

Maintenance and Service Guide

COMPAQ[®]

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* * * W A R N I N G * * *

This equipment has been certified to comply with the limits for a Class B computing device, pursuant to Subpart J of Part 15 of FCC Rules. Only peripherals (computer input/output devices, terminals, printers, etc) certified to comply with the Class B limits may be attached to this computer. Operation with non-certified peripherals is likely to result in interference to radio and TV reception.

* * * W A R N I N G * * *

This equipment generates, uses, and can radiate radio frequency energy. If not installed and used in accordance with the manufacturer's instructions, it may cause interference with radio and television reception. This equipment has been certified to comply with the limits for a Class B computing device, pursuant to Subpart J of Part 15 of FCC Rules, which are designed to provide reasonable protection against such interference. Operating this equipment in a residential area can cause interference. Should this occur, the user will be required to take whatever measures may be necessary to eliminate the interference. In attempting to do so, the user should do the following:

- Reorient the receiving antenna.
- Relocate the computer with respect to the receiver with which it interferes.
- Plug the computer into a different ac outlet so that the computer and the receiver with which it interferes are on different branch circuits.

If necessary, the user should consult the dealer or an experienced radio/television technician for additional suggestions. The user may find the following booklet prepared by the Federal Communications Commission helpful:

How to Identify and Resolve Radio-TV Interference Problems

This booklet is available from the US Government Printing Office, Washington, DC 20402, Stock Number 004-000-00345-4.

N O T I C E

COMPAQ Computer Corporation recommends that all peripheral devices be connected to this computer via shielded cables with metal RFI/EMI connector hoods.

WIRE TYPE: Multi-paired, overall-shielded Belden 98XX; Alpha 54XX; or equivalent.

CONNECTOR HOOD: RFI/EMI metal shield: AMP #74517X-X; or equivalent.

It is important that the chassis ground of the peripheral device be connected to the computer chassis. An Alpha #1221 flat-braid strap is sufficient. This strap is not necessary if the shielded cable connects the two chassis.

Contents

CHAPTER 1	
INTRODUCTION	1-1
About This Guide	1-1
Required Tools and Supplies	1-3
Associated Documentation	1-3
CHAPTER 2	
SYSTEM PROBLEM ISOLATION GUIDE	2-1
CHAPTER 3	
SYSTEM CHECKOUT	3-1
Problem Isolation Procedure (PIP)	3-1
CHAPTER 4	
POWER SUPPLY SUBSYSTEM	4-1
Configuration/Interface Information	4-1
Problem Isolation Procedure (PIP)	4-2
Removal and Replacement Procedures	4-10
Power Supply Assembly	4-10
Fan With Bracket Assembly	4-17
Line Filter/ON-OFF Switch Assembly	4-22
Power Fuse	4-28
CHAPTER 5	
CPU/MEMORY SUBSYSTEM	5-1
Configuration/Interface Information	5-1
Switch Settings	5-3
Problem Isolation Procedure (PIP)	5-5
Removal and Replacement Procedures	5-15
Processor Board Assembly	5-15
Optional Memory Chips	5-25
CHAPTER 6	
KEYBOARD SUBSYSTEM	6-1
Configuration/Interface Information	6-1
Problem Isolation Procedure (PIP)	6-2
Removal and Replacement Procedures	6-11
Keyboard Assembly	6-11
CHAPTER 7	
VIDEO DISPLAY UNIT (VDU) SUBSYSTEM	7-1
Configuration/Interface Information	7-1
Problem Isolation Procedure (PIP)	7-3
CRT Alignment Procedure	7-20
Removal and Replacement Procedures	7-33
VDU Adapter Board Assembly	7-33
VDU Assembly	7-37
CHAPTER 8	
DISK DRIVE SUBSYSTEM	8-1
Configuration/Interface Information	8-1
Problem Isolation Procedure (PIP)	8-2
Removal and Replacement Procedures	8-11
Floppy/Printer Adapter Board Assembly	8-11
Floppy Disk Drive Assembly	8-16
Floppy Disk Drive Speed Adjustment Procedure	8-25

CHAPTER 9

PARALLEL PRINTER PORT SUBSYSTEM 9-1
Configuration/Interface Information 9-1
Problem Isolation Procedure (PIP) 9-3
Removal and Replacement Procedures 9-11
Floppy/Printer Adapter Board Assembly 9-11

CHAPTER 10

FIXED DISK DRIVE SUBSYSTEM 10-1
Configuration/Interface Information 10-1
Problem Isolation Procedure 10-3
Disk Drive Testing 10-4
Removal and Replacement Procedures 10-14
Fixed Disk Adapter Board Assembly 10-14
Fixed Disk Drive Assembly 10-20

CHAPTER 11

OPTIONS

ASYNCHRONOUS COMMUNICATIONS CARD

Introduction 11-1
Tool Requirements 11-1
Initial Steps 11-2
Installation Steps 11-3

320-KBYTE DISK DRIVE

Introduction 11-9
Tool Requirements 11-9
Initial Steps 11-10
Installation Steps 11-12

64-KBYTE MEMORY

Introduction 11-23
Tool Requirements 11-23
Initial Steps 11-24
Installation Steps 11-25

FIXED DISK DRIVE UPGRADE

Introduction 11-35
Tool Requirements 11-35
Initial Steps 11-36
Installation Steps 11-37

APPENDIX A

GLOSSARY AND MNEMONIC DICTIONARY

APPENDIX B

OPERATING AND PERFORMANCE SPECIFICATIONS

APPENDIX C

PARTS CATALOGUE

APPENDIX D

ADMINISTRATION

APPENDIX E

SERVICE ADVISORY

APPENDIX F

SERVICE BULLETINS

INTRODUCTION

About this Guide

The **MAINTENANCE AND SERVICE GUIDE** is a troubleshooting, maintenance, and repair guide for servicing the COMPAQ™ Portable Computer or COMPAQ PLUS™ Portable Computer. It is designed to be used as a reference guide for the following information:

- Performance verification and/or problem isolation procedures.
- Repair and replacement procedures.
- System interface or configuration data.
- Any adjustment/alignment procedures.
- Parts catalogue.

All troubleshooting and repair procedures are detailed to allow subassembly/module-level repair only.

***** CAUTION *****

Due to the complexity of the individual boards and subassemblies, COMPAQ Computer Corporation strongly recommends that you do not attempt to make field repairs at the component level.

This manual is divided into several chapters to allow fast, easy-to-use troubleshooting techniques. Individual chapters are designed to be self-contained guides for all configuration, problem isolation, and removal/replacement information.

Chapter 1, INTRODUCTION, contains a description of the contents and organization of the Maintenance and Service Guide.

Chapter 2, SYSTEM PROBLEM ISOLATION GUIDE, describes the appropriate Problem Isolation Procedure (PIP) for each error code issued, and refers you to the chapter which explains each error code.

Chapter 3, SYSTEM CHECKOUT, shows how to use the Advanced Diagnostics Programs to verify answers to the PIP questions asked when exercising and verifying the performance of all COMPAQ Portable Computer subsystems.

Chapter 4, POWER SUPPLY SUBSYSTEM, discusses the power supply subsystem which includes: the switching-mode power supply, the line filter assembly, and the fan with bracket assembly. It also includes the PIP for power supply malfunctions as well as methods to correct these problems.

Chapter 5, CPU/MEMORY, describes the components of the CPU/memory subsystem and provides charts designed to illustrate the various combinations of switch settings that can be used in the COMPAQ Portable Computer. It also includes the PIP for CPU/memory malfunctions as well as methods to correct these problems.

1-2 Maintenance and Service Guide

Chapter 6, KEYBOARD, discusses the keyboard subsystem which includes the keyboard assembly and the cable which interfaces between the keyboard and the system chassis. It also includes the PIP to help determine if the keyboard subsystem is functioning properly.

Chapter 7, VIDEO DISPLAY UNIT (VDU) SUBSYSTEM, examines the VDU assembly, the VDU adapter board assembly, and their functions. The PIP for the display subsystem is also included to determine whether the display subsystem is functioning properly.

Chapter 8, DISK DRIVE SUBSYSTEM, reviews the disk drive subsystem, which includes the 5¼" floppy disk drive assembly and the floppy/printer adapter board assembly. A PIP is included to help correct any problems encountered with the disk drive subsystem.

Chapter 9, PRINTER PORT, examines the parallel printer port subsystem and primarily discusses the floppy/printer adapter board assembly and its role as an interface between the COMPAQ Computer and all types of parallel I/O peripherals. It also includes the PIP designed to help you to determine if the printer port subsystem is functioning properly.

Chapter 10, FIXED DISK DRIVE SUBSYSTEM, includes the fixed disk drive assembly and the fixed disk adapter board assembly.

Chapter 11, OPTIONS, provides removal and replacement procedures for the Asynchronous Communications card 320-Kbyte Disk Drive, and the 64-Kbyte Memory Options.

Appendix A, GLOSSARY AND MNEMONIC DICTIONARY. Turn to this chapter if you find an unfamiliar technical term or an acronym that you don't know.

Appendix B, OPERATING AND PERFORMANCE SPECIFICATIONS, contain the performance and operating specifications for the COMPAQ Portable Computer and COMPAQ PLUS Portable Computer. Use this chapter as a reference to the technical characteristics of the system.

Appendix C, PARTS CATALOGUE, details the names, part numbers, and ordering numbers of all Field Replaceable Units (FRUs).

Appendix D, ADMINISTRATION, tells you what procedures you need to follow to return defective FRUs to the factory for repair. Included is a sample of the invoice form that you must fill out and attach to every shipment that you are returning.

Appendix E, SERVICE ADVISORIES

Appendix F, SERVICE BULLETINS

Required Tools and Supplies

The following tools and supplies are required to service the COMPAQ Portable Computer:

- COMPAQ Spares Kit
- #1 Phillips screwdriver
- 1/4" Slotted blade screwdriver
- 1/8" Slotted blade screwdriver
- 1/4" Hex-nut driver
- 3/16" Hex-nut driver
- 5/16" Box-end wrench
- 1 1/32" open-end wrench
- Chain nose pliers
- Diagonal cutting pliers
- IC extractor tool
- Wire cutters
- *Cable-ties (TY-223Ms or equivalent)
- *COMPAQ Personal Computer Advanced Diagnostic Program Diskette (Part No. 100386-001)
- Formatted Scratch Diskette(s)
- Credit Card-Sized Plastic Card
- Standard television adjustment tools
- *COMPAQ CRT Alignment Template (Part No. 100686-001)

Optional Tools:

- Floppy Disk Drive Signal Extension Cable (Part No. 100546-001).
- Floppy Disk Drive Power Extension Cable (Part No. 100545-001).

*Items are in the COMPAQ Spares Kit.

Associated Documentation

From time to time, you might need to consult the following associated system documentation:

- **OPERATIONS GUIDE**, Part No. 100001-001
- **AUTHORIZED DEALER GUIDE**, Part No. 100003-001
- **DOS REFERENCE GUIDE**, Part No. 100004-001
- **BASIC REFERENCE GUIDE**, Part No. 100005-001
- **COMPAQ PLUS OPERATIONS GUIDE**, Part No. 100633-001
- **MS-DOS 2.0 REFERENCE GUIDE**, Part No. 100631-001
- **BASIC 2.0 REFERENCE GUIDE**, Part No. 100632-001

SYSTEM PROBLEM ISOLATION GUIDE

The following table is designed as the “starting point” for all attempts to isolate a system problem. Use the error code or error condition resulting from the power-on self-tests to reference the appropriate Problem Isolation Procedure (PIP).

In this book, and in many program descriptions, there is a special symbol used to indicate a control character. For example, if the letter T is to be used as a control character, it is written as [^]T. The caret superscript always means that you must first press and hold down the CTRL key, and then press the designated character key. The [^]T symbol is read aloud as “control T”.

ERROR CODE	ERROR CONDITION	PROBABLE FAILED UNIT	SEE PIP REFERENCE IN
	Unidentified/ intermittent system problem or system fails to boot		CHAPTER 3
	Incorrect or no system power	power supply	CHAPTER 4
1XX	One long and one short beep, incorrect or no processor board operation, endless loop	system ROM or processor board LSI device	CHAPTER 5
xxyy 20X	Incorrect or no memory operation	on-board system RAM	CHAPTER 5
3XX or dd 3XX	Incorrect or no keyboard operation	keyboard assembly or “stuck” key on keyboard	CHAPTER 6
4XX	Incorrect or no printer port operation	floppy/printer adapter board assembly	CHAPTER 9
	One long and two short beeps during power-on self-tests	video display unit (VDU)	CHAPTER 7
5XX	Incorrect or no video display operation	video display unit (VDU)	CHAPTER 7
6XX	Incorrect or no disk drive operation	disk drive unit	CHAPTER 8
170X	Incorrect or no fixed disk drive operation	fixed disk drive unit	CHAPTER 10

Once directed to the appropriate Problem Isolation Procedure, keep these rules in mind:

- Be sure to follow all the steps in order.
- Always complete a step before going on to the next step.
- If an operation directs you to replace or adjust any part, it also refers you to the removal and replacement procedures elsewhere in the manual. Be sure that you read and understand the removal and replacement procedure thoroughly before going on with any work.

SYSTEM CHECKOUT

Problem Isolation Procedure (PIP)

The purpose of this PIP is to exercise and verify the performance of all COMPAQ Portable Computer internal subsystems. Should any step of this procedure result in an error condition or an error message, you will be referred to the appropriate PIP to further isolate the problem. Completion of the System Checkout PIP without any error conditions or error messages, indicates that the system should be operating properly.

ARE THERE ANY NON-COMPAQ COMPUTER OPTION ADAPTERS OR PERIPHERAL DEVICES ATTACHED TO, OR INTEGRATED INTO, THE SYSTEM (SUCH AS PRINTERS, DISK DRIVES, OR MEMORY OPTIONS)?

- YES** Perform the following procedure:
- Step 1 - Set the ON/OFF switch to the OFF position.
 - Step 2 - Remove the power cord from the wall outlet.
 - Step 3 - Remove all non-COMPAQ Computer peripheral devices and options. Check the card cage to make sure that only COMPAQ Computer option adapters are installed. For further information see the Removal and Replacement Procedure in Chapter 5, CPU/ MEMORY SUBSYSTEM.
- NO** Check the card cage to ensure that all boards and connectors are seated properly.

WERE ANY OF THE BOARD CONNECTORS LOOSE OR IMPROPERLY SEATED?

