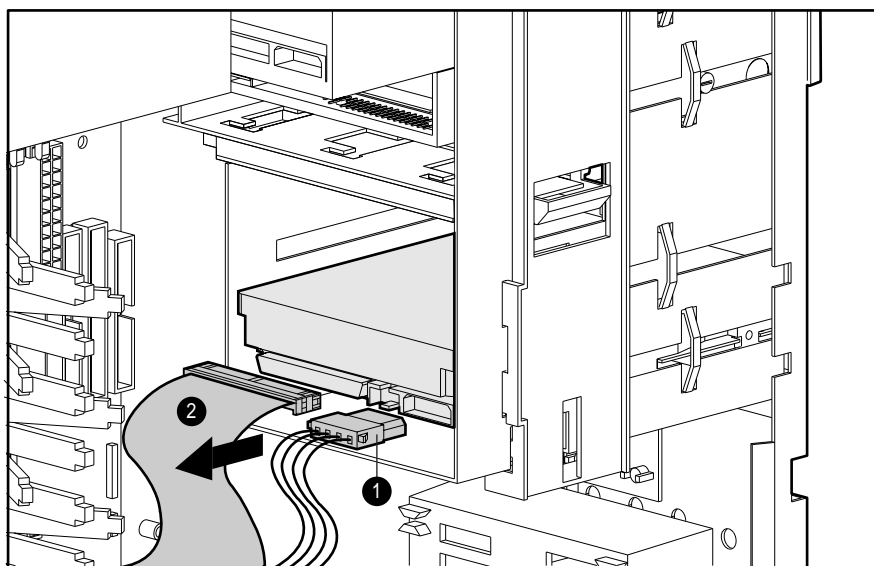


Figure 3-9. Disconnecting the hard drive cables

5. Press the drivelock to unlock the hard drive.

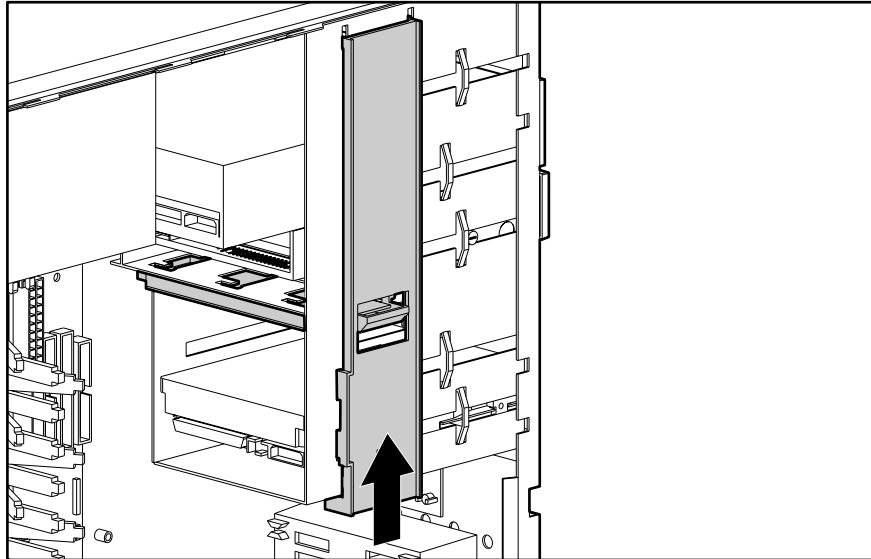


Figure 3-10. Releasing the drive with the drivelock

6. While pressing the drivelock, pull the drive out of the drive bay.

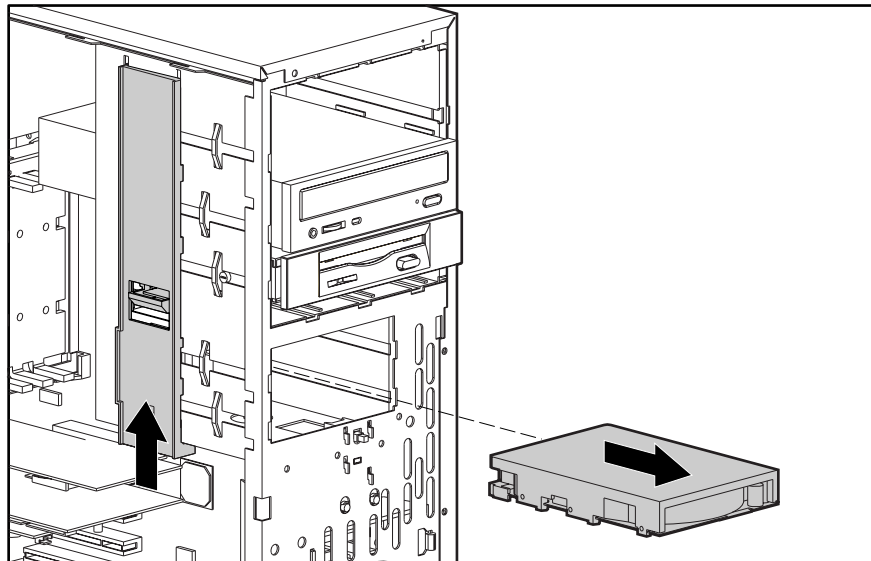


Figure 3-11. Removing a 3.5-inch hard drive

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

To replace the 3.5-inch hard drive, install two guide screws on each side of the replacement drive, be sure the guide screws line up with the guide slots, and slide the drive into the drive bay until it snaps into place.

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

3.5-Inch Drive with 5.25-Inch Drive Adapter

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

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

To remove a 3.5-inch drive with a 5.25-inch drive adapter:



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

1. Perform the service preparations shown on page 3-2.
2. Remove the access panel.
3. Remove the front bezel.
4. Disconnect the cables from the back of the drive.
5. Press the drivelock to unlock the drive.

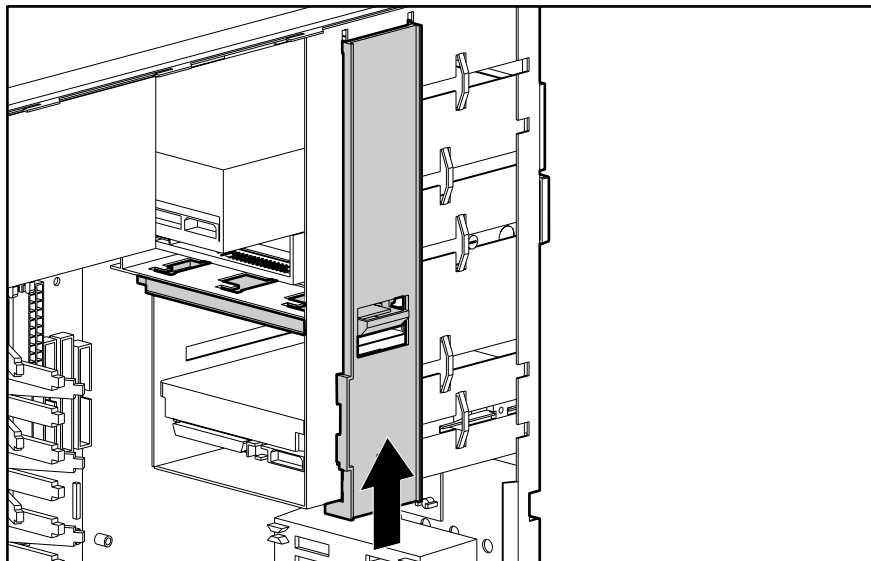


Figure 3-12. Releasing the drive with the drivelock

6. While pressing the drivelock, pull the drive out of the drive bay.

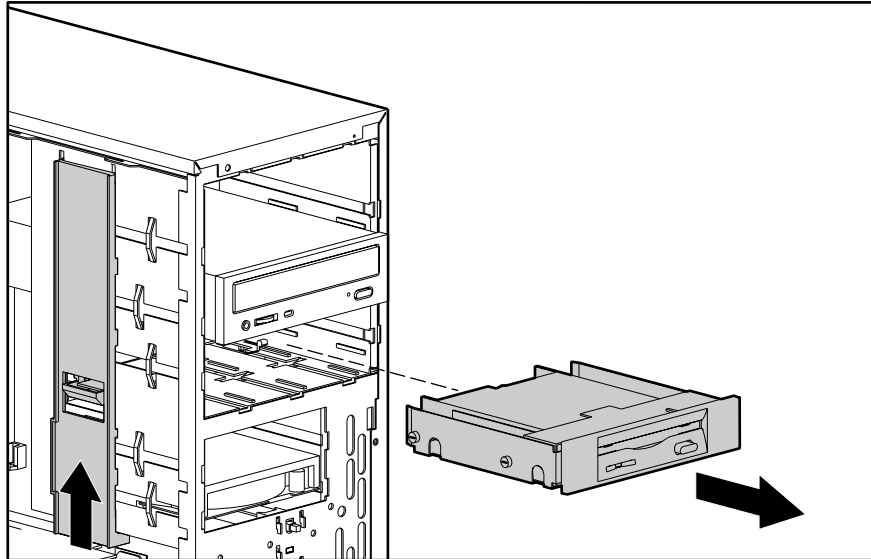


Figure 3-13. Removing a 3.5-inch drive from a 5.25-inch drive bay

7. Remove the bracket brace from the top of the drive adapter by squeezing in on both sides, then rotate the brace up and out.
8. Remove the drive bezel.
9. Remove the screws that secure the drive to the drive adapter.
10. Remove the drive from the drive adapter.

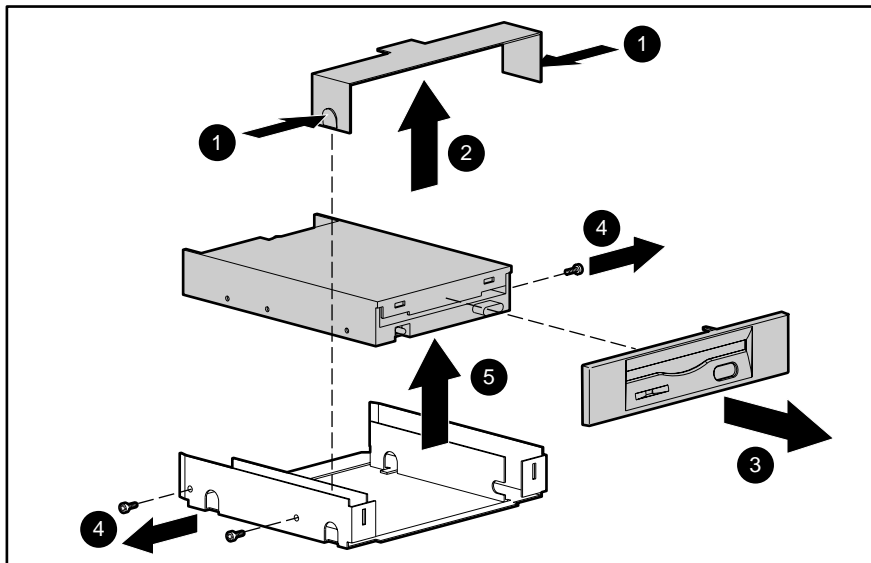


Figure 3-14. Removing a 3.5-inch drive from the 5.25-inch drive adapter

To replace the drive, reverse the above procedure.




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

5.25-Inch Drive

To remove a 5.25-inch drive:



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

1. Perform the service preparations shown on page 3-2.
2. Remove the access panel.
3. Remove the front bezel.
4. Disconnect the power , data , and audio  cables from the back of the drive.

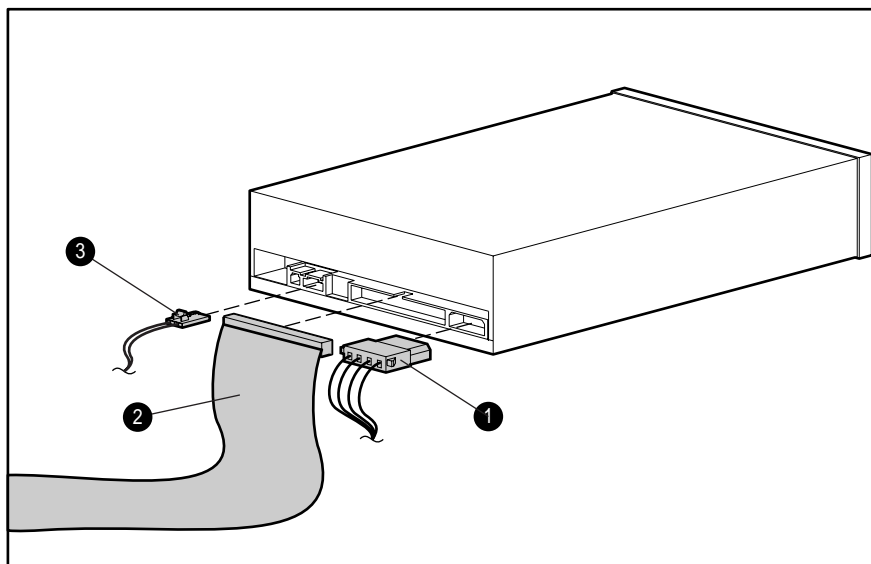


Figure 3-15. Disconnecting the cables

5. Press the drivelock to unlock the drive.

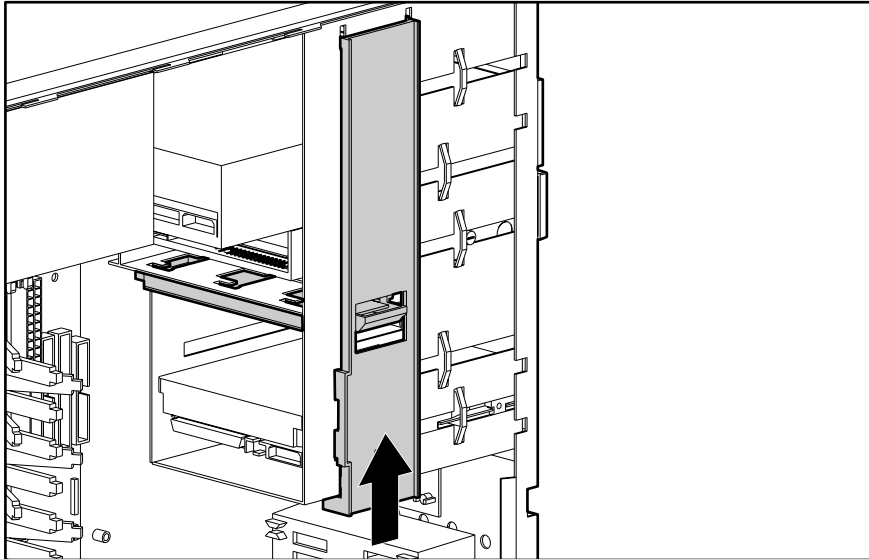


Figure 3-16. Releasing the drive with the drivelock

6. While pressing the drivelock, pull the drive out of the drive bay.

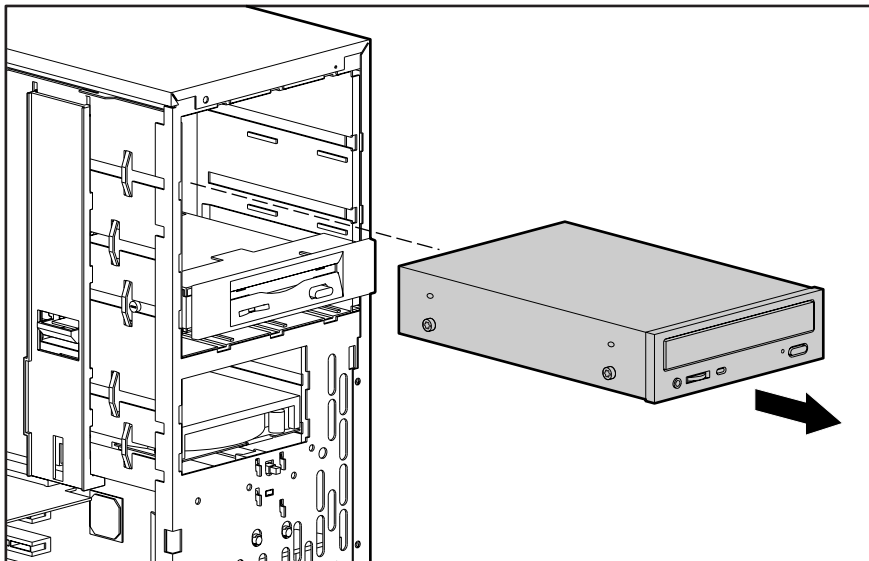


Figure 3-17. Removing a 5.25-inch drive

To replace the drive, install two guide screws on each side of the replacement drive (in the bottom holes), be sure the guide screws line up with the guide slots, and slide the drive into the drive bay until it snaps into place.

Installing Optional SCSI Devices

Select models of the Compaq Professional Workstation AP200 have a preinstalled internal SCSI hard drive. You can install additional SCSI devices using the external SCSI connector located on the rear panel of the workstation.

Important Guidelines for Installing Optional SCSI Devices

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

- To preserve data integrity, do not install more than 7 SCSI devices per SCSI controller.
- The integrated wide-ultra SCSI controller requires that a unique SCSI ID (0-7) be set for each SCSI device installed. The controller identifies a SCSI device by its SCSI ID number rather than its location. Moving a SCSI device from one position to another on the SCSI chain does not affect the communication between the controller and the SCSI device. The reserved and available SCSI ID numbers for SCSI devices are as follows:
 - SCSI ID 0 is reserved for the primary hard drive.
 - SCSI ID 7 is reserved for the controller.
 - 1 through 6 are available.
- Every SCSI chain or circuit must be terminated (closed) at both ends. Termination can be accomplished by using the terminating feature on the device or by using a terminated cable.
- SCSI devices may not have terminating jumpers on the device. Termination on these devices must be achieved with a terminated cable.
- Turn on an external SCSI device before turning on power to the workstation. This enables the system board controller to recognize the external SCSI device. When an external SCSI device is connected to the external SCSI controller on the rear panel of the workstation, that device becomes the end of the SCSI chain and must be terminated.



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

Using the SCSI Cable

The following SCSI cable is included with your workstation (available on select models):

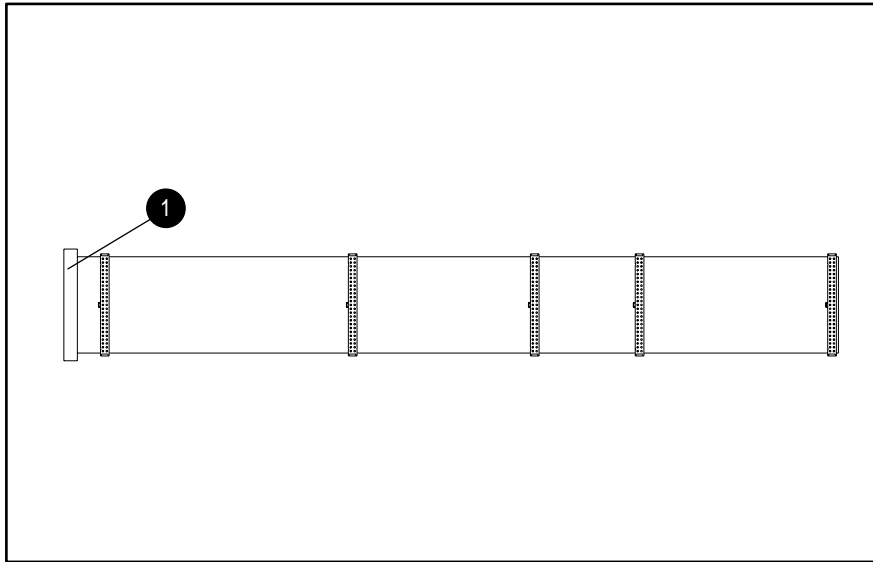




Figure 3-18. SCSI cable with terminator 

NOTE: The SCSI cable included with your workstation may look slightly different than the one pictured.




The SCSI cable illustrated above supports up to 4 SCSI devices and comes with a terminator  on the end.

NOTE: If you are installing a narrow SCSI device, you will need to attach a 68- to 50-pin SCSI adapter to the narrow SCSI device.

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

Drivelock

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

NOTE: In the illustration below, drivelock  is the only drivelock you need to press when removing and replacing mass storage devices. Drivelock  is automatically engaged when drivelock  is pressed.

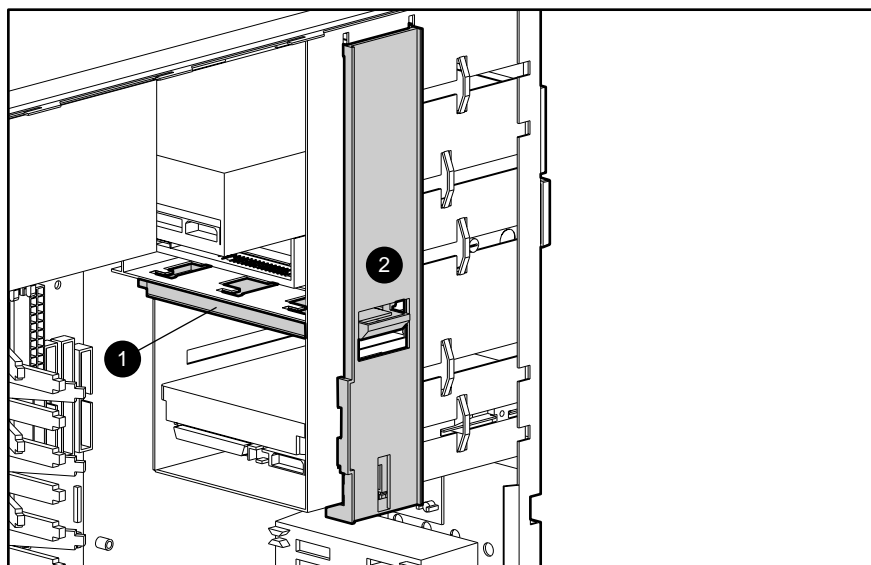




Figure 3-19. Drivelock positions

To remove the drivelocks:




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

1. Perform the service preparations shown on page 3-2.
2. Remove the access panel.
3. Remove the front bezel.
4. Remove all drives from the computer.
5. Lift up on the side of each drivelock nearest you and push them toward the front of the drive cage , then snap the tabs out of the holes in the drive cage .



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

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

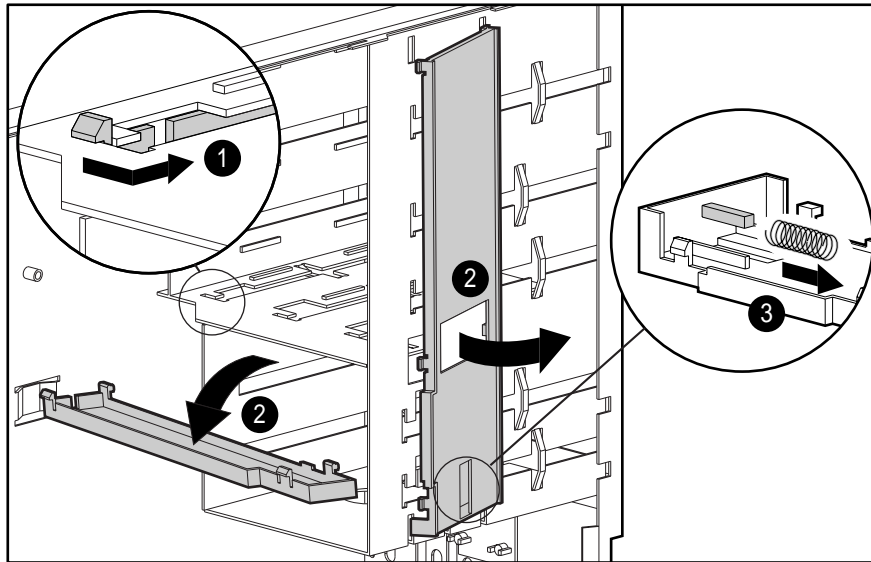


Figure 3-20. Removing the drivelock

To reinstall the drivelock:

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

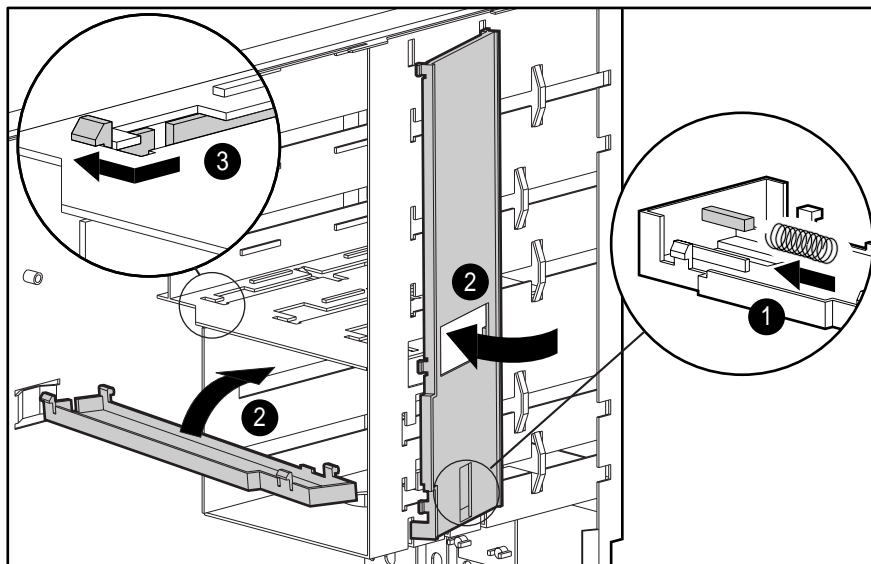


Figure 3-21. Reinstalling the drivelock

Expansion Boards

The following illustration identifies the physical location of expansion slots. See the corresponding table for component names.

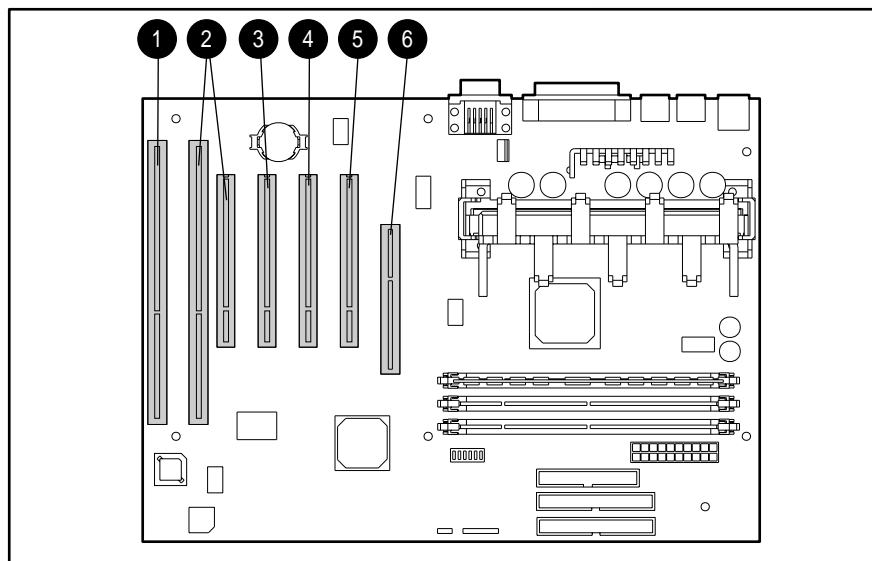








Figure 3-22. Overview of expansion slots

Table 3-2
Expansion Slots

Reference	
	ISA slot (audio card installed)
	Combination slot for either an ISA or a PCI expansion board
	PCI slot (open)
	PCI slot (NIC controller installed)
	PCI slot (SCSI controller on select models)
	Accelerated Graphics Port (AGP) slot

Removing an Expansion Board

To remove an expansion board:



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

1. Perform the service preparations shown on page 3-2.
2. Remove the access panel.
3. Disconnect any cables from the expansion board.
4. Remove the expansion board retaining screw.
5. Hold the expansion board at each end and carefully pull up until the connectors pull free from the slot.

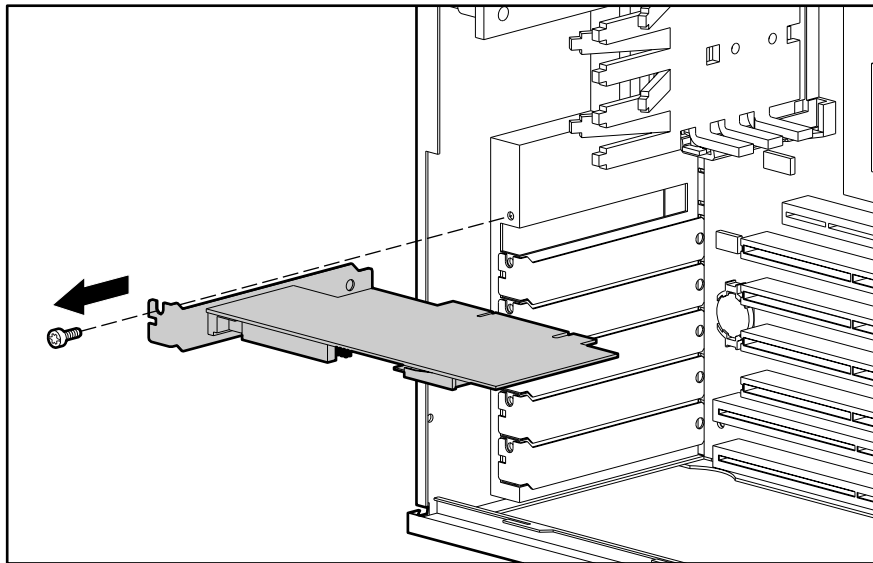


Figure 3-23. Removing an expansion board



To install an expansion board, remove the expansion slot cover and reverse the above procedure.

Graphics Controller Memory

To remove a memory module on the graphics controller:



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

1. Perform the service preparations shown on page 3-2.
2. Remove the access panel.
3. Disconnect any cables from the graphics controller.
4. Remove the retaining screw that secures the graphics controller.
5. Hold the graphics controller at each end and carefully pull up until the connectors pull free from the slot.
6. Place the graphics controller on a flat, grounded surface, then pull up  and out  on the memory module.