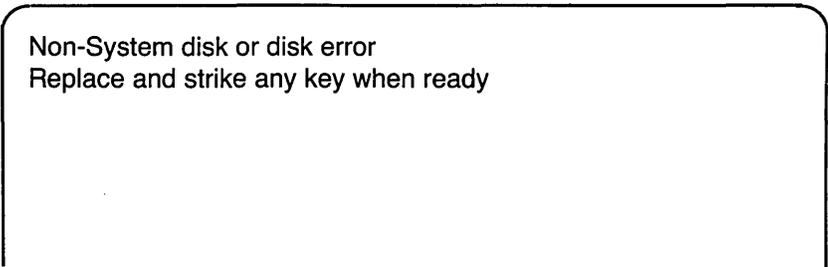
- YES** Repeat or secure the board(s) and/or connector(s).
- NO** Prepare to power-on the system:
- Step 1 - Replace all access plates and covers removed during the previous steps.
 - Step 2 - Reconnect the power cord to the system, and then connect it to a known-good electrical outlet.
 - Step 3 - Turn the BRIGHTNESS control knob clockwise as far as it will go.
 - Step 4 - Place the ON/OFF switch to the ON position. Watch the display and listen closely for sounds from the system.

**AFTER YOU POWER-ON THE SYSTEM, IS THE COOLING FAN OPERATING CORRECTLY?
(AIR SHOULD BE FLOWING OUT OF THE SYSTEM.)**

NO This indicates a probable malfunction in the power supply subsystem. Set the ON/OFF switch to the OFF position, and refer to the PIP in Chapter 4, POWER SUPPLY.

YES About four seconds after you power-on the system, a cursor should appear in the upper left-hand corner of the screen.

In about 10 to 19 seconds, the system completes its power-on self-tests (10 seconds for a 128K system; 19 seconds for a 256K system). If optional memory is added, the tests may take longer. Successful completion of these tests are indicated by a short beep and the appearance of the following message on the screen:



Non-System disk or disk error
Replace and strike any key when ready

Other messages that may appear, or other events that may occur, are error codes or conditions which indicate unsuccessful completion of the power-on self-tests.

DID THE SYSTEM SUCCESSFULLY COMPLETE THE POWER-ON SELF-TESTS?

NO Record the events that occurred during the power-on self-tests. Refer to the PROBLEM ISOLATION GUIDE in Chapter 2 to determine which PIP will assist you in further isolating the cause of the problem.

NOTE: If necessary, power-off the system, wait at least 15 seconds, then power-on the system again. Watch very carefully what happens during the power-on self-tests.

YES Insert the COMPAQ Computer Advanced Diagnostics diskette into Drive A: and perform a system reset (^ALT/DEL) to boot the system and load the diagnostics.

DID THE SYSTEM BOOT PROPERLY?

NO

You may have a defective diagnostics diskette or a diskette that does not contain the correct operating system. Try to boot the system using a diskette that is known to be good.

If the system still does not boot, it is an indication of a probable failure in the disk drive subsystem. Refer to the PIP in Chapter 9, DISK DRIVE SUBSYSTEM, to further isolate the cause of the problem.

YES

If the system booted properly, and contains an AUTOEXEC.BAT file to load the diagnostics, the following menu appears:

```

The COMPAQ PERSONAL COMPUTER
ADVANCED DIAGNOSTICS MENU
Version 1.00 (c) COPYRIGHT 1982, COMPAQ COMPUTER CORP.
ALL RIGHTS RESERVED

YOUR CHOICES ARE:

0 - RUN THE DIAGNOSTIC TESTS
1 - FORMAT A DISKETTE
2 - COPY A DISKETTE
9 - GO TO THE SYSTEM DISKETTE

Input your choice (0,1,2, or 9)
and press ENTER
?_
```

This menu indicates that the diagnostics are loaded and ready to begin.

DID YOU GET THE CORRECT MENU AFTER LOADING YOUR DIAGNOSTICS DISKETTE?

NO

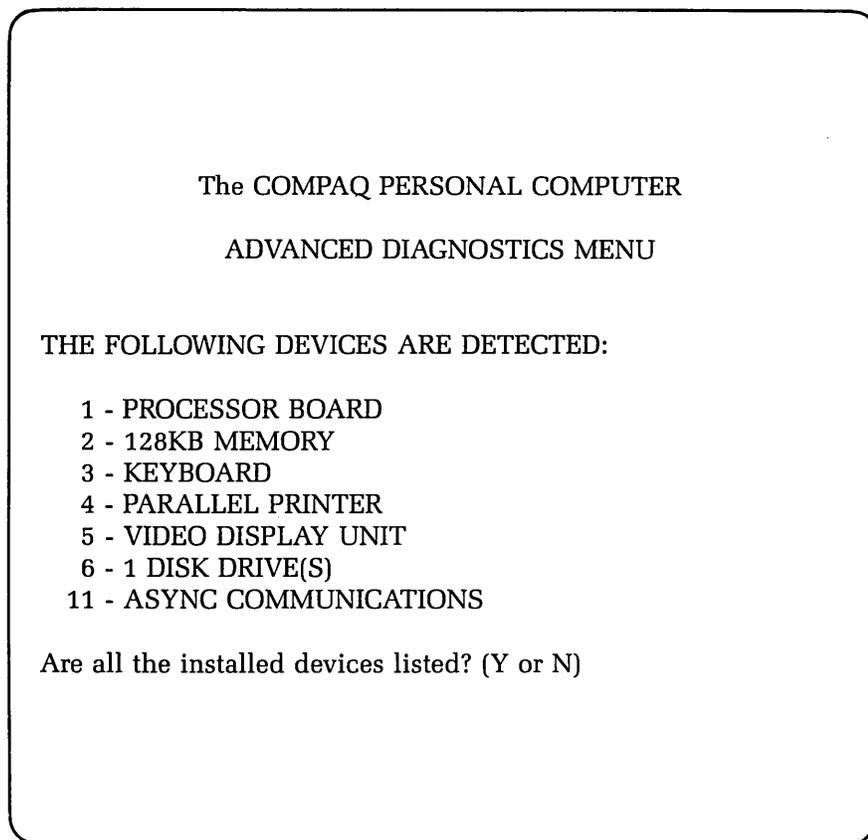
If the diagnostics did not load automatically, type in DIAG, and then press [ENTER]. This causes the diagnostics to load if the diskette contains the file DIAG.COM.

If the diagnostics program still does not load, repeat this procedure with a known-good Advanced Diagnostics Diskette. If the problem is not resolved, refer to the Chapter 8, DISK DRIVE SUBSYSTEM, to further isolate the cause of the problem.

YES

This menu indicates that you have successfully loaded the diagnostics and are ready to begin.

Press [0] and then [ENTER] to select RUN THE DIAGNOSTIC TESTS. A display similar to the following should appear on the screen:

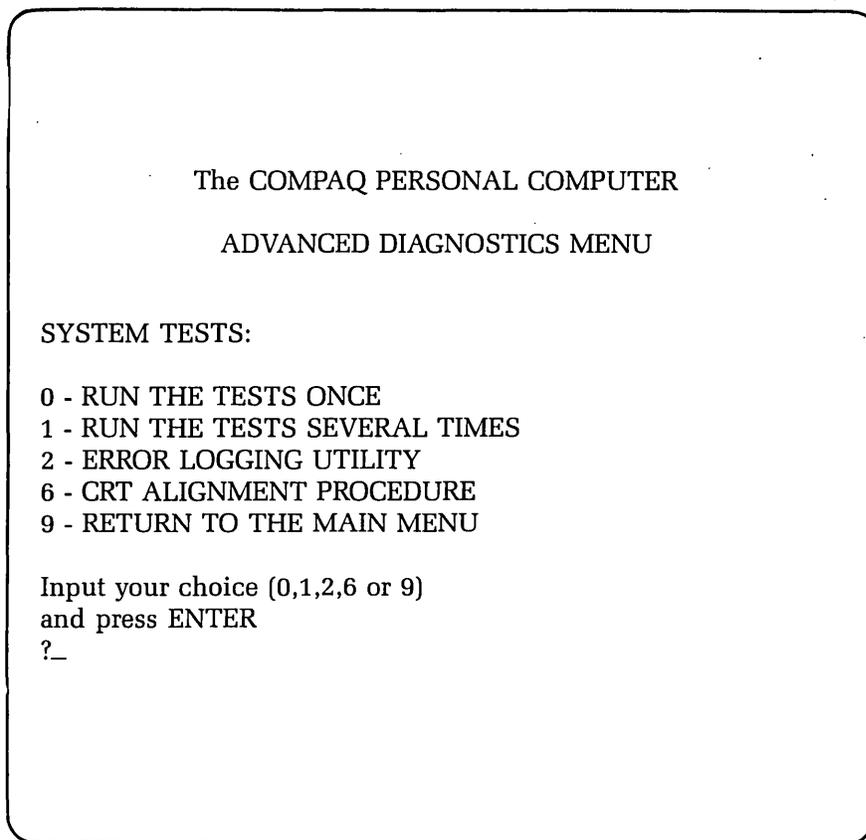


This display allows you to verify the system configuration.

DOES THE DISPLAY ACCURATELY DESCRIBE THE SYSTEM CONFIGURATION?

NO This indicates a possible problem with the setting of the switches (SW1 and SW2) on the processor board. Refer to the configuration portion of Chapter 5, CPU/MEMORY SUBSYSTEM, to confirm the correct positions of SW1 and SW2.

YES Press [Y] and then [ENTER]. The following menu should appear on the screen:



The COMPAQ Advanced Diagnostics Program allows you to run all subsystem tests one time, or several times. You may also log any errors to a printer as they are detected during program execution.

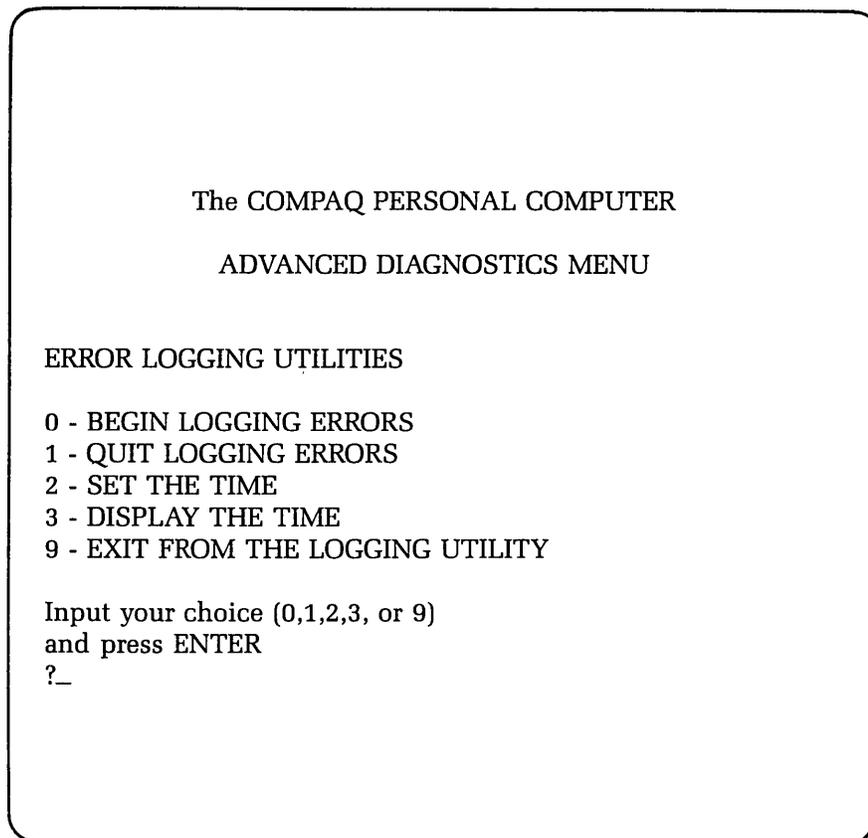
3-6 Maintenance and Service Guide

DO YOU INTEND TO LOG DETECTED ERRORS?

NO Decide if you want to run the selected tests once, or repeat the tests several times.

YES Select the ERROR LOGGING UTILITY by pressing [2] and then [ENTER].

The following menu should appear on the screen:



Error-logging is a convenient way to create a printed copy (hardcopy) of all system errors. This utility will automatically log errors to an attached printer only. Use the [0] and [1] keys, accompanied by [ENTER], to start and stop the error logging function.

The error-logging utility will also record the time at which the error occurred. Use the [2] and [3] keys, accompanied by [ENTER], to make sure that the system clock is set to the current time.

Once the logging function has been initiated, return to the previous menu by selecting EXIT FROM THE LOGGING UTILITY by pressing [9] and the [ENTER].

DO YOU WANT TO RUN THE SELECTED TESTS MORE THAN ONE TIME?

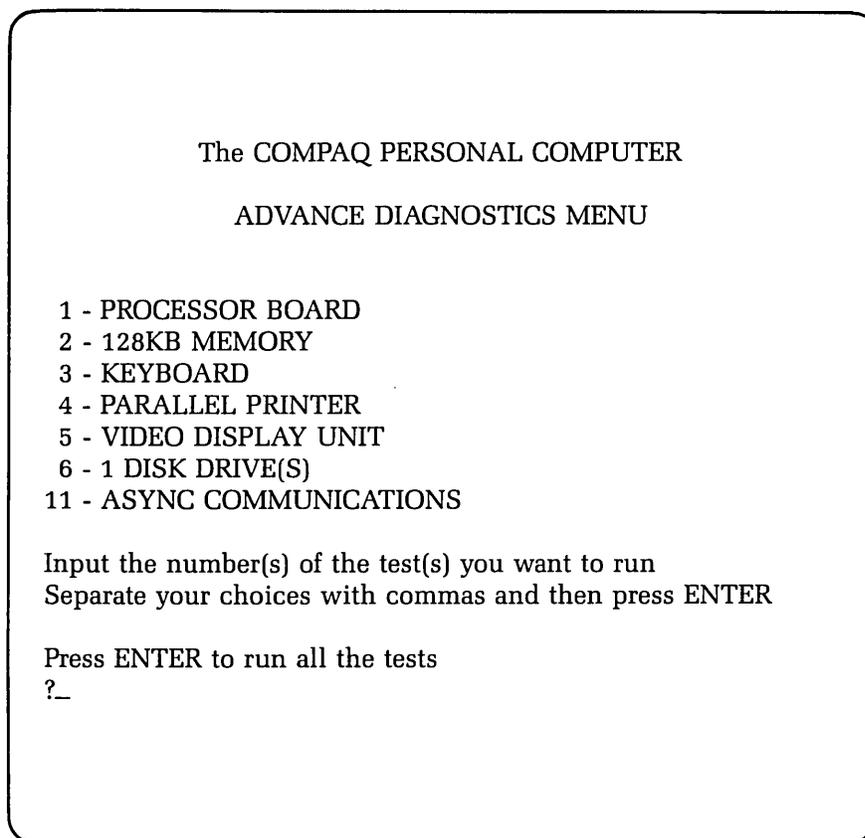
NO Select RUN THE TESTS ONCE by pressing [0] and then [ENTER].