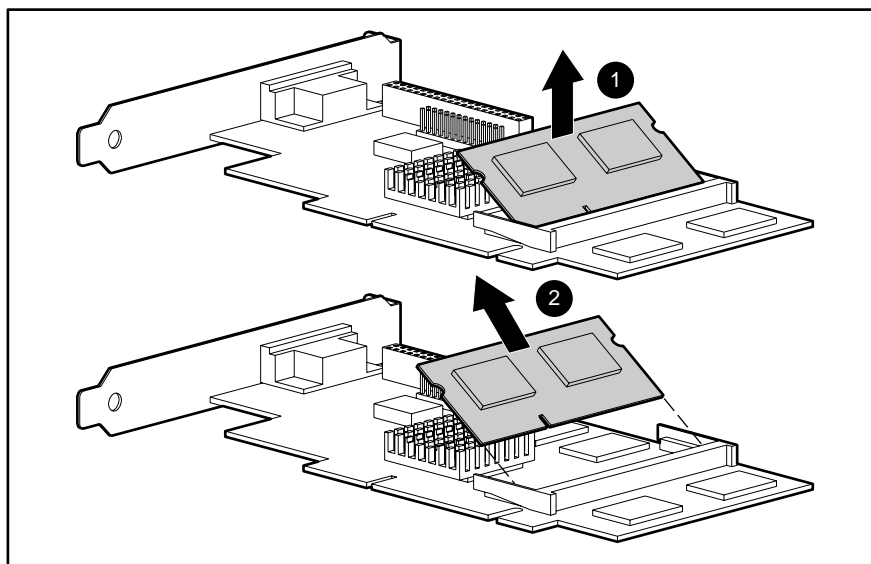


Figure 3-24. Removing a graphics controller memory module



To reinsert the memory module, be sure the memory module notch lines up with the tab in the socket at a 30 degree angle, then lower the module until it latches into position.

Card Guide

To remove the card guide:



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

1. Perform the service preparations shown on page 3-2.
2. Remove the access panel.
3. Remove any full-length expansion boards.
4. Push down on the two tabs on the top of the card guide .
5. While holding the tabs down, remove the guide from the chassis .

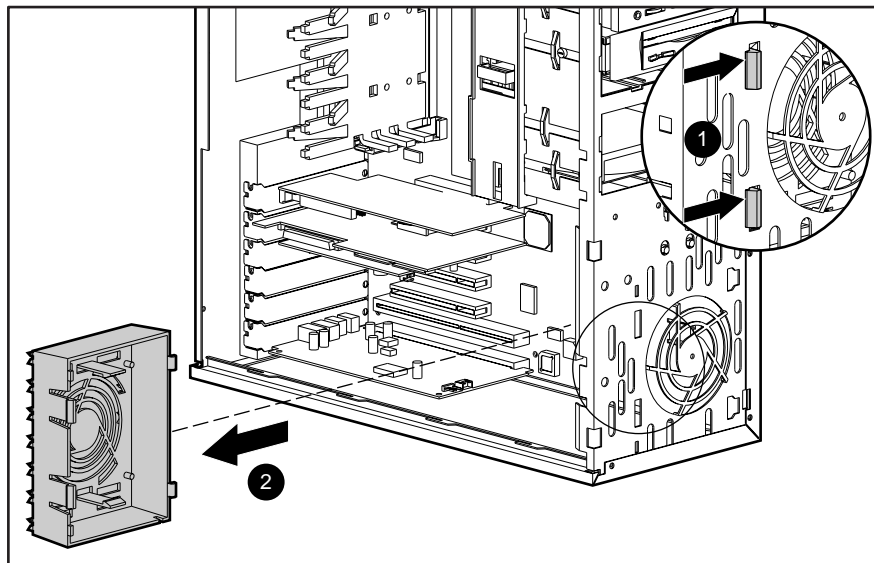


Figure 3-25. Removing the card guide

To replace the card guide, reverse the above procedure.

Memory Modules

Important Guidelines for DIMM Installation

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

- Use only 16-, 32-, 64-, or 128-MB unregistered 100-MHz Error Checking and Correcting (ECC) synchronous dynamic random access memory (SDRAM) dual inline memory modules (DIMMs).
- Self-refresh DIMMs are required on models with three DIMM sockets.
- DIMMs must be industry-standard 168-pin 100-MHz or faster unregistered SDRAM DIMMs. The SDRAM DIMMs must support CAS Latency 2 or 3 (CL=2 or CL=3). They must also contain the mandatory Joint Electronic Device Engineering Council (JEDEC) Serial Presence Detect (SPD) information.
- DIMMs constructed with x4 SDRAM are not supported; the system will not start using unsupported DIMMs.
- **DO NOT MIX REGISTERED AND UNREGISTERED, OR ECC AND NON-ECC SDRAM DIMMS. OTHERWISE, THE SYSTEM WILL NOT FUNCTION PROPERLY.**
- 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 socket. Push the DIMM down into the DIMM socket, ensuring that it is fully inserted and properly seated.
- When upgrading, do not exceed 384 MB total. The system will not boot if total memory exceeds 384 MB.



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



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

DIMM Installation

IMPORTANT: Before installing additional DIMMs, read the previous section, "Important Guidelines for DIMM Installation."

The Compaq Professional Workstation AP200 supports unregistered 100-MHz ECC SDRAM DIMMs. Additional DIMMs (16-, 32-, 64-, or 128-MB) are available to upgrade the memory. The workstation has three DIMM sockets located on the system board that support up to a maximum of 384 MB.

The following illustration identifies the physical location of all DIMM sockets. Note that DIMMs do not need to be installed in pairs, and can be installed in any of the available DIMM sockets.

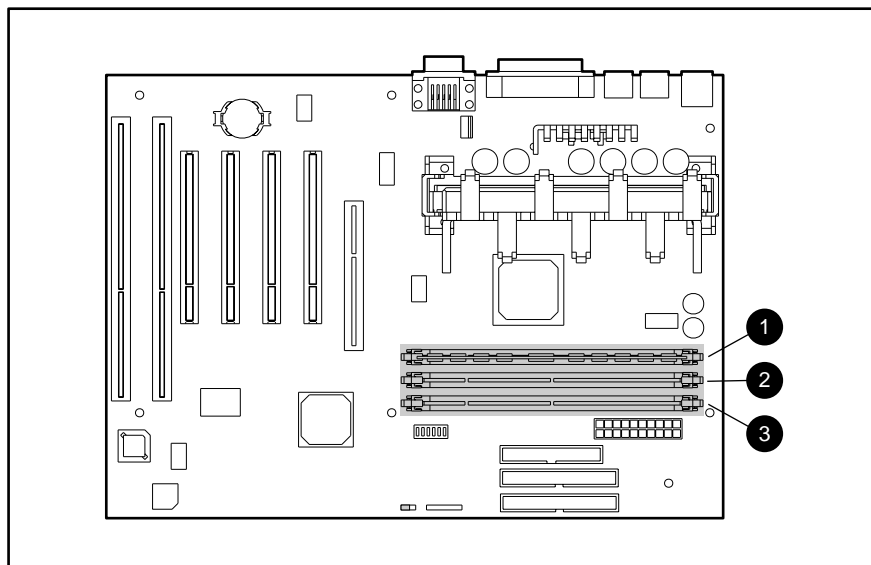




Figure 3-26. Overview of DIMM slots 

To remove a memory module:



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

1. Perform the service preparations shown on page 3-2.
2. Remove the access panel.

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

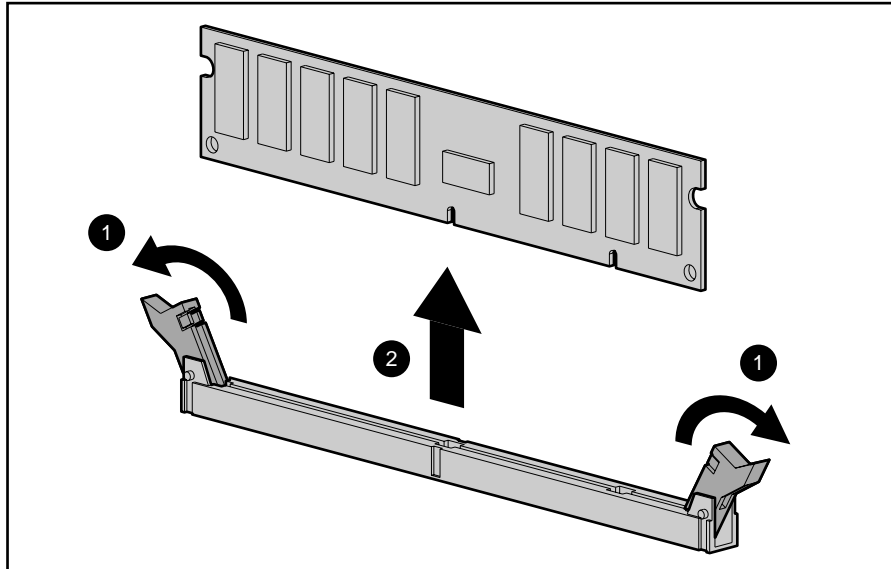


Figure 3-27. Removing a memory module

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

Processor

To remove the processor:





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



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

1. Perform the service preparations shown on page 3-2.
2. Remove the access panel.

NOTE: It may be necessary to remove the AGP graphics controller before removing the processor.

3. Press in on the retaining clips on each side of the processor , then lift the processor out of the socket .

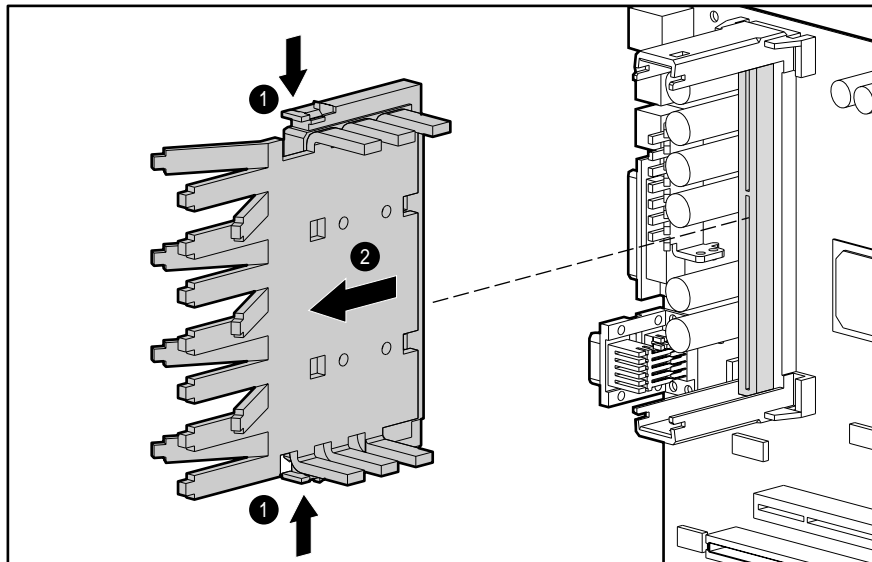


Figure 3-28. Removing the processor from the system board

To install a new processor, reverse the above procedure.

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

Processor Guide Rails



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

To remove the processor guide rails:



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

1. Perform the service preparations shown on page 3-2.
2. Remove the access panel.
3. Remove the processor.
4. Use a small flat-bladed screwdriver to lift and remove the four push tabs that attach the processor guide rails to the system board, then remove the rails.

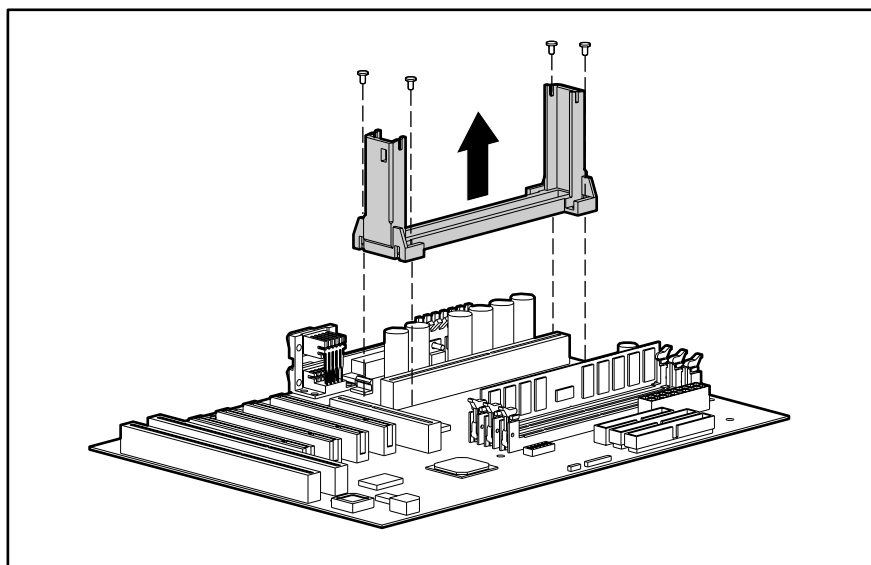


Figure 3-29. Removing the processor guide rails from the system board



To replace the processor guide rails, seat the guide rails flush with the system board, then press in the push tabs to attach the rails to the system board.

Speaker

To remove the speaker:



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

1. Perform the service preparations shown on page 3-2.
2. Remove the access panel.
3. Disconnect the speaker cable from the audio board.
4. Remove the four screws that secure the speaker to the side of the drive cage , then remove the speaker .

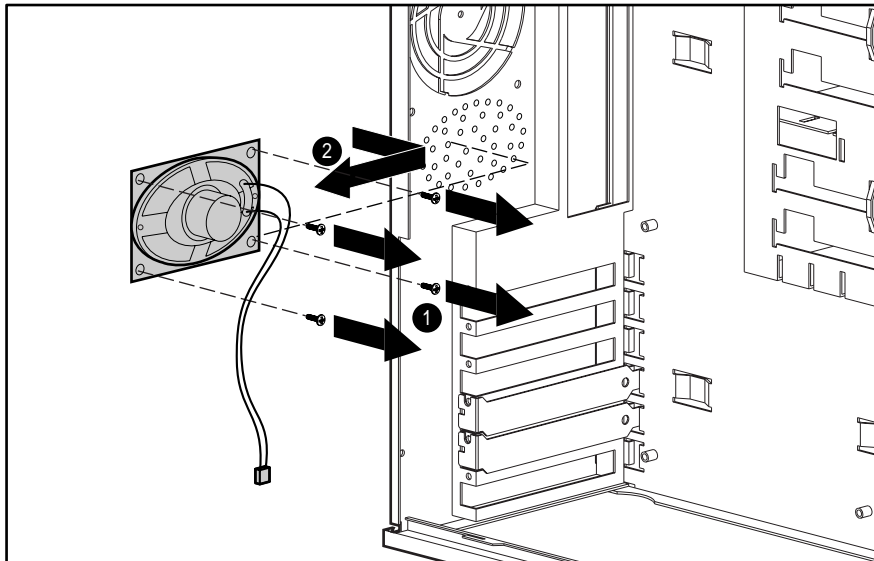


Figure 3-30. Removing the speaker

To reinstall the speaker, reverse the above procedure.


Power Supply

To remove the power supply:



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

NOTE: The system fan is integrated into the power supply.

1. Perform the service preparations shown on page 3-2.
2. Remove the access panel.
3. Disconnect all power cables from the mass storage devices and the system board.
4. Remove the three external screws that secure the power supply to the back of the chassis .