YES Select RUN THE TESTS SEVERAL TIMES by pressing [1] and then [ENTER].

A prompt will appear requesting the number of times you wish to run the selected tests. You may run the test any number of times between 1 and 65,535. Enter the desired number of test cycles, and then press [ENTER].

Finally, when running the tests several times you may choose to halt program execution each time an error is detected. When this prompt appears on the screen, simply press [Y] or [N], followed by [ENTER].

Selecting either mode causes a menu similar to the following to appear:



This menu allows you to select one, or any combination of subsystems to test.

3-8 Maintenance and Service Guide

DO YOU WANT TO TEST ALL THE SUBSYSTEMS?

- YES** If you want to test all the subsystems, press [ENTER]. This begins the automatic testing routine.
- NO** Enter the number(s) corresponding to the option(s) you want to test and press [ENTER]. If you are running more than one test, the selections you enter must be separated by commas.

If you did not select the automatic testing routine, the test you chose will begin now. Refer to the appropriate PIP for information on how to interpret the results of each test.

If you selected the automatic testing routine, prompts will appear during program execution to let you know which test is presently running, to inform you of test results, and to instruct you to perform special procedures (such as removing diskettes and replacing them with scratch diskettes).

If necessary, refer to the appropriate PIP for information on how to interpret the results of each test.

POWER SUPPLY SUBSYSTEM

WARNING

Be sure that you set the ON/OFF switch to the OFF position, and unplug the power cord from the wall outlet before you adjust any cables or connectors. Otherwise, you are exposing yourself to dangerous voltages.

Configuration Information

The power supply subsystem, as discussed in this chapter, will include the switching-mode power supply, the line filter assembly, and the fan with bracket assembly (see Figure 4-1).

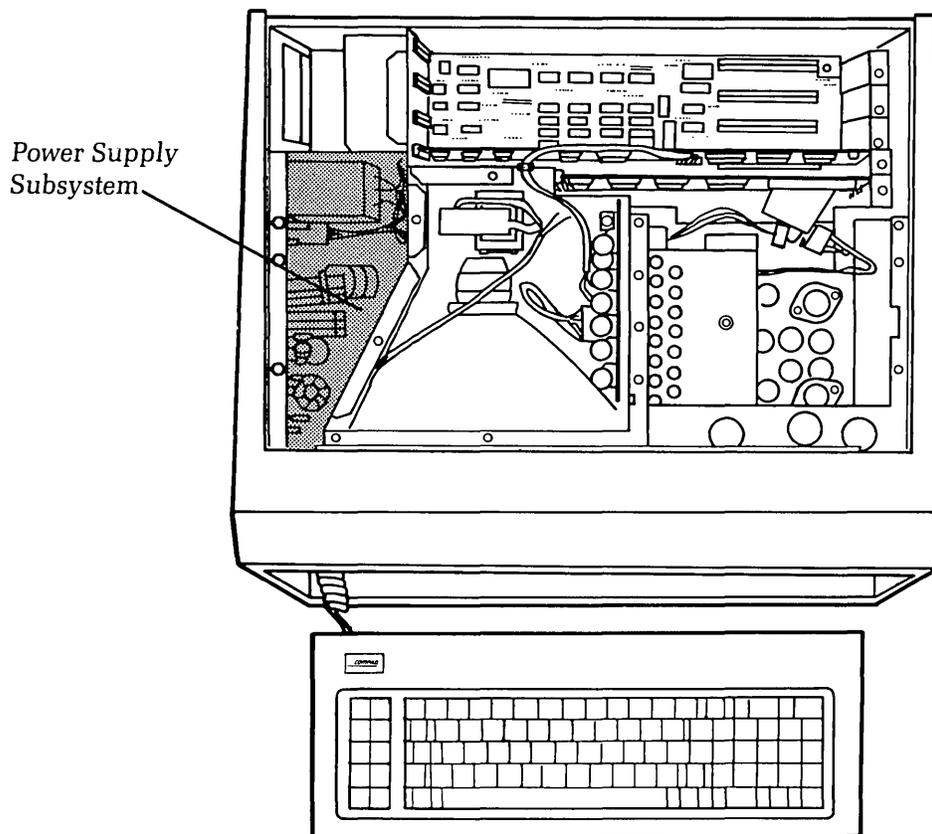


Figure 4-1. Switching-mode Power Supply, Line Filter Assembly, and the Fan With Bracket Assembly.

4-2 Maintenance and Service Guide

The switching-mode power supply contained in the COMPAQ Portable Computer is a specially-developed, patented design which was created exclusively for use with the COMPAQ Portable Computer.

Proper operation of the system requires that the regulated voltages stay within the following limits:

- + 5 VDC (4.75 - 5.25 VDC)
- + 12 VDC (11.4 - 12.6 VDC)
- 5 VDC (-4.75 - -5.25 VDC)
- 12 VDC (-11.4 - -12.6 VDC)

* Another feature of the switching-mode power supply is the ability to detect "missing cycles" in the incoming ac line voltage. Missing a specified number of cycles will cause the power supply to shut down.

The switching-mode power supply can operate at either 120 vac line voltage or 220 vac line voltage. This option is jumper-selectable on the power supply printed circuit board (PCB).

For more information on system/subsystem configuration, contact the COMPAQ Technical Support Department.

Problem Isolation Procedure (PIP)

This procedure is designed to help you to determine if the power supply subsystem is functioning properly. The PIP for power supply malfunctions provides a systematic method for identifying and correcting most power supply problems.

As with any troubleshooting procedure, you may encounter some problem that this procedure does not cover. If you complete this PIP without resolving the problem, contact the COMPAQ Technical Support Department for further technical assistance.

STEP 1

**IS THE COOLING FAN OPERATING CORRECTLY AFTER YOU POWER-ON THE SYSTEM?
(AIR FLOW SHOULD BE OUT OF THE SYSTEM)**

YES Proceed to STEP 2.

NO The PIP for this condition begins at STEP 3.

STEP 2

On the processor board, there is a light-emitting diode (LED) that will light only when all of the power supply regulators are maintaining their correct voltages (see Figure 4-2).

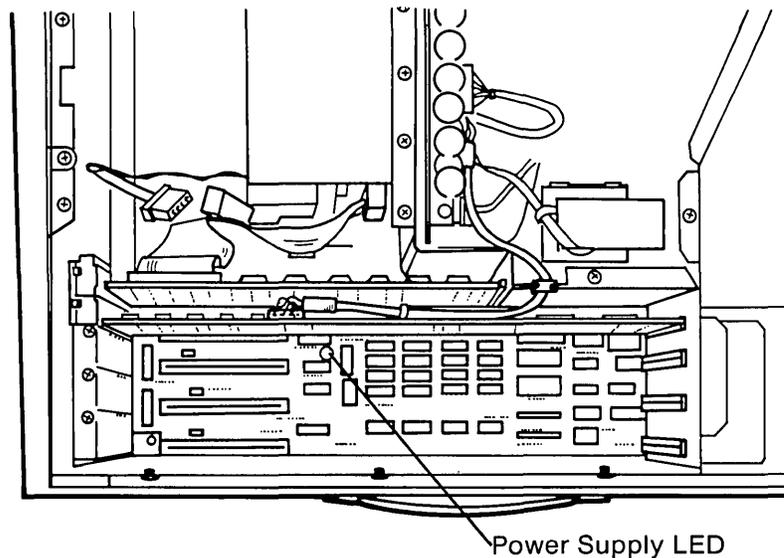


Figure 4-2. Power Supply LED.

IS THE LED ON THE PROCESSOR BOARD LIT AFTER YOU POWER-ON THE SYSTEM?

YES This indicates that the power supply is functioning properly. Refer back to Chapter 2, SYSTEM PROBLEM ISOLATION GUIDE.

NO If the fan is on and the LED is not lit, one of the remaining subsystems may be causing the power supply to go into a current-limiting condition.

To check for this, power-off the system and remove any third party printed circuit boards. Now power-on the system and try again. If the LED is still not lit, remove one of the adapter boards from the card cage (see Figure 4-3).

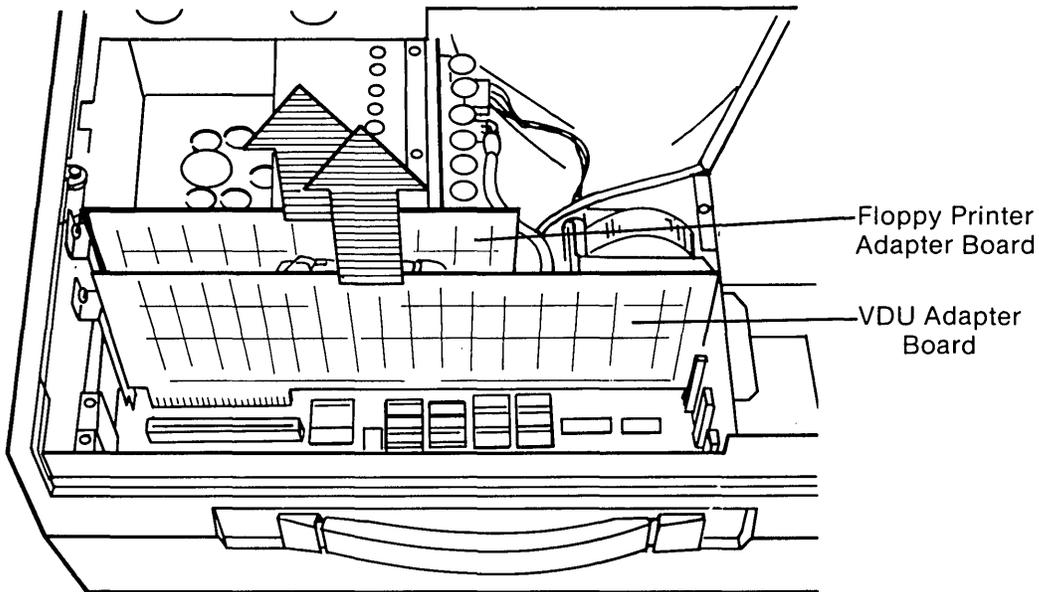


Figure 4-3. Removing Adapter Boards.

After removing one board, power-on the system and observe the processor board LED. Repeat this procedure for each adapter board connected to the processor board until all the boards have been removed, or until the LED is lit after you power-on the system.

NOTE: For more information on how to remove the adapter boards, refer to the Removal and Replacement Procedure in Chapter 5.

IS THE LED LIT AFTER REMOVING ANY ONE OF THE ADAPTER BOARDS?

YES Replace the suspected faulty board as described in Chapter 5, CPU/MEMORY SUBSYSTEM. Reinstall all boards removed to this point, and reattach all connectors. Start the System Checkout PIP again to verify that the entire system is functioning properly.

NO If removing the adapter boards did not resolve the problem, the VDU assembly may be defective.

To check for this, power-off the system and disconnect the power cable to the VDU assembly as shown in Figure 4-4 (leave all previously-removed boards out of the system). Refer to the Removal and Replacement Procedure for the VDU assembly contained in Chapter 7 for more information on how to access the VDU assembly.

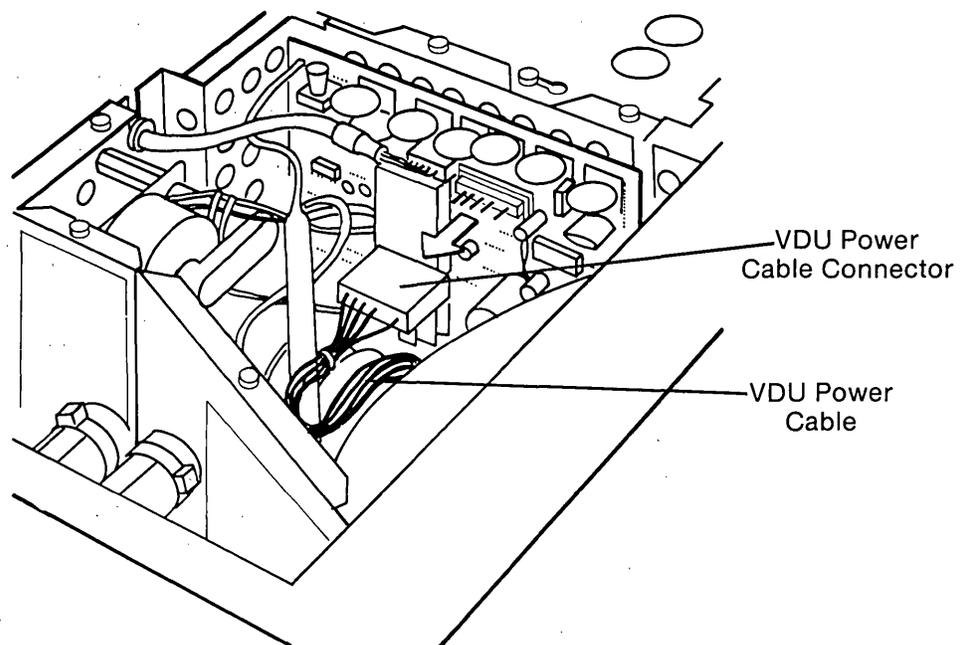


Figure 4-4. Disconnecting VDU Power Cable.

IS THE LED LIT AFTER DISCONNECTING THE POWER CABLE TO THE VDU ASSEMBLY?

YES Replace the VDU assembly as described in Chapter 7, VIDEO DISPLAY UNIT SUBSYSTEM. Reinstall all boards removed to this point, and reattach all connectors. Start the System Checkout PIP again to verify that the entire system is functioning properly.

NO If disconnecting the power cable from the VDU assembly does not resolve the problem, the disk drive may be defective.

To check for this, power-off the system, and disconnect the power connector and signal cable from one disk drive as shown in Figure 4-5. Refer to the Removal and Replacement Procedure for the disk drive subsystem contained in Chapter 8 for more information on how to remove the disk drive cable connections.

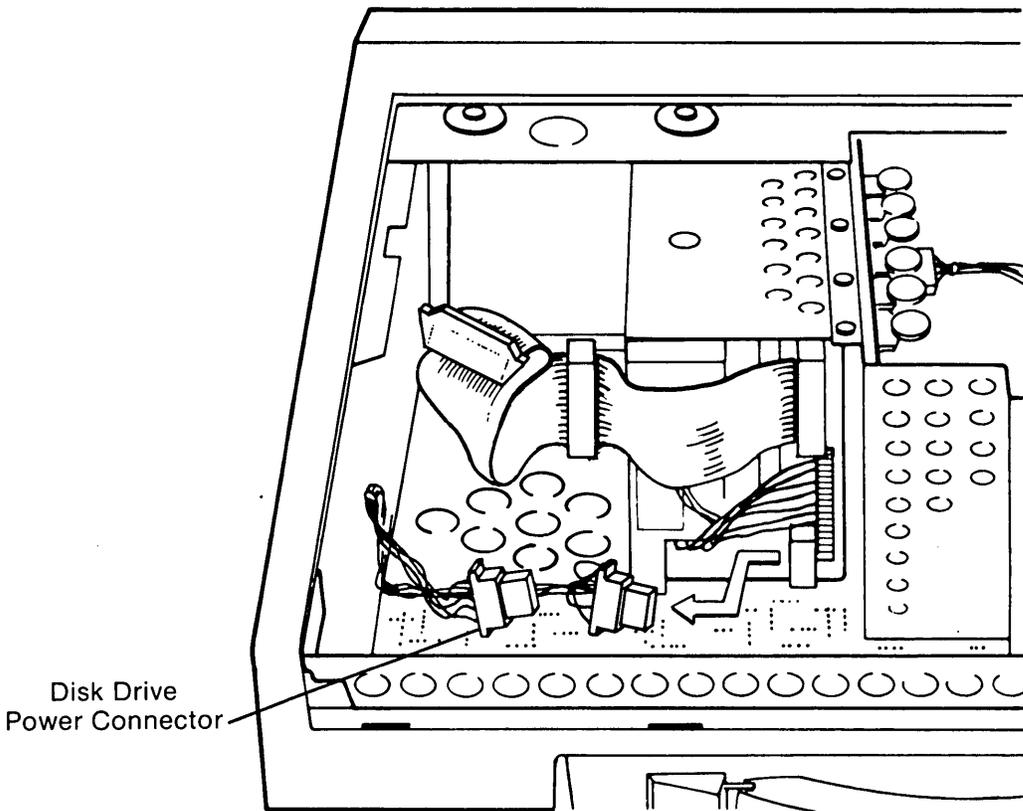


Figure 4-5. Disconnecting Disk Drive Power Connector.

Do not replace any boards removed to this point, or reconnect the VDU assembly power cable.

After disconnecting the disk drive cables, power-on the system and observe the processor board LED.

IS THE LED LIT AFTER DISCONNECTING THE DISK DRIVE CABLES?

YES Replace the disk drive assembly as described in Chapter 8, DISK DRIVE SUBSYSTEM. Reinstall all boards removed to this point, and reattach all connectors. Start the System Checkout PIP again and verify that the entire system is functioning properly.

NO If your system is equipped with dual disk drives, follow the same procedure described above to disconnect the power and signal cables from the remaining disk drive. Once again power-on the system, and observe the processor board LED. If the LED is still not lit, power-off the system and replace the processor board as described in Chapter 5, CPU MEMORY SUBSYSTEM.

NOTE: Do not replace any other boards removed to this point, or reconnect the VDU assembly or disk drive power cables.

Power-on the system again and observe the processor board LED.

IS THE LED LIT AFTER REPLACING THE PROCESSOR BOARD?

YES Reinstall all boards removed to this point and reattach all connectors. Start the System Checkout PIP again to verify that the entire system is functioning properly.

NO If none of the subsystems you have checked to this point appear to be the source of the problem, it is likely that the power supply is defective.

To verify this condition, power-off the system and replace the power supply board. Refer to the Removal and Replacement Procedure located at the end of this chapter for more information on how to replace the power supply board.

NOTE: Do not replace any other boards removed to this point, or reconnect the VDU assembly or disk drive power cables.

Power-on the system again and observe the processor board LED.

IS THE LED LIT AFTER REPLACING THE POWER SUPPLY BOARD?

- YES** Reinstall all boards removed to this point, and reattach all connectors. Start the System Checkout PIP again to verify that the entire system is functioning properly.
- NO** If none of the steps taken to this point seem to be the source of the problem, contact the COMPAQ Technical Support Department for further technical assistance.

STEP 3

IS THE LED ON THE PROCESSOR BOARD LIT AFTER YOU POWER-ON THE SYSTEM? (REFER TO THE INTRODUCTION TO STEP 2 FOR THE LOCATION OF THE LED).

- YES** This indicates that the power supply board is functioning properly. The cooling fan power connector may not be secure, or the fan assembly itself may be defective.
- To check for this, power-off the system and check the fan connection on the power supply board. If the connection is secure, replace the fan as described in the Removal and Replacement Procedure for the Fan Assembly located at the end of this chapter. Start the System Checkout PIP again to verify that the entire system is functioning properly.
- NO** If neither the fan nor the LED are functioning correctly, there may be a problem in supplying ac line voltage to the system.

Check the ON/OFF switch to make sure that it is in the ON position. Then check the ac outlet to make certain that it is outputting the correct ac voltage by using a conventional circuit tester, or simply by connecting a known-good appliance into the ac outlet.

IS THE ON/OFF SWITCH IN THE "ON" POSITION, AND IS THE AC OUTLET FUNCTIONAL?

- YES** The malfunction may be due to a blown fuse.
- To check for this, power-off the system and disconnect the power cord from the computer. Remove the fuse holder from the ON/OFF switch assembly and inspect the fuse. Refer to the Removal and Replacement Procedure for the Power Fuse on page 4-29, for more information on how to access the power fuse.
- NO** Set the ON/OFF switch to the ON position, and locate a working ac outlet. Plug the COMPAQ Portable Computer line cord into the ac outlet. Start the System Checkout PIP again to verify that the entire system is functioning properly.

IS THE FUSE OPERATIONAL?

YES The ON/OFF switch may either be improperly secured to the power supply board, or may be defective.

Check the ON/OFF switch connection on the power supply board. If it is secure, replace the ON/OFF switch as described in the Removal and Replacement Procedure for the Line Filter Assembly located at the end of this chapter. Start the System Checkout PIP again to verify that the entire system is functioning properly.

NO Replace the blown fuse with a new fuse, and reinstall the fuse holder. Reconnect the line power cord and power-on the system.

NOTE: The “blown fuse” condition may have been due to a one-time event (such as a mechanical shock, defective fuse, power surge, etc). It may, however, indicate a power supply board failure.

DID THE FUSE BLOW A SECOND TIME?

YES Replace the power supply board according to the Removal and Replacement Procedure for the Power Supply, located at the end of this chapter. Start the System Checkout PIP again to verify that the entire system is functioning properly.

NO The power supply subsystem should be operational. Start the System Checkout PIP again to verify that the entire system is functioning properly.

If you still cannot isolate the source of the problem, contact the COMPAQ Technical Support Department for further technical assistance.

Removal and Replacement Procedure For The Power Supply Subsystem

Power Supply Assembly

*** * * WARNING * * ***

Before opening the unit's case to perform any removal, replacement, or maintenance procedures, disconnect the line cord from the ac outlet and set the ON/OFF switch to the OFF position before disconnecting the cord. Otherwise, dangerous voltages may be present throughout the system.

STEP:

ACTION:

1

Place the computer on a level surface, such as a table or workbench with the handle assembly facing you (see Figure 4-6).

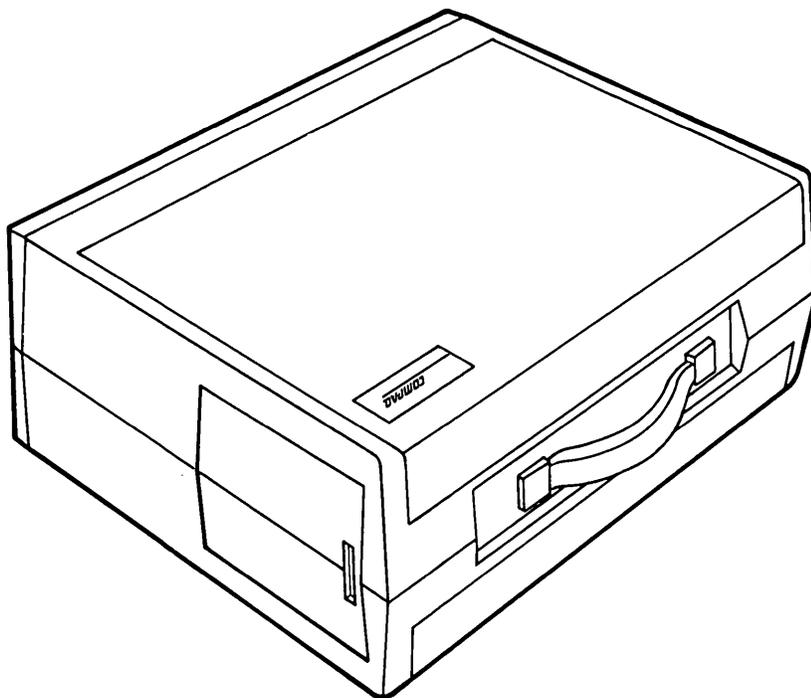


Figure 4-6. Computer on Work Surface.

STEP:

ACTION:

2

Open the top access cover by pressing down on the plastic cover of the unit with one hand next to the COMPAQ logo (see Figure 4-7a). As pressure is applied, the plastic cover will bulge at the connecting seam which runs directly above the handle. Partially insert a plastic card under the cover at the bulge, and release the hand pressure applied. At the opposite end of the plastic cover (see Figure 4-7b), apply pressure with your hand in the same manner as previously done. When the plastic cover bulges, reach under the cover and pull upward and outward, then slide cover out (see Figure 4-7c).

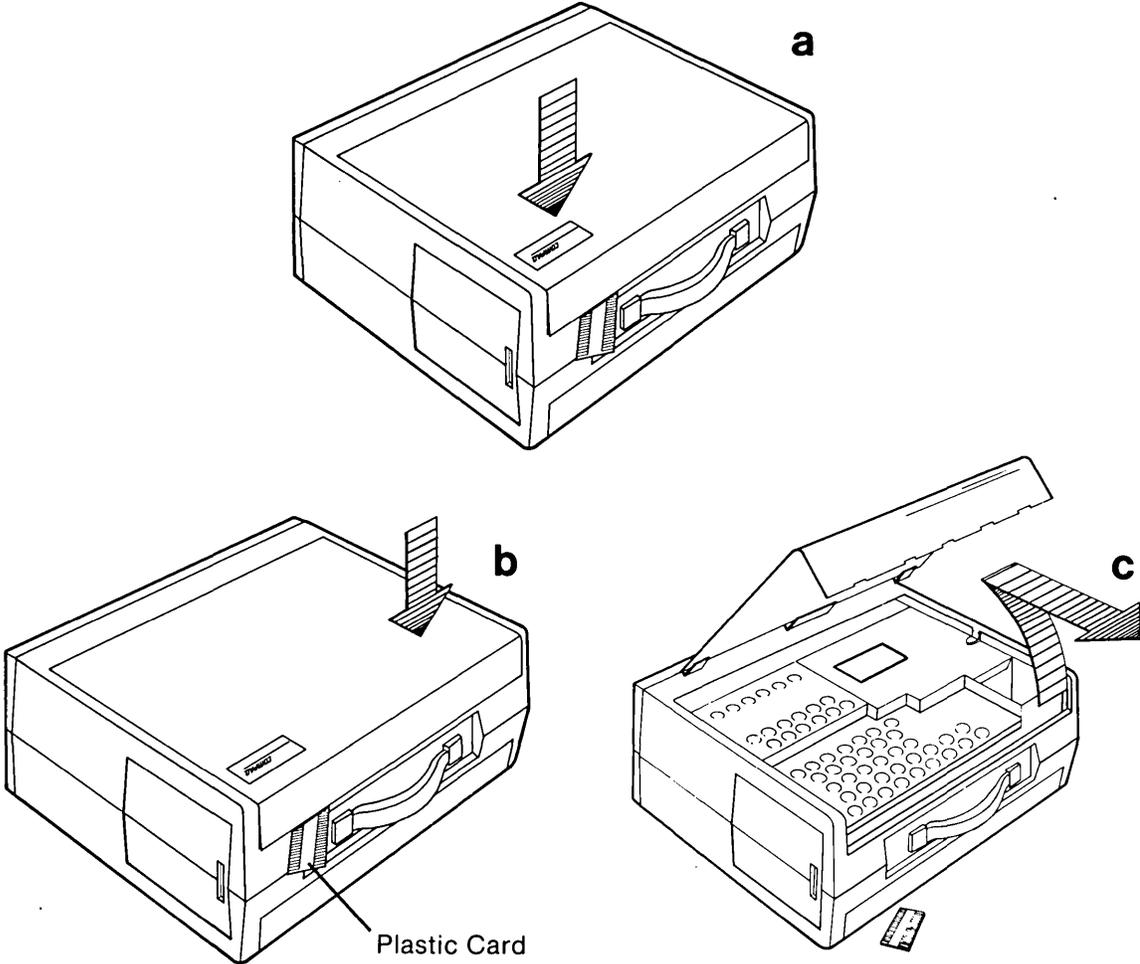


Figure 4-7. Removing Top Cover.

STEP:

ACTION:

3

Loosen (DO NOT REMOVE) the six (6) Phillip screws and the two (2) 1/4" nuts which hold the metal access cover over the power supply/VDU assembly compartment. Slide the metal cover toward the rear of the computer and lift it off (see Figure 4-8).