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

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

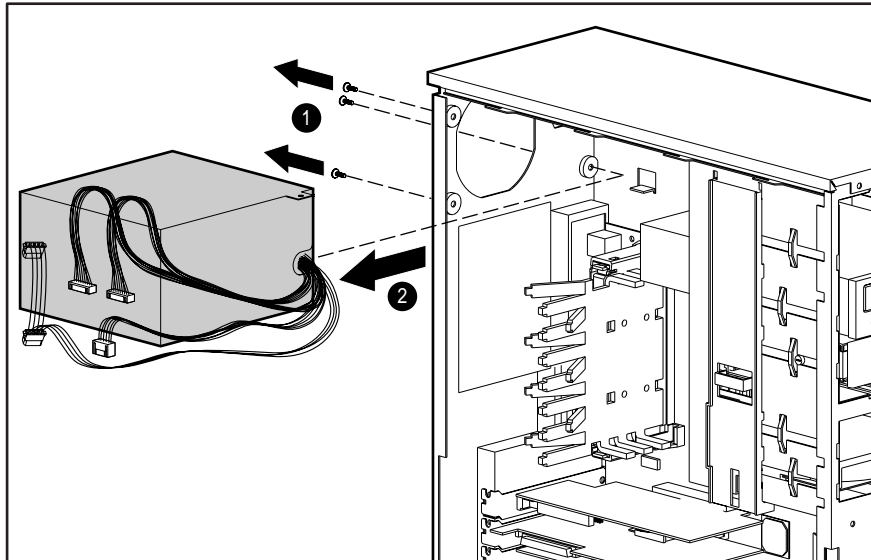


Figure 3-31. Removing the power supply

To replace the power supply, reverse the above procedure.



WARNING: This equipment is designed for connection to a grounded (earthed) outlet. The grounding type plug is an important safety feature.

To reduce the risk of electrical shock, damage to the equipment, or loss of the data, do not disable this feature.



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.

Power Switch





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

To remove the power switch and switch holder:



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

1. Perform the service preparations shown on page 3-2.
2. Remove the access panel.
3. Disconnect the power/LED cable from the system board.
4. Push the release tab toward the drive bays , then remove the power switch from the chassis .

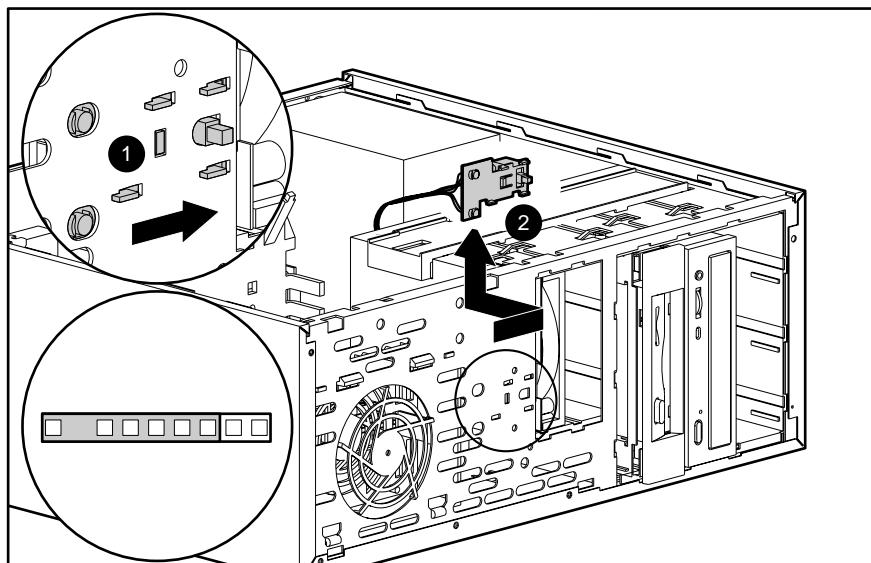


Figure 3-32. Disconnecting and removing the power switch and switch holder

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

System Board



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

To remove and replace the system board:



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

1. Perform the service preparations shown on page 3-2.
2. Remove the access panel.
3. Remove all expansion boards.
4. Disconnect all cables that are attached to the system board.
5. Remove the processor, processor guide rails, and the DIMMs.
6. Remove the retaining screws that secure the system board to the chassis.
7. Slide the board 1/2 inch toward the front of the chassis to clear the I/O panel connectors, then lift it up and out of the chassis.

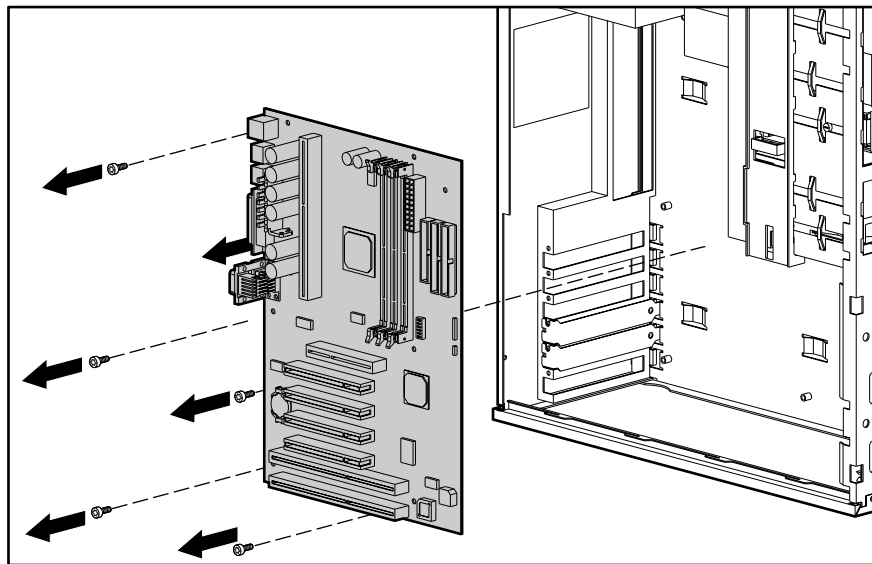


Figure 3-33. Removing the system board

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

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

I/O Panel

To remove the I/O panel:



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

1. Perform the service preparations shown on page 3-2.
2. Remove the access panel.
3. Remove all expansion boards.
4. Disconnect all cables that are attached to the system board.
5. Remove the system board.
6. From the back of the chassis, push in and lift the I/O panel out.

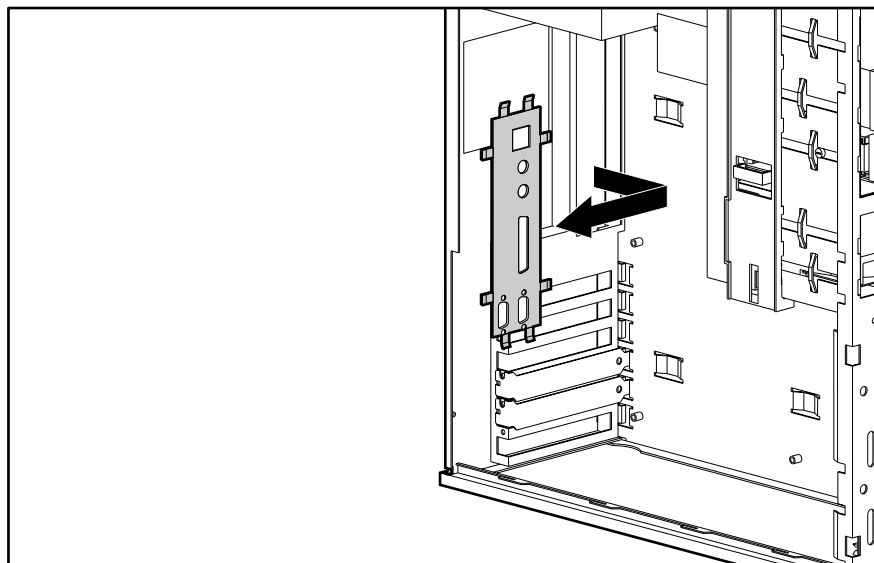


Figure 3-34. Removing the I/O panel

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

Lithium Battery

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



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

NOTE: It is important to make a diagnostics diskette before you install a new battery. Refer to "Creating a Diagnostics Diskette" in Chapter 4 for more information.

To replace the lithium battery:



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



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

1. Perform the service preparations shown on page 3-2.
2. Remove the access panel.
3. Locate the battery on the system board.

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

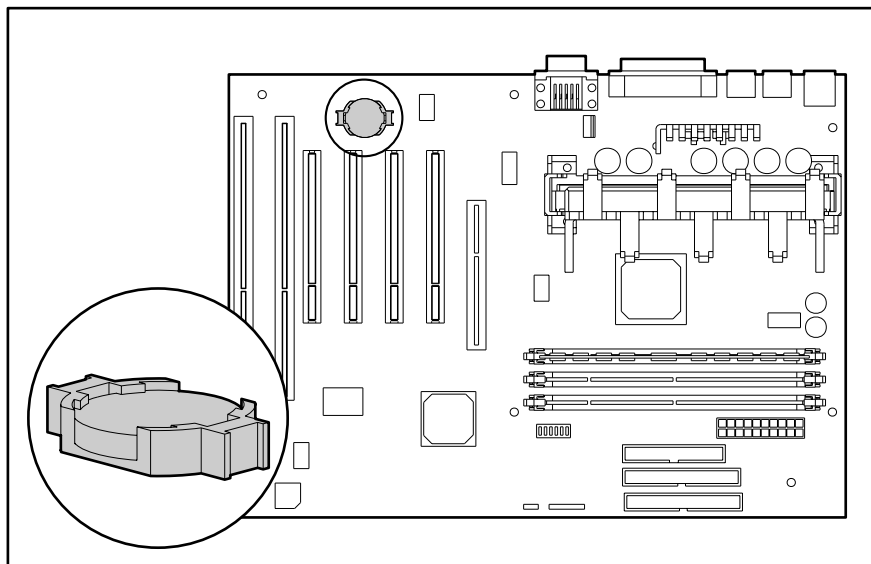


Figure 3-35. Locating the battery on the system board

4. Lift the battery out of the holder.

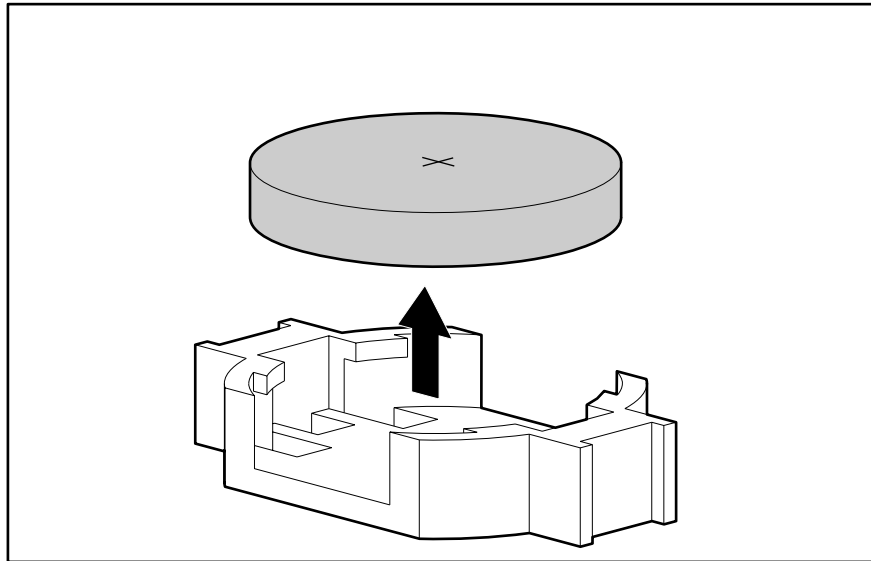


Figure 3-36. Removing the battery

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

IMPORTANT: Positive polarity should be positioned up.

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

Converting a Minitower to a Desktop Configuration

To convert a minitower to a desktop configuration:



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

1. Perform the service preparations shown on page 3-2.
2. Remove the access panel.
3. Remove the front bezel.
4. Disconnect all power and data cables from the drives in the 5.25-inch drive bays.
5. Remove the drives from the 5.25-inch drive bays by pressing drivelock.

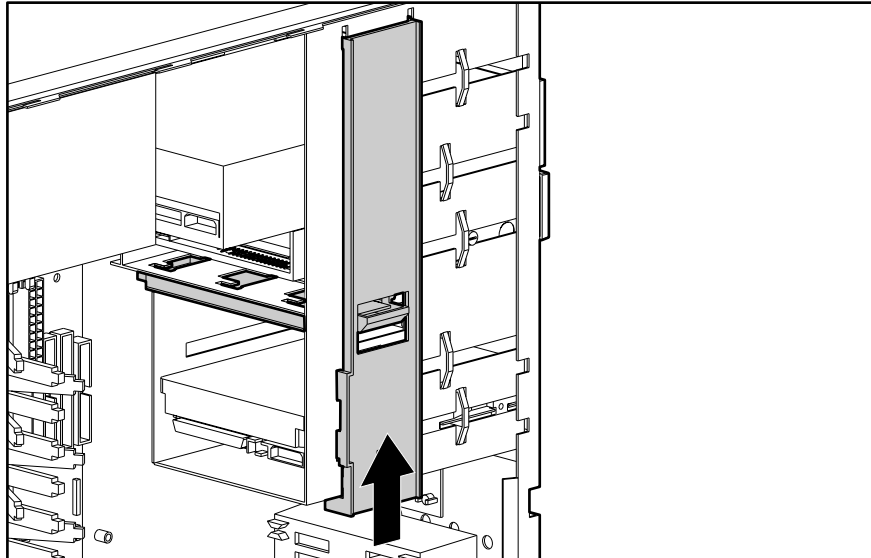


Figure 3-37. Releasing the drives with the drivelock

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

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

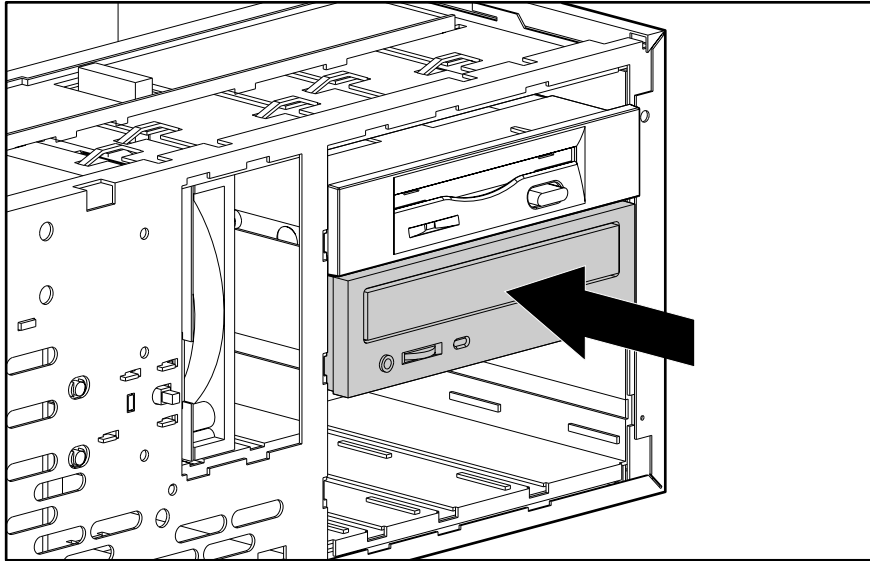


Figure 3-38. Installing a drive in the desktop configuration

7. Reconnect the cables to the drives.

8. Remove the subpanel and rotate the bezel blanks 90 degrees.



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

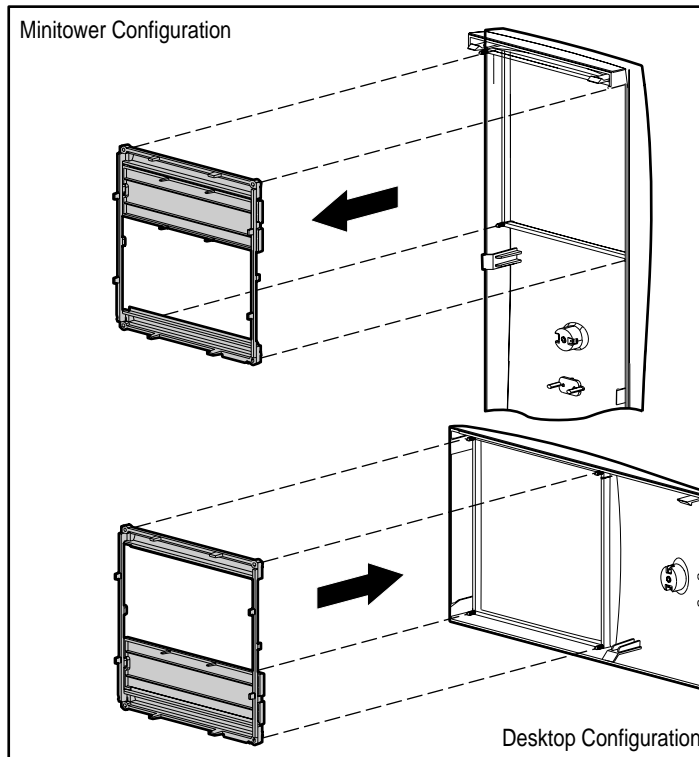


Figure 3-39. Rotating the bezel blanks when converting a minitower to a desktop

9. Replace the subpanel, front bezel, and the access panel.
10. Reassemble the computer.

Converting a Desktop to a Minitower Configuration

To convert a desktop to a minitower configuration:



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

1. Perform the service preparations shown on page 3-2.
2. Remove the access panel.
3. Remove the front bezel.
4. Disconnect all power and data cables from the drives in the 5.25-inch drive bays.
5. Remove the drives from the 5.25-inch drive bays by pressing drivelock.

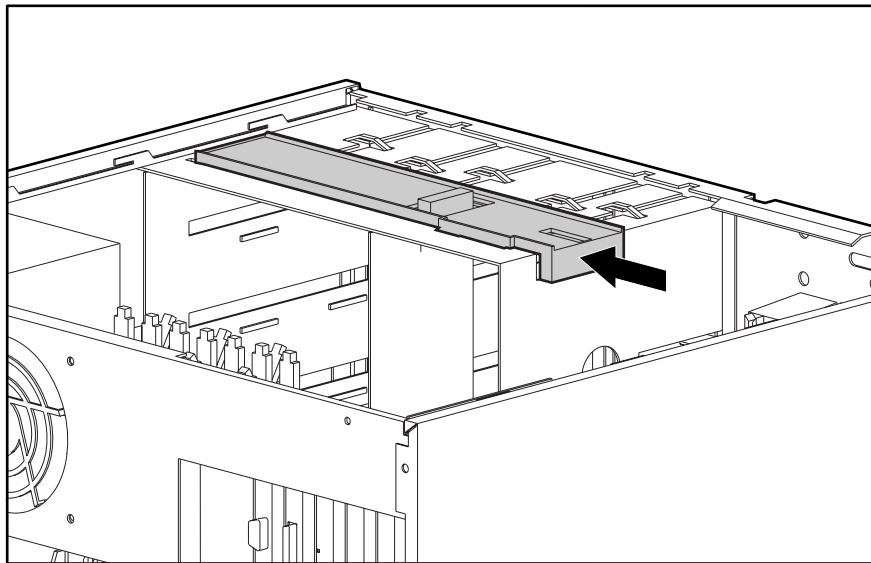


Figure 3-40. Releasing the drives with the drivelock

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

IMPORTANT: The diskette drive should always be placed in the bay 3, the bay nearest the internal 3.5-inch drives, for proper placement within the chassis.

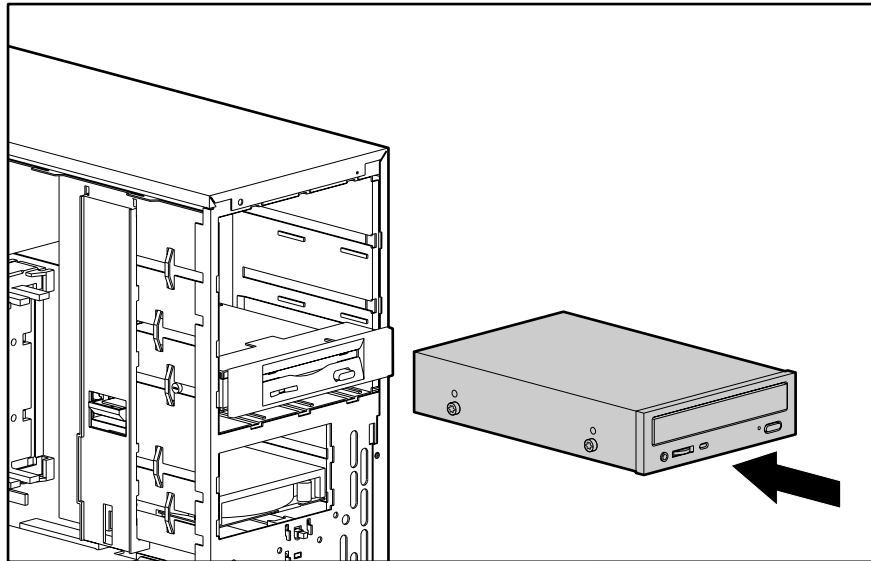


Figure 3-41. Installing a drive in the minitower configuration

7. Reconnect the cables to the drives.

- Remove the subpanel and rotate the bezel blanks 90 degrees.



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

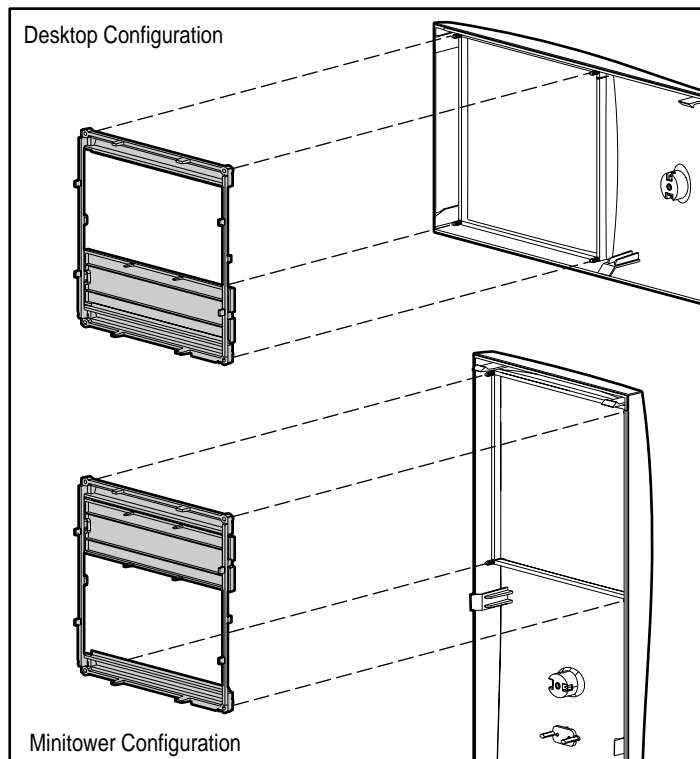


Figure 3-42. Rotating the bezel blanks when converting a desktop to a minitower

- Replace the subpanel, front bezel, and the access panel.
- Reassemble the computer.

Chapter 4

Diagnostic Tools

This chapter provides the following information to assist you when servicing the Compaq Professional Workstation AP200:

- Power-On Self-Test (POST)
- Troubleshooting Minor Problems
- Computer Setup and Diagnostics Utilities
- Error Codes
- 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
- 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	Replace the system board.
101-Option ROM Checksum Error	1L, 1S	Option ROM checksum	1. Inspect the ROM placement. 2. Verify the correct ROM. 3. Replace the ROM.
102-System Board Failure	None	DMA, timers, etc.	Replace the system board.
162-System Options Error	2S	No diskette drive or mismatch in drive type	Run Computer Setup or Windows NT utilities.
162-System Options Not Set	2S	Configuration incorrect	Run Computer Setup or Windows NT utilities.
		RTC (real-time clock) battery may need to be replaced. Battery life is approximately 5 years.	First reset the date and time under Control Panel. If the problem persists, replace the RTC battery. See Chapter 3, "Removal and Replacement Procedures" for instructions.
		CMOS jumper may not be properly installed.	Clear the configuration memory.
163-Time & Date Not Set	2S	Invalid time or date in configuration memory	Set the date and time under Control Panel.
		RTC (real-time clock) battery may need to be replaced. Battery life is approximately 5 years.	If the problem persists, replace the RTC battery. See Chapter 3, "Removal and Replacement Procedures" for instructions.
		CMOS jumper may not be properly installed.	Clear the configuration memory.
164-Memory Size Error	2S	Memory configuration incorrect	Be sure memory module(s) are installed properly.
201-Memory Error	None	RAM failure	1. Be sure memory module(s) are installed properly 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. Be sure memory module(s) are installed properly. 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 1 Gbyte of Memory Supported. System Halted.	None	Too much memory installed	Reduce memory installed by removing DIMMs.
212-Failed Processor	1L	Processor has failed to initialize	Replace the processor and/or the Processor Power Module.
213-Incompatible DIMM Module	2S	A DIMM module in DIMM socket identified in the error message is missing critical SPD information or is incompatible with the chipset.	Replace the DIMM with a module conforming to the SPD standard.
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. Reconnect the keyboard with computer turned on. 2. Replace the keyboard. 3. 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.
602-Diskette Boot Record Error	None	Diskette in drive A not bootable.	Replace the diskette.
605-Diskette Drive Type Error	2S	Mismatch in drive type	Run Computer Setup or Windows NT utilities.
610-External Storage Drive Failure	None	External tape drive not connected.	Reinstall tape drive or press F1 and allow system to reconfigure without the drive.
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-SMART Hard Drive Detects Imminent Failure	None	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	1L, 3S	System ROM is bad; System is running in Failsafe Boot Block mode.	Reflash the ROM using a RomPaq diskette.
(RESUME = F1 KEY)	None	As indicated to continue	Press F1.

* L = Long, S = Short

Troubleshooting Minor Problems

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

- Verify that the workstation is connected to a working grounded AC outlet.
- Is the workstation turned on and the power light illuminated?
- Check all cable connections. Be sure the connectors are seated properly.
- Is the monitor turned on and the power light illuminated?
- If the monitor is dim, turn up the brightness and contrast controls of the monitor.
- 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.	Be sure the workstation is connected to a grounded AC outlet. Be sure cables from the workstation's power supply are plugged in properly. A PCI or ISA card that has been installed is not seated properly or is defective. Be 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.	<ol style="list-style-type: none"> 1. Diskette might be damaged. In Windows NT Workstation 4.0, run Scan Disk. Click Start, then select Programs, DiskTools, ScanDisk. 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.	<ol style="list-style-type: none"> 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.	<ol style="list-style-type: none"> 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. 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. In Windows NT Workstation 4.0, run Scan Disk. Click Start, then select Programs, DiskTools, ScanDisk.
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.	<ol style="list-style-type: none"> 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 grounded AC 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 or AGP slot.
Graphics colors are wrong.	<ol style="list-style-type: none"> 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.	<ol style="list-style-type: none"> 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.	<ol style="list-style-type: none"> 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.	<ol style="list-style-type: none"> 1. Printer is not turned on and online. Turn the printer on and be 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 grounded AC outlet.
Prints garbled information.	<ol style="list-style-type: none"> 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 Workstation 4.0, 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.	<ol style="list-style-type: none"> 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. Restart 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.	<ol style="list-style-type: none"> 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.	<ol style="list-style-type: none"> 1. The CD-ROM boot is not enabled through the Computer Setup utility. Run the Computer Setup utility and set the drive priorities. 2. Be sure that drive cabling and jumpers are set correctly.
Cannot eject compact disc.	CD is not properly seated in the drive. Turn off the workstation, insert a thin metal rod into the emergency eject hole, and push firmly (a straightened paper clip can be used). Slowly pull the tray out from the drive until the tray is fully extended, then remove the CD.
CD-ROM device is not detected; driver is not loaded.	CD-ROM drive is not connected properly. Open the workstation. 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.	<ol style="list-style-type: none"> 1. Run Performance Monitor. Click Start, Programs, 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 sockets 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.	Be 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.	<ol style="list-style-type: none"> 1. Possible driver problem 2. Possible failed network controller 	<ol style="list-style-type: none"> 1. Load latest version of Compaq SSD for Windows NT. 2. Replace system board.
System Setup utility reports unprogrammed EPROM.	<ol style="list-style-type: none"> 1. The network controller is defective. 2. Network drivers are not loaded. 	<ol style="list-style-type: none"> 1. Replace the controller or the system board. 2. Boot the workstation without the network drivers using a system boot diskette, and reconfigure the network controller.
Diagnostics reports a failure.	<ol style="list-style-type: none"> 1. The cable is not securely connected. 2. The cable is attached to the incorrect connector. 3. There is a problem with the cable or a device at the other end of the cable. 4. The network controller is defective. 5. Network controller interrupt or memory overlaps the interrupt or memory of an expansion board. 	<ol style="list-style-type: none"> 1. Be sure the cable is securely attached to the network connector and that the other end of the cable is securely attached to the correct device. 2. Be sure that the cable is attached to the correct connector. 3. Be sure that the cable and device at the other end are operating correctly. 4. Replace the controller or the system board. 5. Run Computer Setup and modify the network controller memory value.
Diagnostics passes, but the system does not communicate with the network.	<ol style="list-style-type: none"> 1. Network drivers are not loaded, or driver parameters do not match current configuration. 2. The network controller is not configured for the workstation. 3. The network controller interrupt or memory overlaps the interrupt or memory of an expansion board. 	<ol style="list-style-type: none"> 1. Be sure the network drivers are loaded and that the driver parameters match the configuration of the network controller. 2. Select the Network icon in the Control Panel. Reconfigure the driver if necessary, using the Network Setup found in the Control Center. 3. Run Computer Setup and modify the network controller memory value.

Continued

Computer Setup and Diagnostics Utilities

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

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

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

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

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

Accessing the Computer Setup Menu

NOTE: Computer Setup is built into the reprogrammable system ROM on the Compaq Professional Workstation AP200, and is shipped in English only.