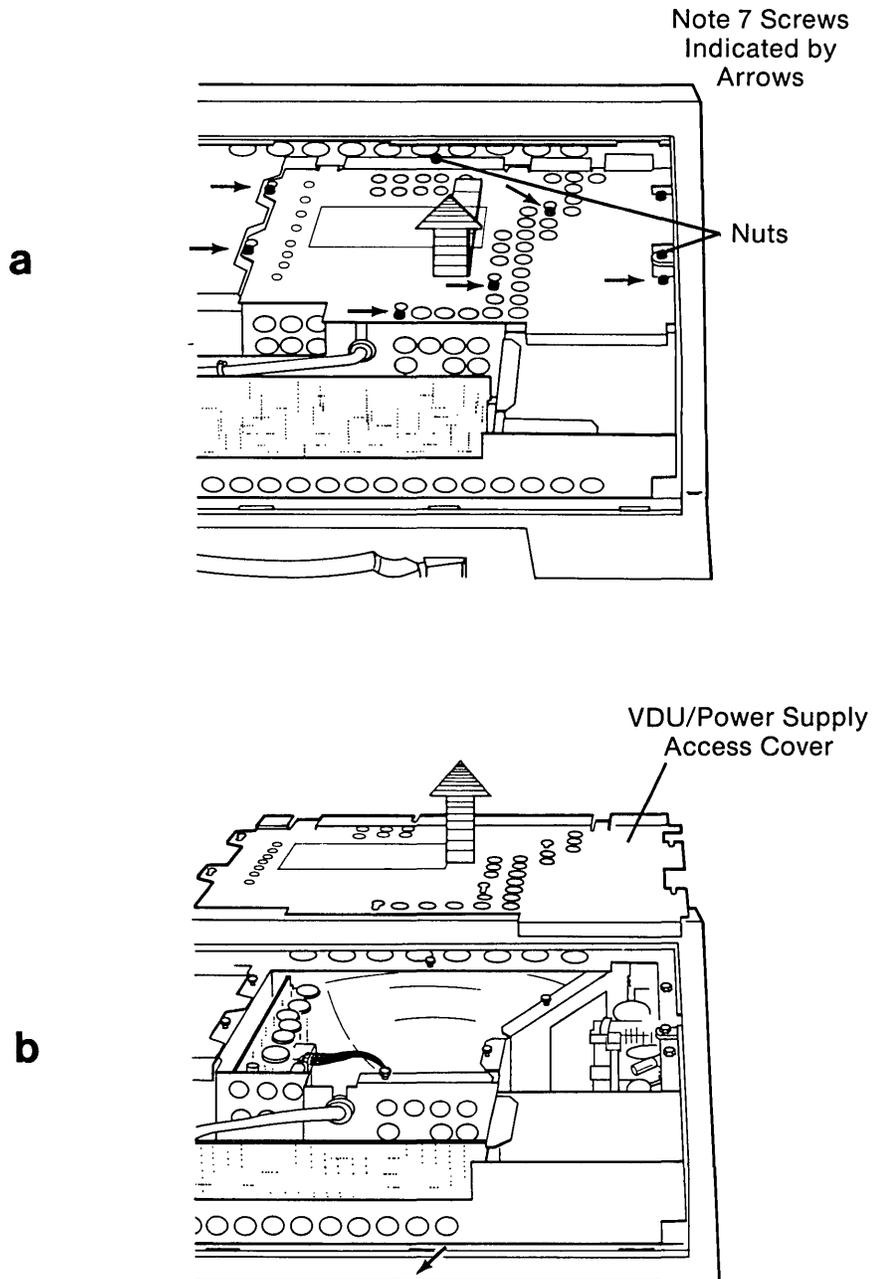


Figure 4-8. Removing the Power Supply Metal Access Cover.

STEP:

ACTION:

4

Slide open the power compartment access door located on the side of the computer. Remove the two (2) screws holding the ON/OFF switch assembly in place (see Figure 4-9a). Lift the switch assembly out and place it on the system chassis (see Figure 4-9b). It is not necessary to disconnect the ON/OFF switch assembly ground strap.

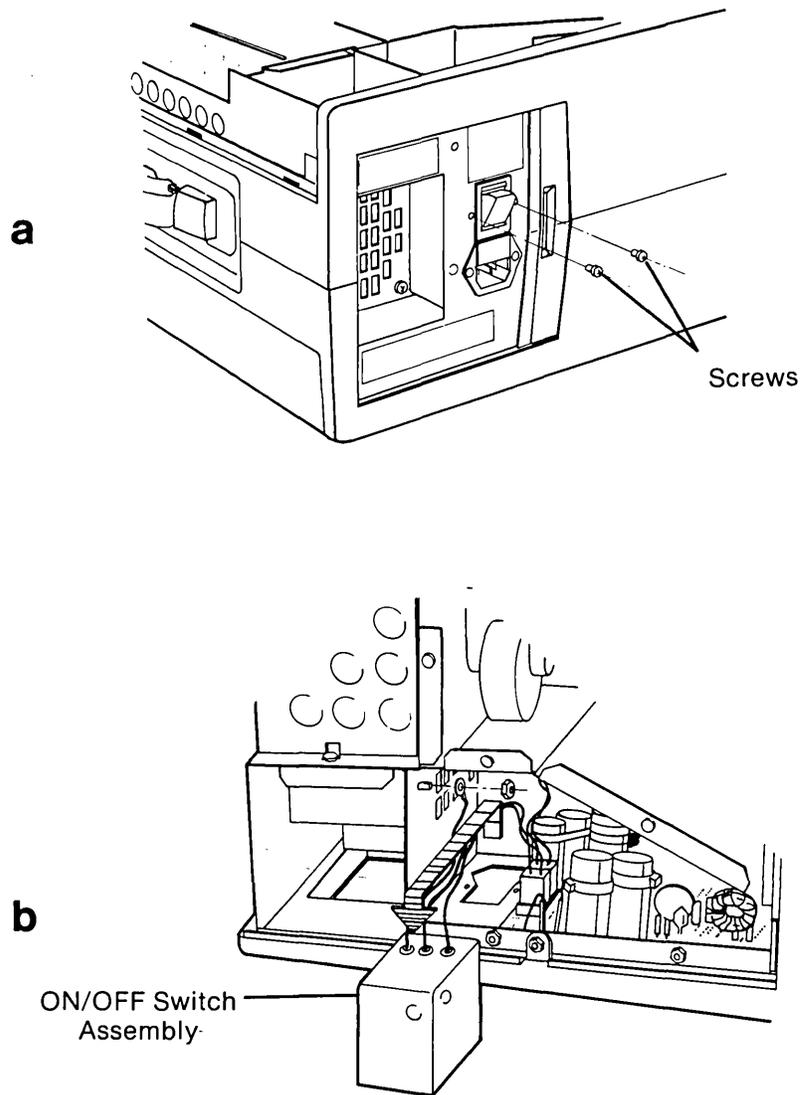


Figure 4-9. Removing the ON/OFF Switch Assembly.

4-14 Maintenance and Service Guide

STEP:

ACTION:

5

Using a 5/16" box wrench, reach in through the ON/OFF switch assembly opening and unscrew the spring-loaded hex-head screw on the lower corner of the power supply board (see Figure 4-10). The screw is held by a retainer and will remain in the board.

NOTE: When replacing the board, make sure that this screw is reattached securely.

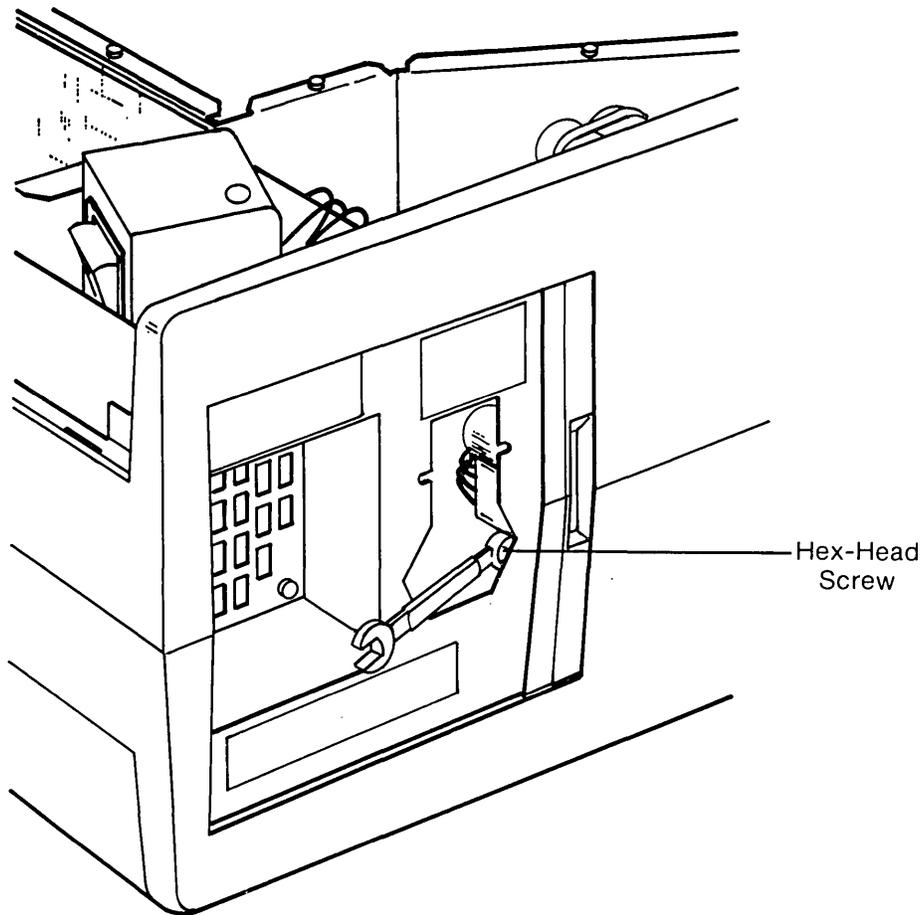


Figure 4-10. Removing Hex-head Screw From the Power Supply Board.

STEP:

ACTION:

6

Unplug the two (2) connectors from the top of the power supply board (see Figure 4-11).

***** CAUTION *****

Pull only on the connectors. Pulling on the wires will damage the connectors.

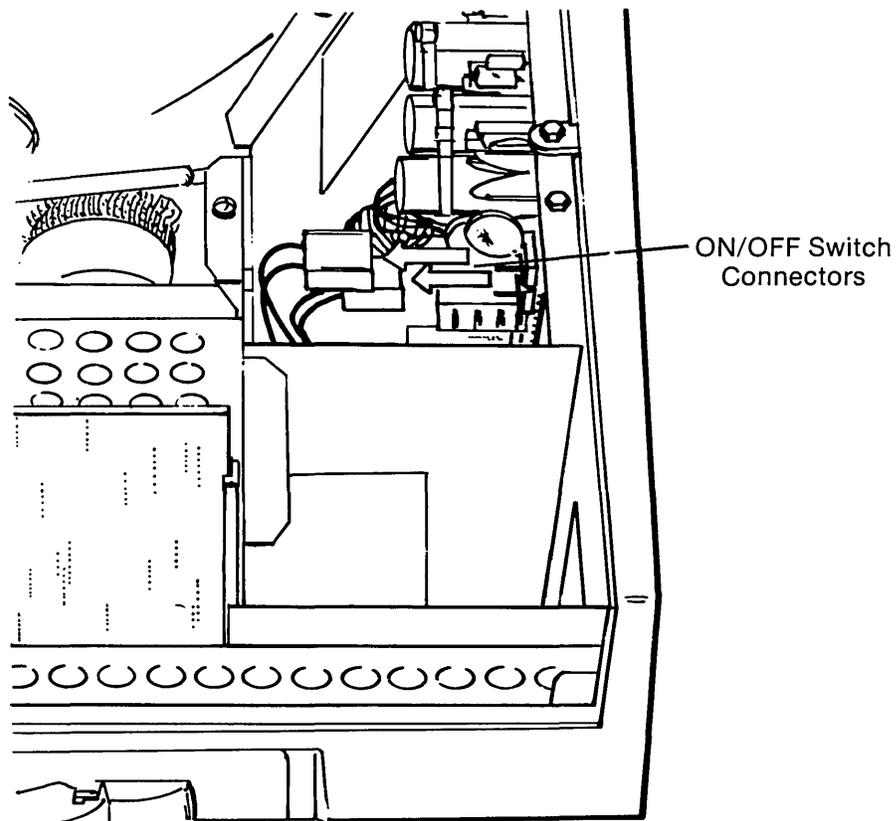


Figure 4-11. Removing ON/OFF Connectors From Power Supply Board.

STEP:

ACTION:

7

Slide the power supply board toward the rear of the computer to disengage the three (3) standoffs from the slots in the chassis. This will release the power supply board from the system chassis (see Figure 4-12).

Carefully lift the power supply board out of the system chassis and gently remove all remaining connectors from the board.

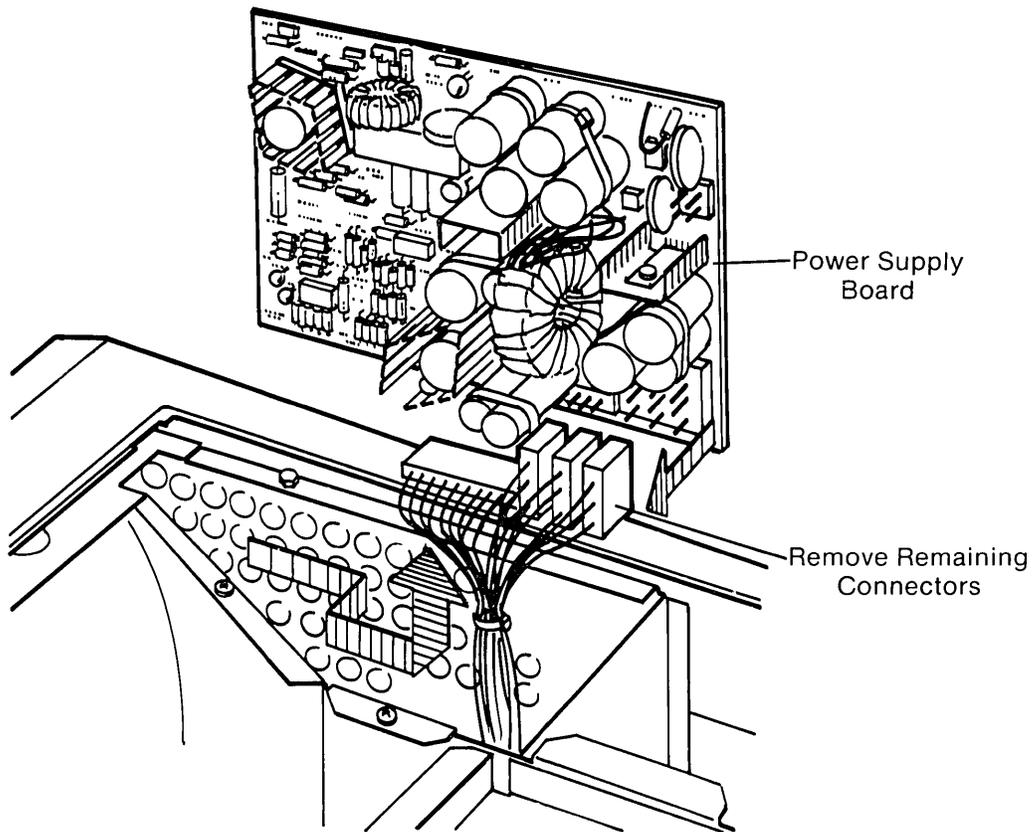


Figure 4-12. Removing the Power Supply Board.