To access the Computer Setup menu:

1. Turn on or restart the workstation.

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

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

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

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

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

Diagnostics Utilities

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

Another Compaq diagnostics tool is Diagnostics for Windows NT, which is installed in the Compaq Information Center folder and runs under Windows NT Workstation. For information on how to use Diagnostics for Windows NT, refer to “Compaq Diagnostics for Windows NT” later in this chapter.

Creating a Diagnostics Diskette

To create a diagnostic diskette:

1. With Windows NT Workstation 4.0 installed and running, insert a blank, formatted diskette into the diskette drive.
2. Insert the SmartStart for Workstations CD into the CD-ROM drive.
3. From the SmartStart for Workstations Home Page, click *Manual System Configuration*.
4. Click *Install Optional Compaq Software*.
5. Click *Create a Diagnostics Diskette*.
6. Follow the instructions on the screen.

Running Computer Checkup (TEST)

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

TEST, the primary diagnostics utility, confirms whether the various workstation devices are recognized by the system and are functioning properly. Use TEST in the following instances:

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

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

- CPU (main system)
- 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:

NOTE: You must create a diagnostics diskette before you can run TEST.

1. Restart the workstation from the diagnostics diskette you have created.
2. Press **Enter** to bypass the welcome screen.
3. Select *Computer Checkup (TEST)*.
4. Select the option to view the device list. A list of installed hardware devices is displayed.
5. Verify that TEST correctly detected the devices installed. If the list is correct, select **OK**. The test option menu is displayed again. If the list is incorrect, be sure that any new devices are installed properly.

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

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



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

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

7. Follow the instructions on the screen as the diagnostic tests are run on the devices. When the testing is complete, the TEST option menu is displayed again.
 8. To exit TEST, press **ESC** until you see the Exit option, then press **Enter**.
-

Running View System Information (INSPECT)

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

The View System Information (INSPECT) utility provides information about the system 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
- Keyboard
- Graphics
- Windows files
- Network status
- Miscellaneous

To run INSPECT:

NOTE: You must create a diagnostics diskette before you can run TEST.

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

Diagnostic Error Codes

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

The following tables list possible error codes, descriptions of each error condition, and actions required to resolve the error condition. 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 be sure the power is off before disconnecting or reconnecting the mouse, keyboard, or any other peripheral devices. Disconnecting or connecting any peripheral devices while the unit power is on can damage the system board.

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

If a key icon () appears on the screen when POST completes, the Power-On Password is set. If this occurs, you must enter the password to continue. To delete the password, type the current password, then press Enter. If you do not have access to the password, you must disable it through the SW1 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 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.
402-xx	Printer port test failed.	2. Check power to the printer.
403-xx	Printer pattern test failed.	3. Install the loop-back connector and retest. 4. Replace system board and retest.

Diskette Drive

**Table 4-16
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:
601-xx	Diskette format failed.	1. Replace the diskette media and retest.
602-xx	Diskette read test failed.	2. Check and/or replace the diskette power and signal cables and retest.
603-xx	Diskette write, read, compare test failed.	3. Replace the diskette drive and retest.
604-xx	Diskette random seek test failed.	4. Replace the system board and retest.
605-xx	Diskette ID media test failed.	
606-xx	Diskette speed test failed.	
609-xx	Diskette reset controller failed.	
610-xx	Diskette change line test failed.	
697-xx	Diskette type error.	
698-xx	Diskette drive speed not within limits.	
699-xx	Diskette drive/media error.	1. Replace media. 2. Run Computer Setup and Computer Checkup.

Serial Port

Table 4-17
Serial Test Error Codes

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

Modem

Table 4-18
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	Recommended Action
8601-xx	Mouse test failed.	The following steps apply for 8601-xx error codes:
8602-xx	Interface test failed.	<ol style="list-style-type: none"> 1. Replace with a working pointing device and retest. 2. Replace the system board and retest.

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: 1. Replace the CD media and retest. 2. Check the jumper settings on the CD-ROM drive. 3. Verify that the speaker is connected. 4. Check and/or replace the power and signal cables and retest. 5. Replace the CD-ROM drive and retest.
3305-xx	CD-ROM drive seek test failed.	
6600-xx	ID test failed.	
6600-xx	ID test failed.	
6605-xx	Read test failed.	
6608-xx	Controller test failed.	
6623-xx	Random read test failed.	

Tape Drive

Table 4-21
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: 1. Replace the tape cartridge and retest. 2. Check the switch settings and terminations on the tape drive. 3. Check and/or replace the signal cable and retest. 4. Replace the tape drive and retest. 5. Replace the system board and retest.
1901-xx	Tape drive servo test failed.	
1902-xx	Tape drive format or format verification test failed.	
1903-xx	Tape drive sensor test failed.	
1904-xx	Tape drive BOT/EOT test failed.	
1905-xx	Tape drive read test failed.	
1906-xx	Tape drive write/read/compare failed.	

Video

Table 4-22
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: 1. Replace the monitor and retest. 2. Replace the graphics controller.
502-xx	Video memory test failed.	
503-xx	Video attribute test failed.	
504-xx	Video character set test failed.	
505-xx	Video 80 × 25 mode 9 × 14 character cell test failed.	
506-xx	Video 80 × 25 mode 8 × 8 character cell test failed.	
507-xx	Video 40 × 25 mode test failed.	
508-xx	Video 320 × 200 mode color set 0 test failed.	
509-xx	Video 320 × 200 mode color set 1 test failed.	
510-xx	Video 640 × 200 mode test failed.	
511-xx	Video screen memory page test failed.	
512-xx	Video gray scale test failed.	
514-xx	Video white screen test failed.	
516-xx	Video noise pattern test failed.	
2402-xx	Video memory test failed.	The following steps apply to error codes 2402-xx through 2456-xx: 1. Run the Diagnostics utilities. 2. Replace the monitor and retest. 3. Replace the graphics controller and retest.
2403-xx	Video attribute test failed.	
2404-xx	Video character set test failed.	
2405-xx	Video 80 × 25 mode 9 × 14 character cell test failed.	
2406-xx	Video 80 × 25 mode 8 × 8 character cell test failed.	
2408-xx	Video 320 × 200 mode color set 0 test failed.	
2409-xx	Video 320 × 200 mode color set 1 test failed.	
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 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
- 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
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.	<ol style="list-style-type: none"> 1. Ensure fan(s) connected. 2. Replace nonfunctional fan(s).
XXXX-91	Over Temperature.	<ol style="list-style-type: none"> 1. Ensure proper air flow. 2. Perform required maintenance and cleaning.
XXXX-99	Autoloader reported tapes not loaded properly.	<ol style="list-style-type: none"> 1. Install tape(s) in autoloader tape drive according to test instructions. 2. Change autoloader magazine.

Upgrading the ROM

If the Compaq Professional Workstation AP200 does not have a Setup Password enabled, the ROM is not write-protected and unauthorized updates can occur. If you need or want to upgrade your system ROM, you can:

- Order an upgraded ROMPaq diskette from Compaq.
- Order the *Compaq Support Software CD Kit*.
- Download the latest ROMPaq images from the Compaq website (<http://www.compaq.com>) in the Compaq Services and Technical Help area under Downloadables.

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

Local ROM Flash

To upgrade the ROM, follow these steps:

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



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

2. If prompted, enter the Setup Password.

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

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

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

Remote ROM Flash

The Compaq Professional Workstation AP200 offers Remote ROM upgrade capability. The following software is available for downloading from the Compaq website (<http://www.compaq.com>) in the Compaq Services and Technical Help area under Downloadables:

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

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

FailSafe Boot Block ROM

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

- If the system ROM is valid, the system starts normally.
- If the system ROM fails the validation check, the FailSafe Boot Block ROM provides enough support to start the system from a System ROM Recovery diskette, which will program the system ROM with a valid image. The Flash Recovery diskette is a SoftPaq downloadable from the Compaq website (<http://www.compaq.com>) in the Compaq Services and Technical Help area under Downloadables.

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

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

To recover the system after hearing the FailSafe Boot Block beeps, follow these steps:

1. Remove any diskettes from the diskette drive and turn off the power.
2. Insert the System ROM 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 following three keyboard lights will turn on.

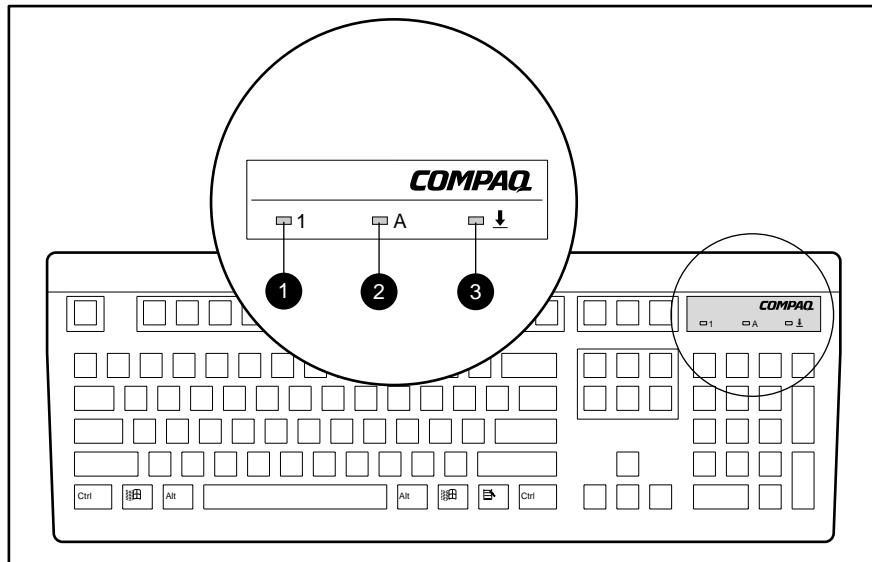


Figure 4-1. Keyboard lights

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

Table 4-28
Keyboard Lights

Num Lock ①	Caps Lock ②	Scroll Lock ③	Meaning and Required Action
OFF	ON	OFF	System requires Setup Password. Enter the Setup Password. The light remains turned on until you enter a valid Setup Password.
ON	OFF	OFF	System could not start from diskette because the Flash Recovery diskette is not present, is bad, or the drive is not ready. Insert a valid Flash Recovery diskette, turn the power off, then turn the power on.

Continued

Keyboard Lights *Continued*

Num Lock ❶	Caps Lock ❷	Scroll Lock ❸	Meaning and Required Action
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.

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 Compaq Insight Management Workstation Agents for Windows NT on the Compaq Professional Workstation AP200 and the installation of the Insight Manager console on a computer used as a management console. The Agents are provided on the SmartStart for Workstations CD. Before installing the Insight Agents on the Workstation, be sure to install SNMP service from the Microsoft Windows NT CD and the TCP/IP protocol. See installation instructions in the *Workstation Software Reference Addendum* in the Compaq Information Center folder or on the SmartStart for Workstations CD. For more detailed instructions about setting up SNMP networking, refer to *Start Here*, the Microsoft Windows NT Workstation installation guide provided with your workstation.

Compaq Insight Manager provides the following features to help you support the Compaq Professional Workstation AP200:

- 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>) in the Compaq Services and Technical Help area under Downloadables and also through subscription to the *Compaq Support Software CD Kit*.

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
- Compaq HAL for Microsoft NT 3.51
- ELSA display driver
- ESS 1869 AudioDrive driver

IMPORTANT: When servicing the workstation, be sure 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.

- **Remote capability** - allows the ability to install, remove, update, and configure components remotely via machine name (computer name). Supports distributed computing environment (DCE) perspectives.

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

- **New Silent Setup Command Line Interface** - provides the functionality of the Graphical User Interface (GUI) 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, Exit*.

Chapter 5

System Security

This chapter identifies and explains the following:

- Security Features
- Advanced Security Management

Security Features

The Compaq Professional Workstation AP200 is equipped with features that secure valuable components and system integrity. The following table identifies and explains the security features.

Table 5-1
Security Features

Feature	Purpose	How It Is Established
Setup Password	Allows configuration to be changed.	Computer Setup menu
Power-On Password	Prevents use of the workstation when the workstation is restarted unless the power-on password is entered.	Computer Setup menu
Windows NT for Workstations 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 (Must be used in combination with the Power-On Password.)	Disables keyboard and mouse interface, and can blank the screen without exiting application; enabled with a power-on password.	Computer Setup menu
Serial or Parallel Interface Control	Prevents transfer of data through the integrated serial or parallel interface.	Computer Setup menu
Removable Media Boot Control	Prevents startup from the diskette drive.	Computer Setup menu
Removable Media Write Control	Prevents writing to the removable media drives.	Computer Setup menu

Continued

Security Features *Continued*

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

IMPORTANT: Always 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:

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

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

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

Establishing a Power-On Password

To establish a Power-On Password:


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


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

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

Entering the Setup or Power-On Password

To enter the Setup or Power-On Password:


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

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

Changing a Setup or Power-On Password

To change the Setup or Power-On Password:

1. Turn on the workstation.
2. To change the Setup Password, run Computer Setup.

To change the Power-on Password, when the key icon () appears, type your current password, then a slash (/) or alternate delimiter character, your new password, another slash(/) or alternate delimiter character, and your new password:


current password/new password/new password

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

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

Deleting a Setup or Power-On Password

To delete the Setup or Power-On Password:

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

current password/

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

Clearing a Setup or Power-On Password

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

To clear the Setup or Power-On Password:

1. Turn off the workstation.
2. Remove the access panel.
3. Locate the SW1 switch on the system board.

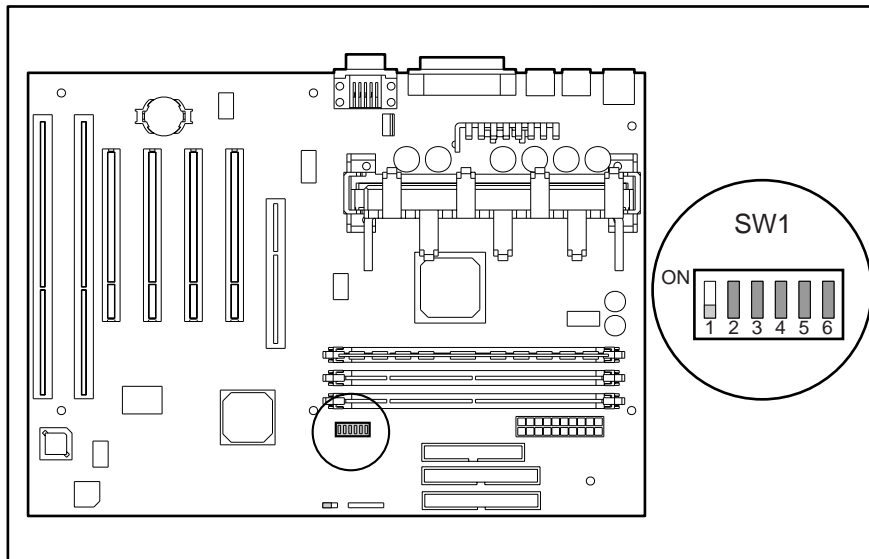


Figure 5-1. Locating the SW1 switch

4. On SW1, move switch 1 to the ON position (currently in the OFF position).

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 allow the operating system to start. This erases the current passwords and disables the password features.

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 and Power-On Password, if desired.

Windows NT Workstation Password

To establish a password in Windows NT Workstation:

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 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
 - 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:

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

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

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

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

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:

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

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

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

QuickLock/QuickBlank

The QuickLock and QuickBlank features disable the keyboard and mouse interfaces while 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.