To replace the power supply board, reverse Steps 1 through 7.

Removal And Replacement Procedures For The Fan Assembly

Fan With Bracket Assembly

*** * * W A R N I N G * * ***

Before opening the unit's case to perform any removal, replacement, or maintenance procedures, disconnect the line cord from the ac outlet and set the ON/OFF switch to the OFF position. Otherwise, dangerous voltages may be present throughout the system.

STEP:

ACTION:

1

Place the computer on a level surface, such as a table or workbench, with the handle assembly facing you (see Figure 4-13).

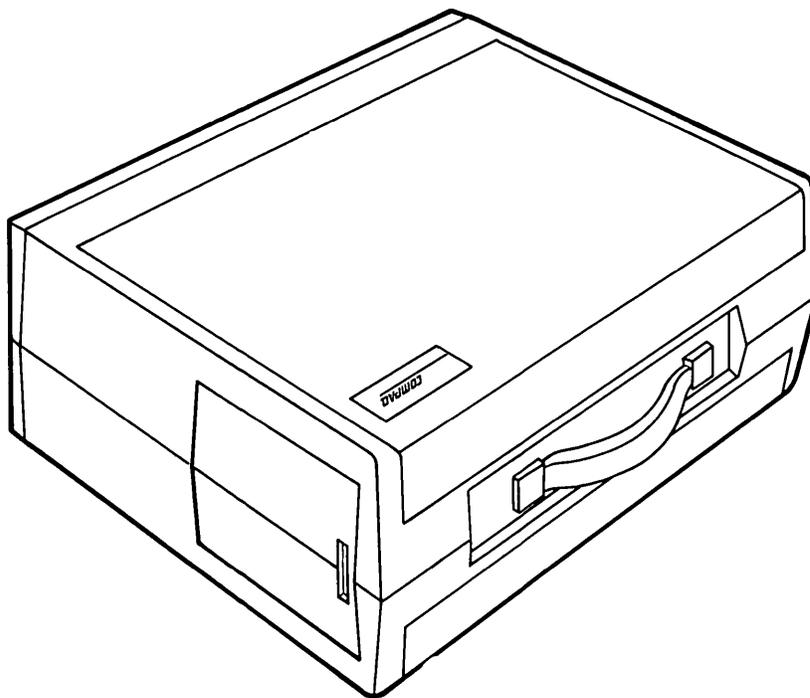


Figure 4-13. Computer on Work Surface.

STEP:

ACTION:

2

Open the access cover by pressing down on the plastic cover of the unit with one hand next to the COMPAQ logo (see Figure 4-14a). As pressure is applied, the plastic cover will bulge at the connecting seam which runs directly above the handle. Partially insert a plastic card under the cover at the bulge, and release the hand-pressure applied. At the opposite end of the plastic cover (see Figure 4-14b), apply pressure with your hand in the same manner as previously done. When the plastic cover bulges, reach under the cover and pull upward and outward, then slide cover out (see Figure 4-14c).

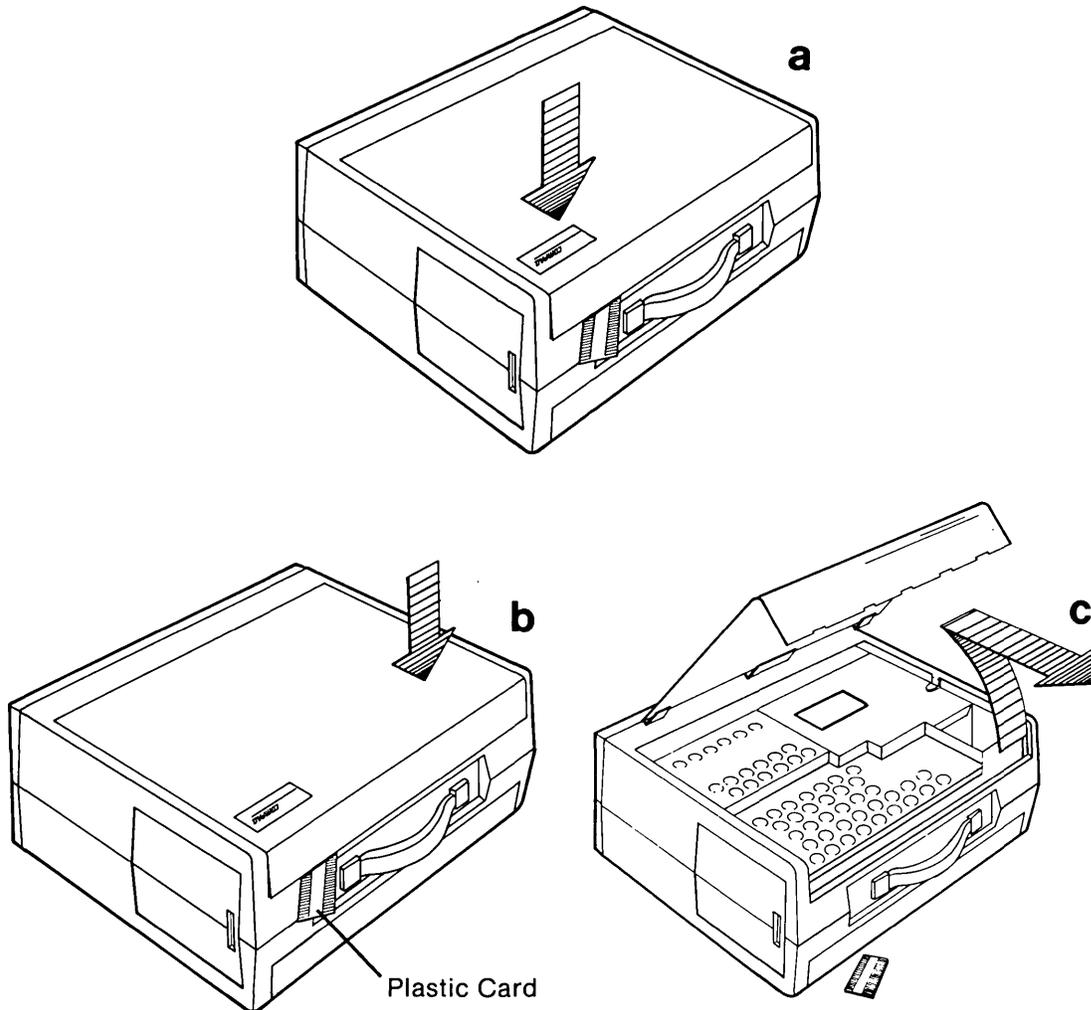


Figure 4-14. Removing Top Cover.

STEP:

ACTION:

3

Loosen (DO NOT REMOVE) the six (6) Phillip screws and the two (2) 1/4" nuts which hold the metal access cover over the Power Supply/VDU assembly compartment. Slide the metal cover toward the rear of the computer and lift it off (see Figure 4-15 a & b).

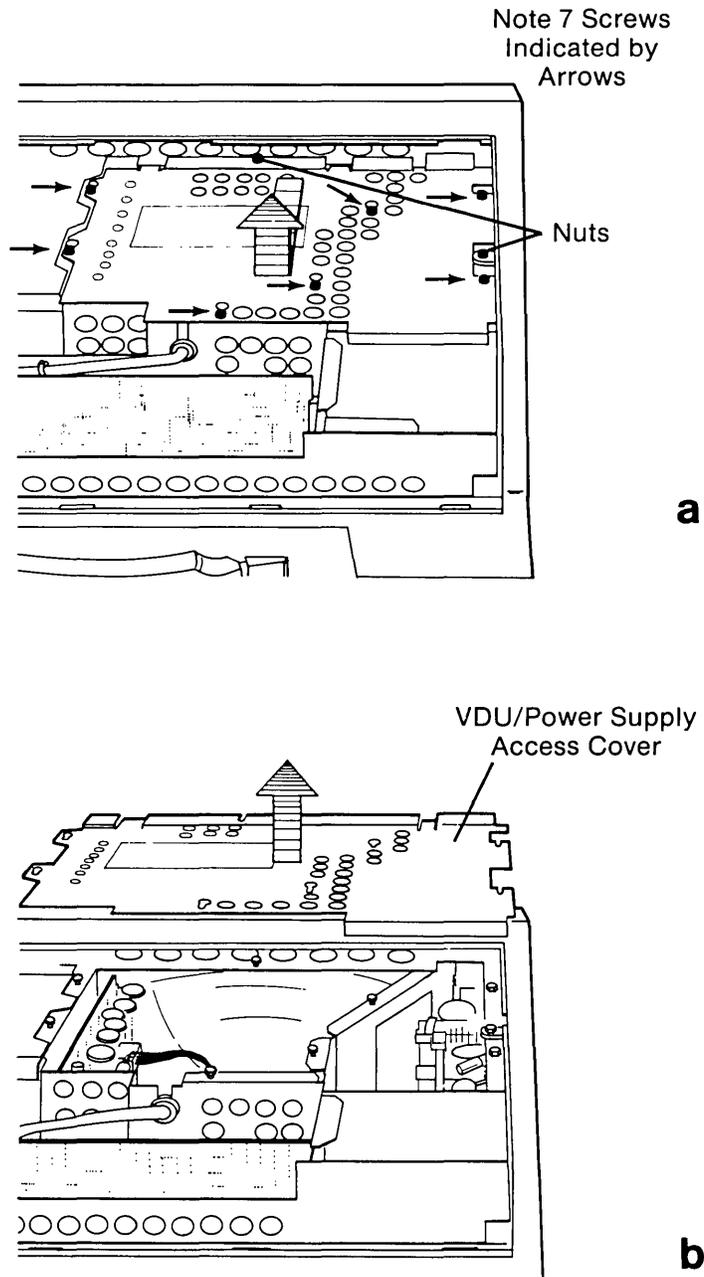


Figure 4-15. Removing the VDU/Power Supply Metal Access Cover.

STEP:

ACTION:

- 4 Unplug the fan assembly connector from the power supply board (see Figure 4-16).

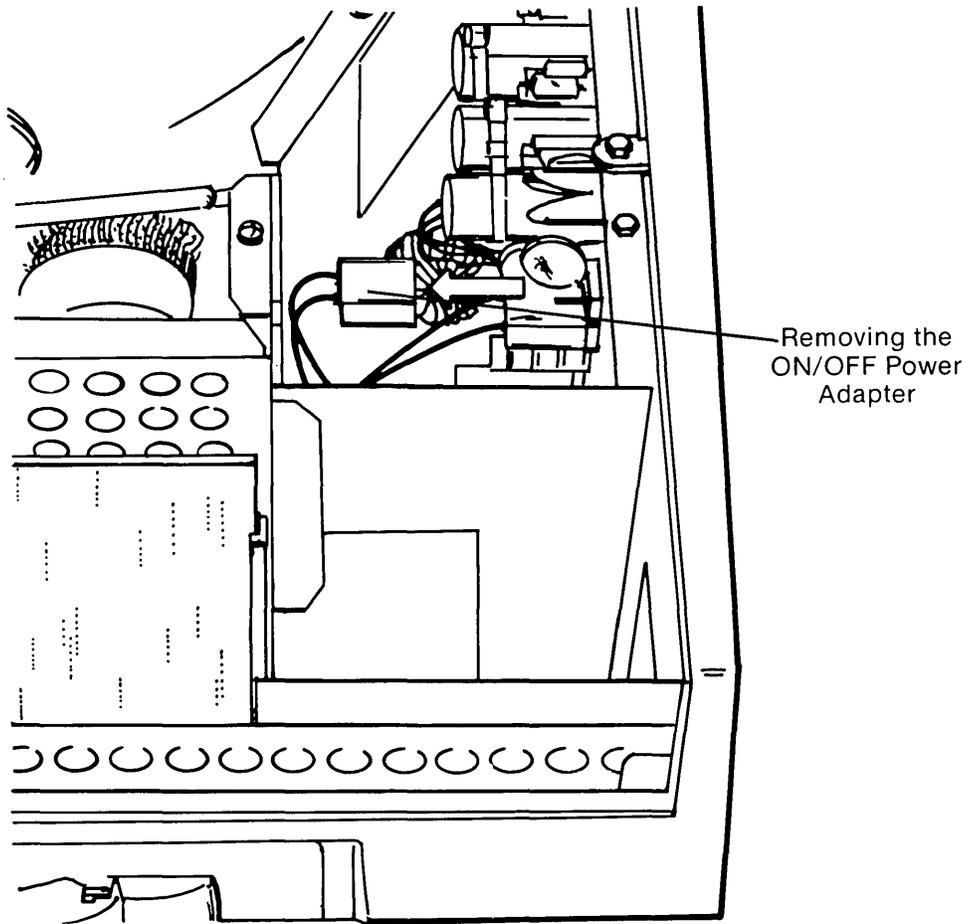


Figure 4-16. Removing Connector From Power Supply Board.

***** CAUTION *****

Pull only on the connector. Pulling on the wires will damage the connector.

STEP:

ACTION:

5

Remove the four (4) screws holding the fan and bracket assembly in place (see Figure 4- 17a). Then carefully lift the fan assembly out and away from the system chassis (see Figure 17b).

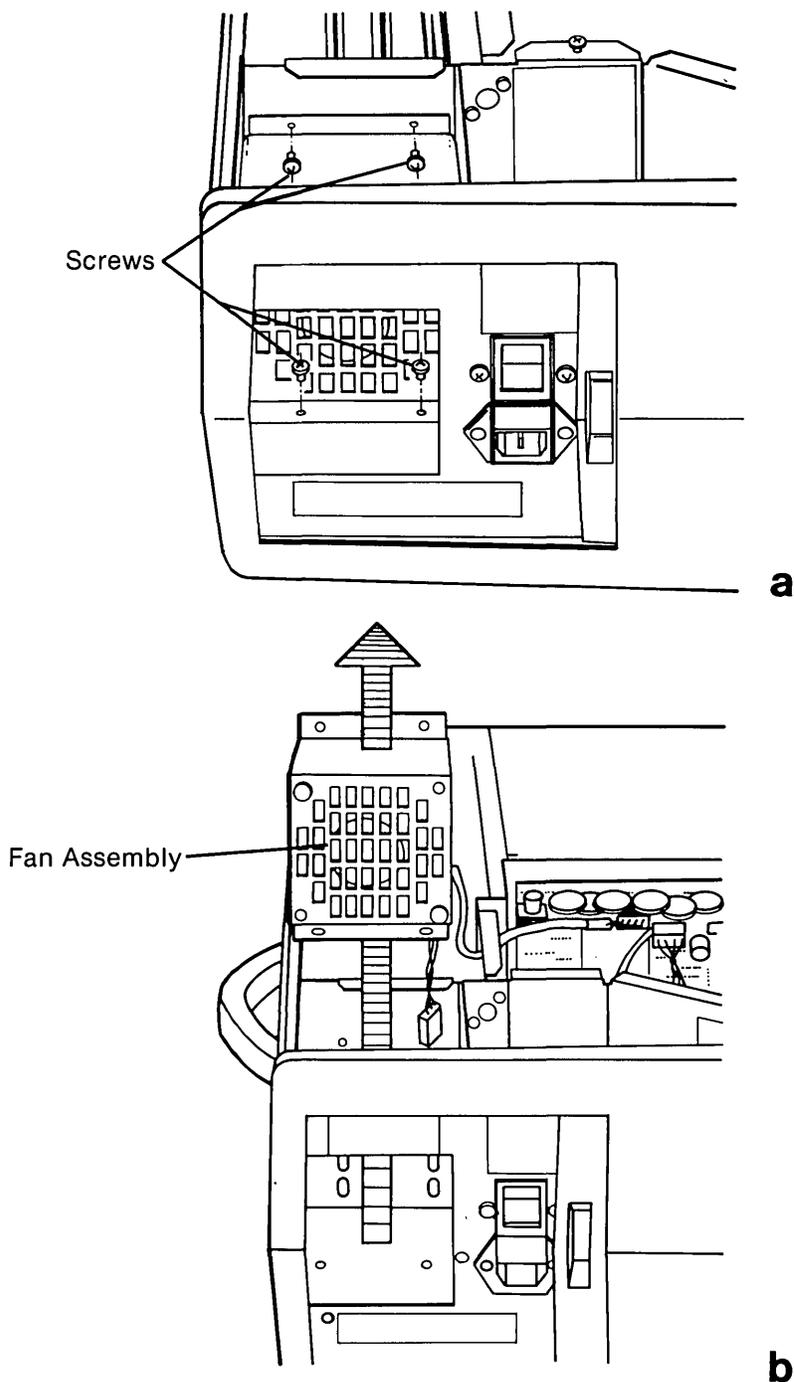


Figure 4-17. Removing the Fan Assembly.

To replace the fan assembly, reverse Steps 1 through 5.

Removal And Replacement Procedure Of The Line Filter Assembly

Line Filter Assembly

*** WARNING ***

Before opening the unit's case to perform any removal, replacement, or maintenance procedures, disconnect the line cord from the ac outlet and set the ON/OFF switch to the OFF position. Otherwise, dangerous voltages may be present throughout the system.

STEP:

ACTION:

1

Place the computer on a level surface, such as a table or workbench, with the handle assembly facing you (see Figure 4-18).

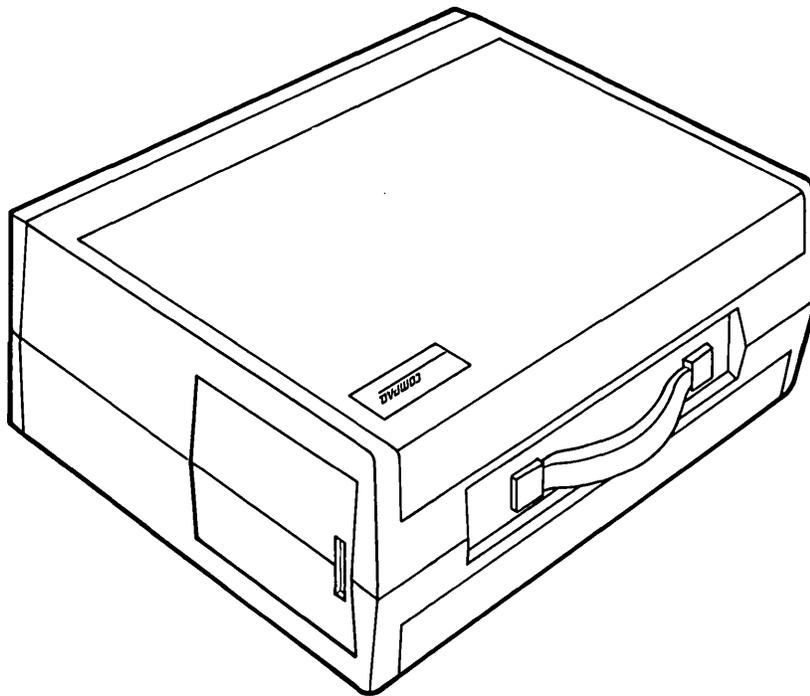


Figure 4-18. Computer on Work Surface.

STEP:

2

ACTION:

Open the access cover by pressing down on the plastic cover of the unit with one hand next to the COMPAQ logo (see Figure 4-19a). As pressure is applied, the plastic cover will bulge at the connecting seam which runs directly above the handle. Partially insert a plastic card under the cover at the bulge, and release the hand pressure applied. At the opposite end of the plastic cover (see Figure 4-19b), apply pressure with your hand in the same manner as previously done. When the plastic cover bulges, reach under the cover and pull upward and outward, then slide cover out (see Figure 4-19c).

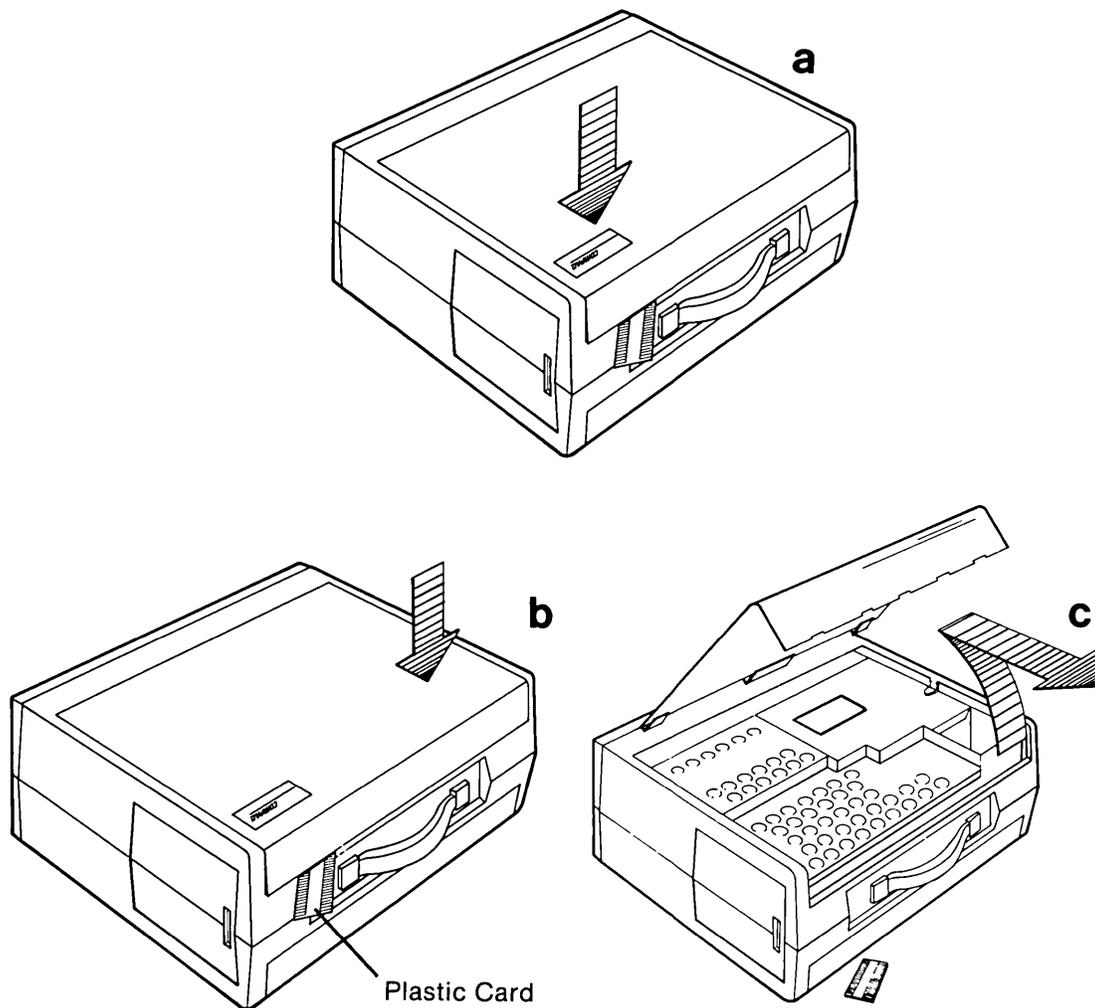


Figure 4-19. Removing Top Cover:

STEP:

ACTION:

3

Loosen (DO NOT REMOVE) the six (6) Phillips screws and the two (2) 1/4" nuts which hold the access cover over the power supply/VDU assembly compartment. Slide the cover toward the rear of the computer and lift it off (see Figure 4-20).

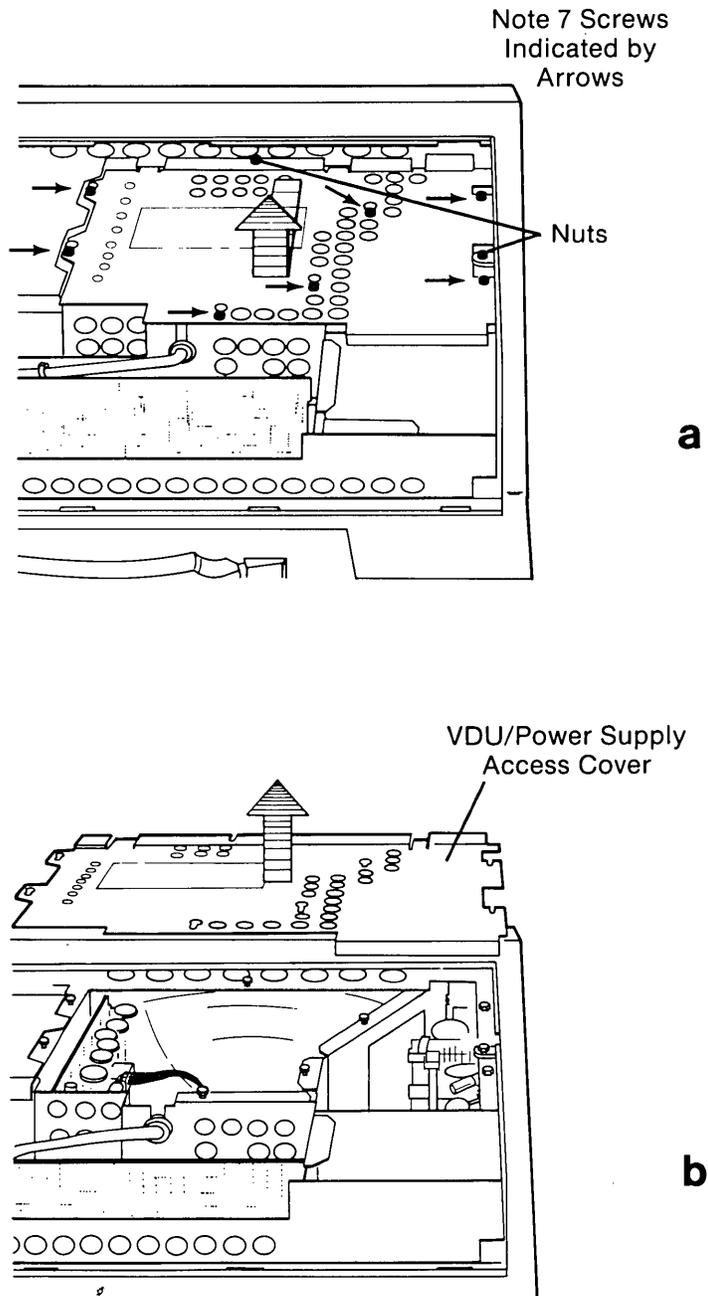


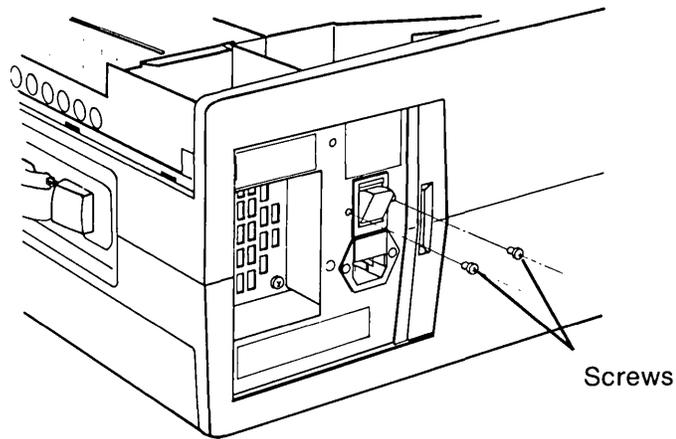
Figure 4-20. Removing the Power Supply Access Cover.

STEP:

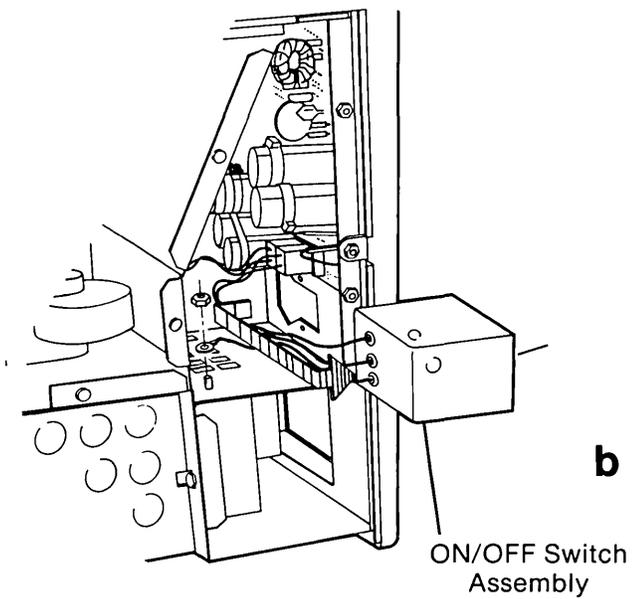
ACTION:

4

Slide open the power compartment access door located on the side of the computer. Remove the two (2) screws holding the ON/OFF switch assembly in place (see Figure 4-21a). Lift the switch assembly out and place it on the system chassis (see Figure 4-21b).



a



b

Figure 4-21. ON/OFF Switch Assembly.