To enable the QuickLock and QuickBlank features from the Computer Setup menu:

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

NOTE: You have approximately two seconds to press **F10**. If you do not press **F10** during this time, restart the computer to access the utility.

3. From the main menu, select *Security*, then select *Password Options*.
4. To enable QuickLock, press the up/down arrow keys to move the *Keyboard Quicklock* selection, then use the left/right arrow keys to select *Enable*.

This displays the QuickLock and QuickBlank options:

- To enable QuickBlank, press the up/down arrow keys to move the *QuickBlank Screen When Locked* selection, then use the left/right arrow keys to select *Enable*.
 - To enable QuickLock in Energy Saver mode, press the up/down arrow keys to move the *Quicklock in Energy Saver Mode* selection, then use the left/right arrows keys to select *Enable*.
5. Save the configuration and exit the utility.
-

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.

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.

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 AP200. 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.

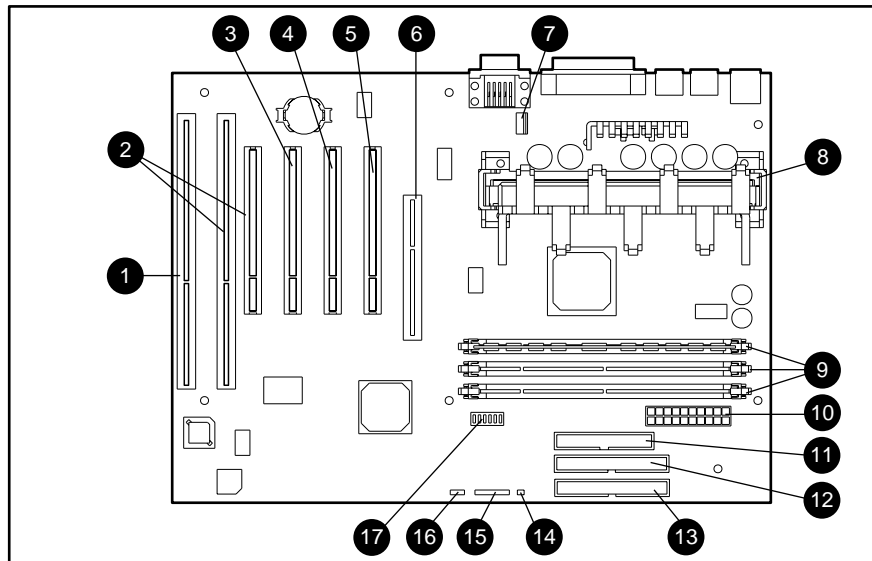


Figure 6-1. Overview of system board components

Table 6-1
System Board Components

Reference	Component
1	ISA expansion slot
2	ISA/PCI expansion slot
3	PCI expansion slot
4	PCI expansion slot
5	PCI expansion slot
6	AGP graphics controller slot
7	Fan connector (not used on standard models)
8	Processor connector
9	DIMM sockets 1-3
10	Power supply connector
11	IDE connector (diskette drive)
12	IDE hard drive/primary connector
13	IDE CD-ROM/secondary connector
14	SCSI LED
15	Power switch and LED connector
16	CMOS header
17	SW1 switch

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/Setup Password.

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

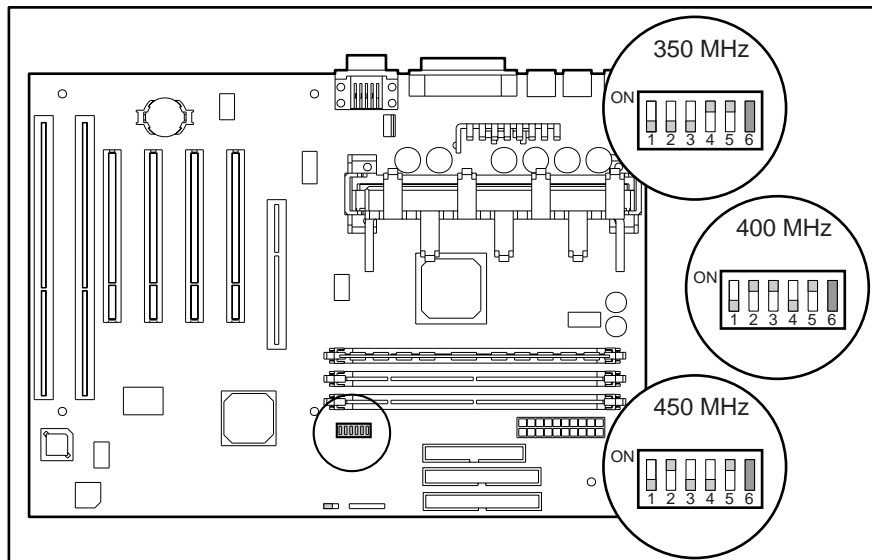


Figure 6-2. System Board SW1 location

Table 6-2
SW1 Settings

	S1	S2	S3	S4	S5	S6
350/100 MHz	OFF	OFF	OFF	ON	ON	OFF
400/100 MHz	OFF	ON	ON	OFF	ON	OFF
450/100 MHz	OFF	ON	OFF	OFF	ON	OFF

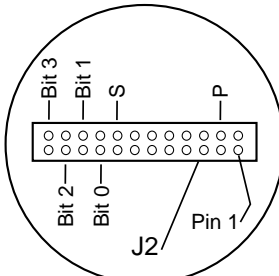
NOTE: S1 OFF = Password enabled (default)

Hard Drives

The Compaq Professional Workstation AP200 supports the 9.1-GB and 4.3-GB Wide-Ultra SCSI hard drives, and the 8.4-GB and 6.4-GB Ultra ATA hard drives.

9.1-GB Wide-Ultra SCSI Hard Drive

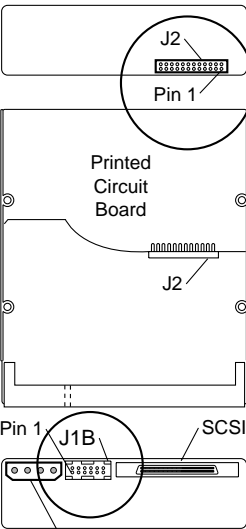
Drive Size: 9.1 GB
Model: DDRS-39130



SCSI ID Settings

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

Key ○ Jumper NOT Installed
 ■ Jumper Installed



Default Settings

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

Key ○ Jumper NOT Installed
 ■ Jumper Installed

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

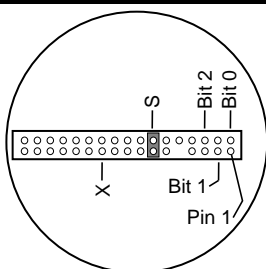
NOTES:

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

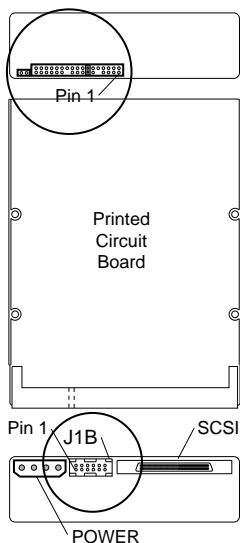
Figure 6-3. Jumper positions for the 9.1-GB hard drive (DDRS-39130)

4.3-GB Wide-Ultra SCSI Hard Drives

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



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.

SCSI ID Settings

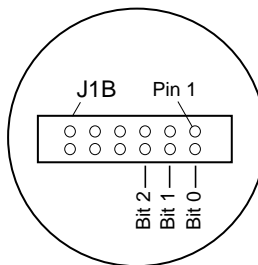
SCSI ID	Bit 2	Bit 1	Bit 0
0	○	○	○
1	○	○	■
2	○	■	○
3	○	■	■
4	■	○	○
5	■	○	○
6	■	■	○

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	○

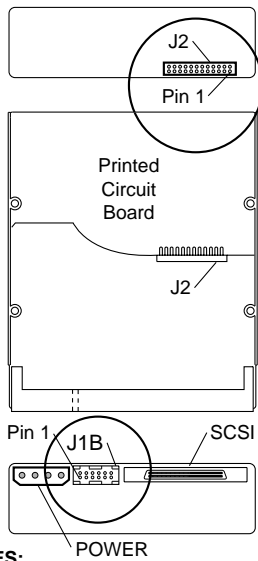
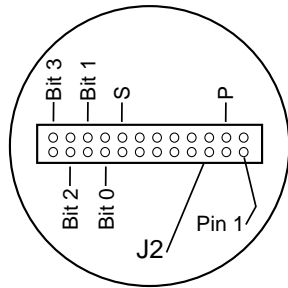
Key ○ Jumper NOT Installed ** Not Configurable
 ■ Jumper Installed



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

Figure 6-4. Jumper positions for the 4.3-GB hard drive (WDE4360W)

Drive Size: 4.3 GB Model: DDRS-34560



NOTES:

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

SCSI ID Settings

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

Key ○ Jumper NOT Installed
 ■ Jumper Installed

Default Settings

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

Key ○ Jumper NOT Installed
 ■ Jumper Installed

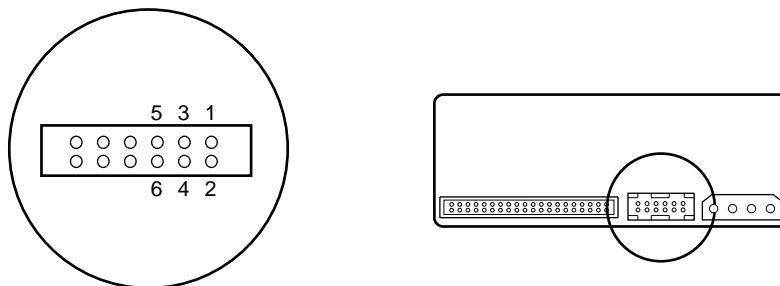
NOTE:

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

Figure 6-5. Jumper positions for the 4.3-GB hard drive (DDRS-34560)

8.4-GB Ultra ATA Hard Drive

Drive Size: 8.4 GB **Model: ST38641A**



IDE Settings

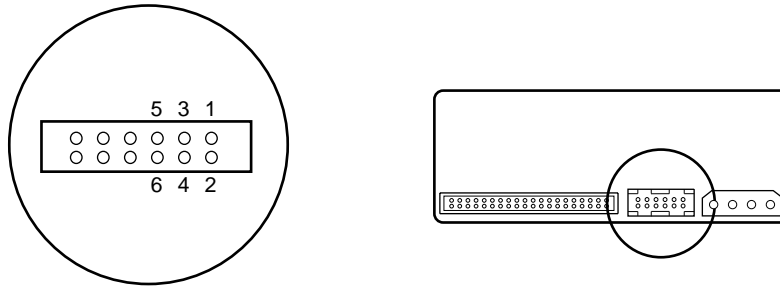
Configuration	1-2	3-4	5-6
Single (Standard Installation)	○	○	○
Dual Master	○	○	◐
Dual Slave	○	◐	○
Cable Select (Shipping Configuration)	◐	○	○
Single (Neutral Position)	○	◐	○

Key ○ Jumper NOT Installed
 ◐ Jumper Installed

Figure 6-6. Jumper positions for the 8.4-GB hard drive (ST38641A)

6.4-GB Ultra ATA Hard Drives

Drive Size: 6.4 GB **Model: ST36531A**

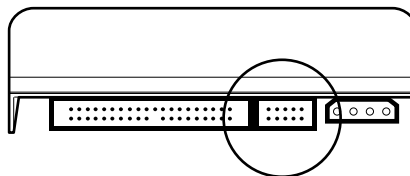
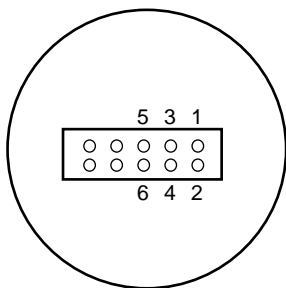


IDE Settings

Configuration	1-2	3-4	5-6
Single (Standard Installation)	○	○	○
Dual Master	○	○	■
Dual Slave	○	■	○
Cable Select (Shipping Configuration)	■	○	○
Single (Neutral Position)	○	■	○

Key ○ Jumper NOT Installed
 ■ Jumper Installed

Figure 6-7. Jumper positions for the 6.4-GB hard drive (ST36531A)

Drive Size: 6.4 GB**Model: AC36400-60LC****IDE Settings**

Configuration	1-2	3-4	5-6
Single (Standard Installation)	○ ○	○ ○	○ ○
Dual Master	○ ○	○ ○	◐ ○
Dual Slave	○ ○	◐ ○	○ ○
Cable Select (Shipping Configuration)	◐ ○	○ ○	○ ○
Single (Neutral Position)	○ ○	◐ ○	○ ○

Key ○ Jumper NOT Installed
 ◐ Jumper Installed

Figure 6-8. Jumper positions for the 6.4-GB hard drive (AC36400-60LC)

32X Max CD-ROM Drive (IDE)

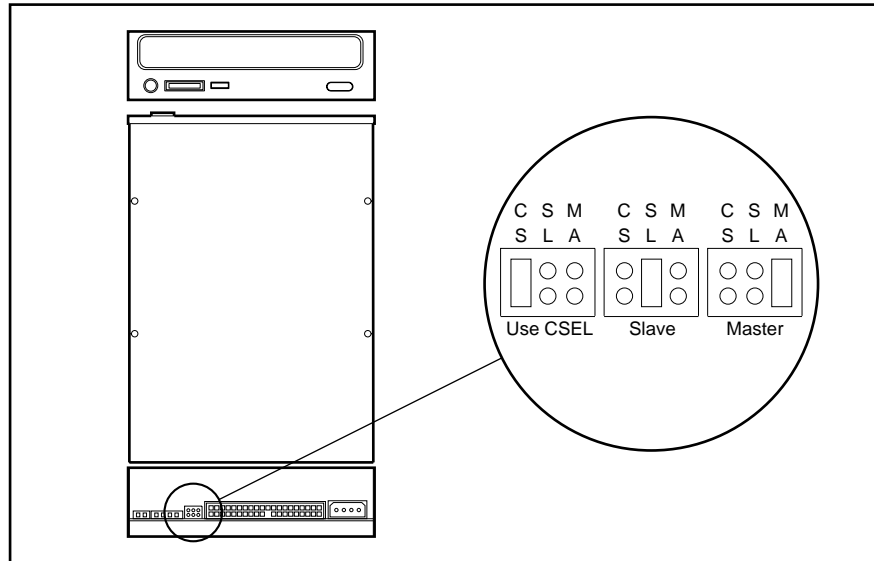


Figure 6-9. Jumper positions for the 32X Max CD-ROM drive (IDE)

Chapter 7

Physical and Operating Specifications

This chapter provides operating and performance specifications for the following Compaq Professional Workstation AP200 hardware:

- System Unit
- Power Supply
- Diskette Drive
- CD-ROM Drive
- Hard Drives
- Audio System
- Keyboard
- Mouse (3-button)
- Graphics Controller
- Network

System Unit

**Table 7-1
System Specifications**

	U. S.	Metric
Desktop Dimensions		
Height	6.60 in	16.76 cm
Width	17.65 in	44.83 cm
Depth	17.11 in	43.46 cm
Minitower Dimensions		
Height	17.65 in	44.83 cm
Width	6.60 in	16.76 cm
Depth	17.11 in	43.46 cm
Weight (approximate)	26 lb	12 kg
Power Supply, 200W		
Operating Voltage Range	90-132 VAC	180-264 VAC
Rated Voltage Range	100-127 VAC	200-250 VAC
Rated Line Frequency	50-60 Hz	50-60 Hz
Rated Input Current (maximum)	5.5 A	3.0 A
Environmental Requirements		
Temperature		
Operating	50° to 95°F	10° to 35°C
Shipping	-22° to 140°F	-30° to 60°C
Relative Humidity (noncondensing)		
Operating	20% to 80%	20% to 80%
Nonoperating	10% to 90%	10% to 90%
Maximum Altitude (unpressurized)		
Operating	10,000 ft	3048 m
Nonoperating	30,000 ft	9144 m
Heat Dissipation (nominal)	525 Btu/hr *	2.21 kg-cal/min

*Assuming nominal system draw is 100W and typical ps efficiency is 67.5%,
then Btu/hr = (100/.675) * 3.54 = 525

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	Unused
IRQ 6	Diskette Drive
IRQ 7	Parallel Port (LPT 1)
IRQ 8	Real-time clock
IRQ 9	ESS sound chip
IRQ 10	Unused
IRQ 11	PCI Interrupts
IRQ 12	Mouse
IRQ 13	Non-catastrophic errors / CPU error
IRQ 14	IDE Controller
IRQ 15	CD-ROM

**Table 7-3
System Direct Memory Access (DMA)**

Hardware DMA	System Function
DMA 0	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
072-077	CMOS Storage
072 - 07F	Unused

Continued

System I/O *Continued*

I/O Address (Hex)	System Function (Shipping Configuration)
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.
15C - 15D	Super I/O Index/Data Register
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 I/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)

Continued

System I/O *Continued*

I/O Address (Hex)	System Function (Shipping Configuration)	
3F0 - 3F7	Diskette Controller	
3F8 - 3FF	Serial Port (Primary)	
Memory Address	Size	System Function
FFFFFFFFh to FFF80000h	512 KB	System ROM
FEEFFFFFFh to FEE00000h	1024 KB	Local APIC Address Range
FECFFFFFFh to FEC00000h	1024 KB	I/O APIC Address Range
C7FFFFFFh to 40000000h	2,228,224 KB	PCI Memory Expansion
3FFFFFFFh to 01000000h	1,032,192 KB	HOST Memory Expansion
00FFFFFFh to 00100000h	15,360 KB	HOST or ISA Memory Expansion
000FFFFFFh to 000F0000h	64 KB	System ROM
000EFFFFFFh to 000E0000h	64 KB	Expansion System ROM
000DFFFFFFh to 000C0000h	128 KB	Option ROM
000BFFFFFFh to 000A0000h	128 KB	Video RAM
0009FFFFFFh to 00000000h	640 KB	Base Memory

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

200W Power Supply

Table 7-5
200W Power Supply Specifications

Input Specifications	115 Voltage Setting	230 Voltage Setting
Rated Input Voltage	90 to 132 VAC	180 to 264 VAC
Rated Input Current	5.5 A	3.0 A
Rated Input Frequency	47 to 63 Hz	47 to 66 Hz
General Specifications		
Input Power	310W	310W
Range Input Line	90 to 132 VAC	180 to 264 VAC
Holdup Time	16 ms from zero crossing at 115 VAC	16 ms from zero crossing at 230 VAC
Full Output Rating	To 40°C and 5,000 ft.	
	To 32°C and 10,000 ft. (derate linearly)	
Minimum Load	1.5A on +5V and +3.3V outputs; 0.1A on +12V and +5V aux outputs	
Ambient Temperature Range		
Operating	50° to 104°F	10° to 40°C
Storage	-40° to 149°F	-40° to 65°C
Safety Standard	UL 1950 3 rd Edition; CSA 22.2 No. 950 3 rd Edition, EN 60 950	
Input Transient Susceptibility:		
Surge Tolerant Power Supply (superimposed on AC line)	2000V surge per IEC1000-4-5 with no abnormal operation.	

Diskette Drive

Table 7-6
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)	3/6
Average (high/low)	94/173
Latency Average (ms)	100
Data Transfer Rate (Mbit/s)	
High/Low (To/From Media)	500/250 Kb/s

CD-ROM Drive

Table 7-7
32X Max Tray-Load CD-ROM Drive (IDE)

Disk	
Diameter	12 cm
Capacity	
Mode 1	540 MB
Mode 2	650 MB
Disk Thickness	1.2 mm
Track Pitch	1.6 μ m
Performance	
Access Time	
Random Seek	<100 ms
Full Stroke Seek	<150 ms
Data Transfer Rate	
Sustained	150 KB/s
Burst	2100 to 4800 KB/s (14x to 32x 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}

Continued

32X Max CD-ROM Drive (IDE) *Continued***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
Noise	0.1%
Frequency Response	20 to 20 kHz
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 IEC-958 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% (maximum)	1800 mA
12 VDC +/-5% (typical)	<600 mA
12 VDC +/-5% (maximum)	<1800 mA

Total Drive Power (Stand-by Mode) < 1 W

Hard Drives

Table 7-8
9.1-GB Wide-Ultra SCSI Hard Drive

Capacity	9.1 GB
Transfer Rate	
Media	13.6 to 21.3 MB/s
Asynchronous	5.0 MB/s
Synchronous	Up to 40.0 MB/s
Seek Time (typical)	
Single Track	1.6 ms
Average	7.5 ms
Full Stroke	15.0 ms
Disk Rotation Speed	7200 rpm
Cylinders	8419
Data Heads/Cylinder	10
Sectors/Track	165 to 264 (8 zones)
Buffer Size	384 KB

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

Table 7-9
4.3-GB Wide-Ultra SCSI Hard Drive

Capacity	4.5 GB
Transfer Rate	
Media	13.6 to 21.3 MB/s
Asynchronous	5.0 MB/s
Synchronous	Up to 40.0 MB/s
Seek Time (typical)	
Single Track	1.6 ms
Average	7.5 ms
Full Stroke	15.0 ms
Disk Rotation Speed	7200 rpm
Cylinders	8419
Data Heads/Cylinder	5
Sectors/Track	165 to 264 (8 zones)
Buffer Size	384 KB

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

Table 7-10
8.4-GB Ultra ATA Hard Drive

Capacity	8.4 GB
Drive Type	65 (soft)
Transfer Rate	
Media	83 to 140 MB/s
Interface	33 MB/s
Seek Time (typical)	
Single Track	1.7 ms
Average	11.5 ms
Full Stroke	20.2 ms
Disk Rotation Speed	5400 rpm
Cylinders	16383
Data Heads (Logical)	16
Sectors/Track (Logical)	63
Buffer Size	128 KB

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

Table 7-11
6.4-GB Ultra ATA Hard Drive

Capacity	6.4 GB
Drive Type	65 (soft)
Transfer Rate	
Media	83 to 140 MB/s
Interface	33.3 MB/s
Seek Time (typical)	
Single Track	2.0 ms
Average	9.5 ms
Full Stroke	20.0 ms
Disk Rotation Speed	5200 to 5400 rpm
Cylinders	13328
Data Heads (Logical)	15
Sectors/Track (Logical)	63
Buffer Size	128 to 256 KB

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

Audio System

Table 7-12
Audio System

Sampling rate	4 KHz to 48 KHz (adjustable)	
Full Scale Input Voltage (rms)		
Microphone-in	0.050	
Line-in	1.0	
Full Scale Output Voltage (rms)		
Line Output	1.0	
Dynamic Range (SNR)		
Line Input-to-Line Output	-83 dB	
Digital Playback	-81 dB	
Digital Record	-78 dB	
Total Harmonic Distortion	0.060%	
Frequency Response (-3 dB cutoffs)		
Line Level (48 KHz)	20 Hz to 20,000 Hz	
Speaker	110 Hz to 15,000 Hz	
Impedence (nominal)		
Microphone-in	100-K ohm	
Line-in	100-K ohms	
Headphone-out	16 ohms (min.)	
Line-out	5-K ohms	
Data Types		
PCM	8-/16-bit (mono/stereo)	
A-Law	8-/16-bit (mono/stereo)	
μ -Law	8-/16-bit (mono/stereo)	

Keyboard

Table 7-13
Compaq Enhanced Keyboard

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

Mouse

Table 7-14
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	

Graphics Controller

Table 7-15
GLoria Synergy+ Graphics Controller
Maximum Color Support

Resolutions	Colors 4-MB Standard	Colors 4-MB Standard with 4-MB Upgrade	Maximum Refresh Rate
1920 x 1200	256	32,768	75 Hz
1920 x 1080	256	32,768	80 Hz
1600 x 1280	32,768	32,768	75/85 Hz
1600 x 1200	32,768	32,768	85 Hz
1600 x 1000	32,768	32,768	100 Hz
1536 x 1152	32,768	32,768	85 Hz
1280 x 1024	32,768	16,777,216	100/80 Hz
1152 x 864	16,777,216	16,777,216	100 Hz
1024 x 768	16,777,216	16,777,216	100 Hz
800 x 600	16,777,216	16,777,216	100 Hz
640 x 480	16,777,216	16,777,216	100 Hz

Network

Table 7-16
Ethernet Network Interface Controller (NIC)

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

RJ-45 Network Cable Specifications

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

Chapter 8

External Connectors

This chapter provides an overview of the external connectors, including pin assignments, for the Compaq Professional Workstation AP200.

Physical Location

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

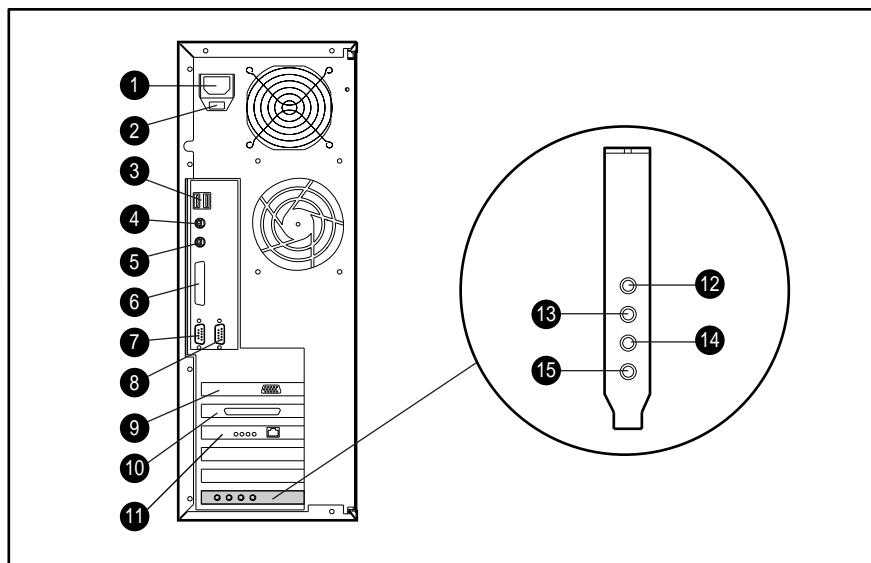


Figure 8-1. Overview of external connectors

Table 8-1
External Connectors

Reference	Connector	Function
1	Power cord connector	Connects to the power cord
2	Voltage Selector Switch	Switches voltage from 110V to 220V
3	USB connectors (2)	Connects to USB devices
4	Keyboard connector	Connects to a keyboard (orange icon)
5	Mouse connector	Connects to a mouse (green icon)

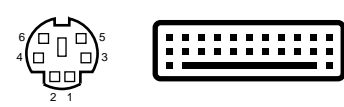
Continued

External Connectors *Continued*

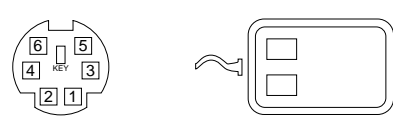
Reference	Connector	Function
6	Parallel port connector	Connects a parallel device such as a printer
7	Serial port connector	Connects a serial device, such as a serial printer COM 2 (B) on top, COM 1 (A) on bottom
8	Serial port connector	Connects a serial device, such as a serial printer COM 2 (B) on top, COM 1 (A) on bottom
9	Video Port (AGP)	Connects a monitor
10	External SCSI connector	Connects a SCSI device
11	RJ-45 connector	Connects to the Ethernet network
12	Headphone connector	Connects to headphones
13	Audio line-out connector	Connects an external amplifier (to power additional speakers) or a tape deck for recording
14	Audio line-in connector	Connects a device that supplies sound, such as a tape deck or CD player
15	Microphone connector	Connects a microphone

Pin Assignments

**Table 8-2
Keyboard**

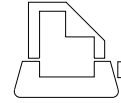
Connector and Icon (Orange)	Pin	Signal
	1	Data
	2	Unused
	3	Ground
	4	+5 VDC
	5	Clock
	6	Reserved

**Table 8-3
Mouse**

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

**Table 8-4
Parallel Interface**

Connector and Icon



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

Table 8-5
Serial Interfaces

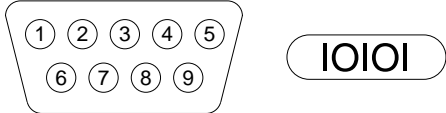
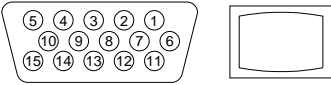
Connector and Icon	Pin	Signal
 The diagram shows a 9-pin D-sub connector with pins numbered 1 through 9. Pin 1 is at the top left, pin 5 is at the top right, pin 9 is at the bottom right, and pin 6 is at the bottom left. To the right of the connector is an oval icon containing the text "IOIOI".	1	Carrier Detect
	2	Receive Data
	3	Transmit Data
	4	Data Terminal Ready
	5	Signal Ground
	6	Data Set Ready
	7	Request to Send
	8	Clear to Send
	9	Ring Indicator

Table 8-6
Video

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

* For DDC support (I²C monitors)

Table 8-7
Ethernet RJ-45

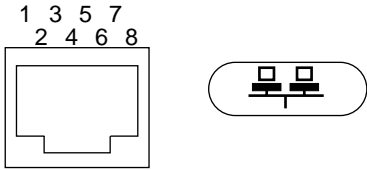
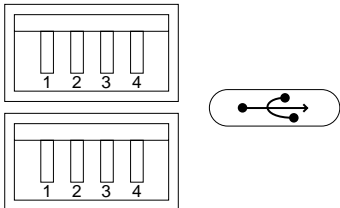
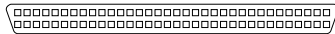
Connector and Icon	Pin	Signal
	1	(+) Transmit Data
	2	(-) Transmit Data
	3	(+) Receive Data
	4	Unused
	5	Unused
	6	(-) Receive Data
	7	Unused
	8	Unused

Table 8-8
USB

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

**Table 8-9
SCSI Connector**

Connector and Icon



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

Table 8-10
Audio Line-In Connector

Connector and Icon



Stereo 1/8-inch Miniphone

Table 8-11
Audio Line-Out Connector

Connector and Icon



Stereo 1/8-inch Miniphone

Table 8-12
Microphone Connector

Connector and Icon (Blue)



Stereo 1/8-inch Miniphone

Table 8-13
Headphone Connector

Connector and Icon



Stereo 1/8-inch Miniphone

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