STEP:

ACTION:

5

Unplug the ON/OFF switch assembly connector from the power supply board (see Figure 4-22).

***** CAUTION *****

Pull only on the connectors. Pulling on the wires will damage the connector.

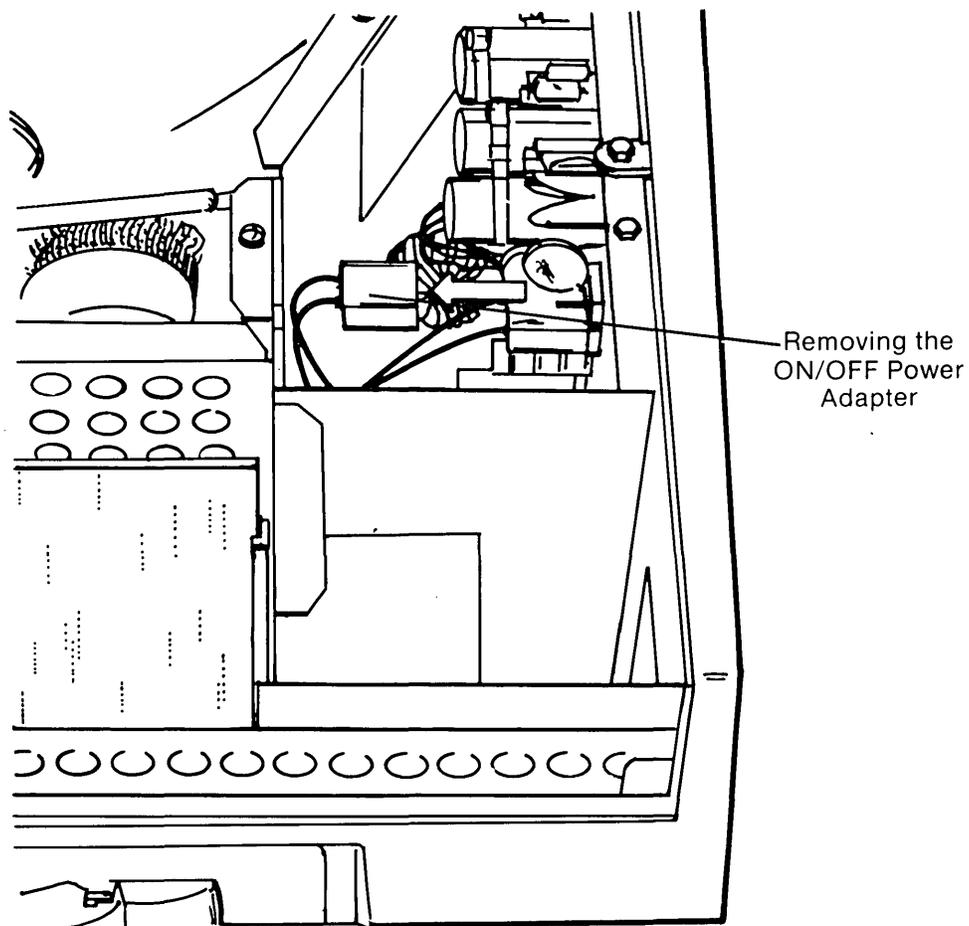
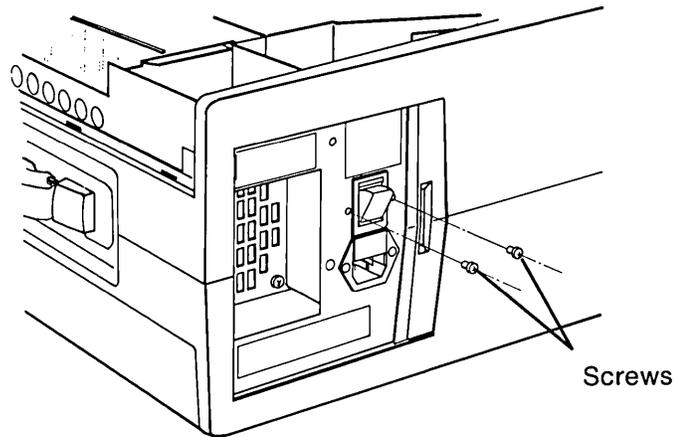
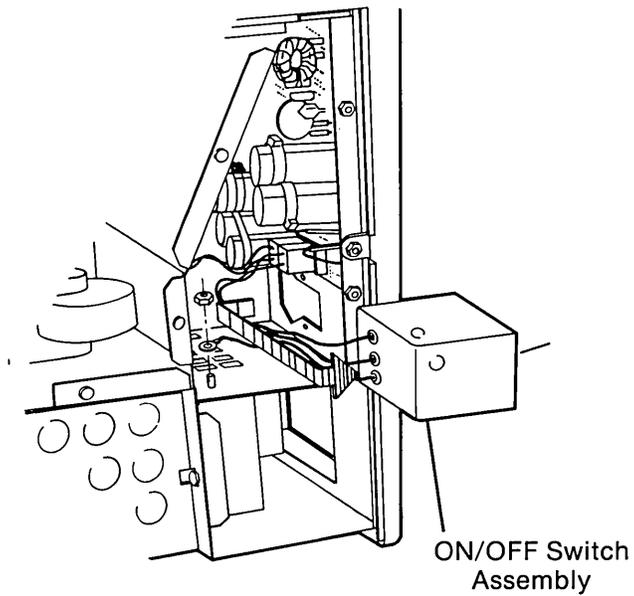


Figure 4-22. Unplugging ON/OFF Switch Assembly Adapter from the Power Supply Board.

Remove the 1/4" nut securing the ON/OFF switch ground strap and carefully lift the ON/OFF switch assembly up and away from the system chassis (see Figure 4-23).



a



b

Figure 4-23. Removing the ON/OFF Switch Assembly.

To replace the ON/OFF switch assembly, reverse Steps 1 through 5.

Removal And Replacement Procedure For The Power Fuse

Power Fuse

*** WARNING ***

Before opening the unit's case to perform any removal, replacement, or maintenance procedures, disconnect the line cord from the ac outlet and set the ON/OFF switch to the OFF position. Otherwise, dangerous voltages may be present throughout the system.

The fuse is located just above the power connection (see Figure 4-24). Use the following procedure to replace the fuse:

- | STEP: | ACTION: |
|-------|--|
| 1 | Disconnect the power cord from the wall outlet. Then disconnect it from the power cord connection on the left side of the computer. |
| 2 | Insert a flat-bladed screwdriver along the bottom edge of the fuse box (see Figure 4- 24). Pry outward with enough pressure to force the fuse box out of the casing. |

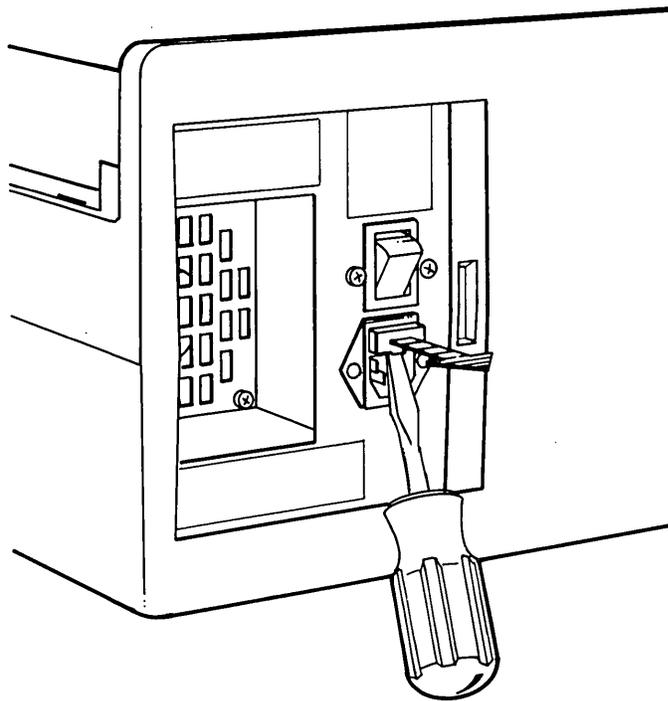


Figure 4-24. Removing the Fuse Holder From the ON/OFF Switch Assembly.

STEP:

ACTION:

- 3 Once the fuse box is out, you will see a spare fuse provided in a holding area in the fuse box (see Figure 4-25). Lift out the faulty fuse, and replace it with the spare one.

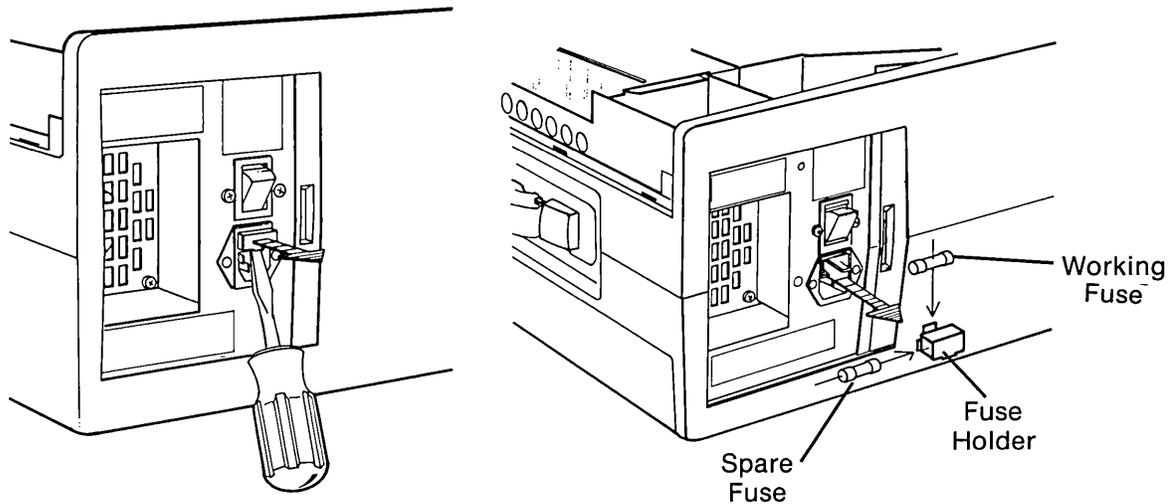


Figure 4-25. Removing the Fuse.

- 4 Slide the fuse box back into the case. With your thumb, press in on the cover until you feel it snap into place. Reconnect the power cord to the computer. Now plug the power cord back into the wall outlet, and try to turn the system on.

To replace the fuse, reverse Steps 1 through 4.

CPU/MEMORY SUBSYSTEM

Configuration/Interface Information

The CPU/Memory subsystem, as discussed in this chapter, will include the processor board assembly and the on-board memory associated with the COMPAQ Portable Computer (see Figure 5-1).

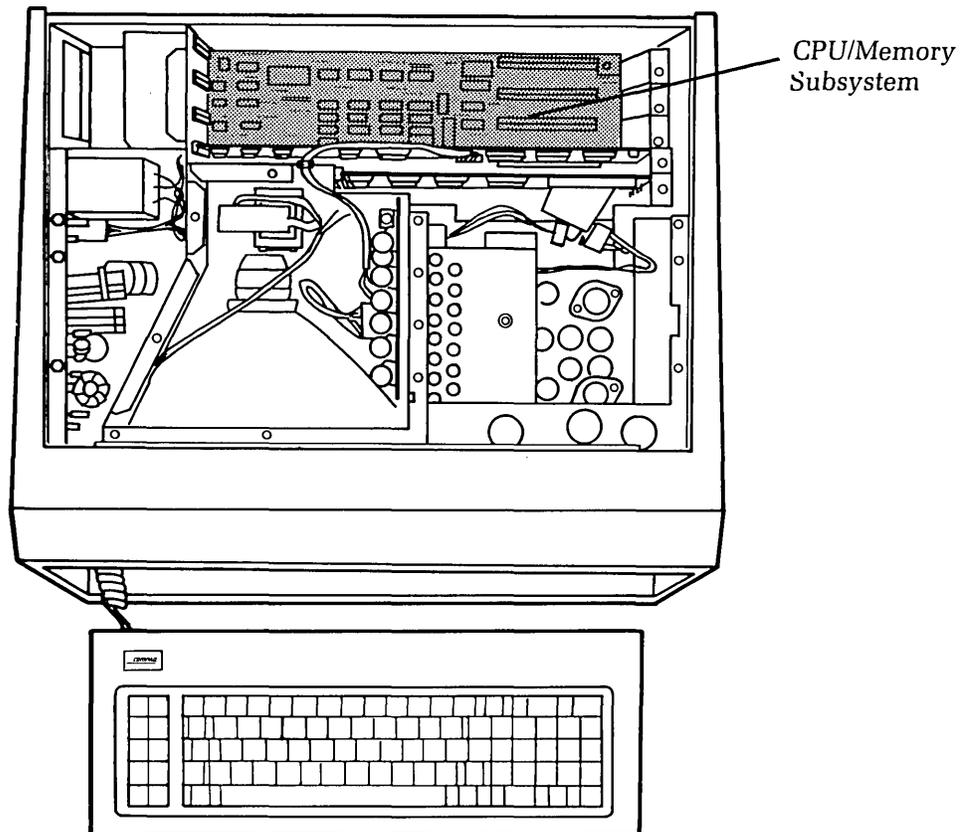


Figure 5-1. CPU/Memory Subsystem.

The COMPAQ Computer processor board contains all of the main electronics for the system, including the 8088 microprocessor, read-only memory (ROM), and 128-Kbytes of on-board random-access memory (RAM) as well as expansion sockets for an additional 128-Kbytes of optional random-access memory (totaling 256-Kbytes). The processor board also contains five (5) built-in expansion slots, of which three (3) slots are available for additional option boards.

Processor Board Configuration

The operational characteristics of the whole computer are largely dependent on the configuration of the processor board. In particular, the revision level of the System ROMs must be established and the switch groupings SW1 and SW2 must be properly configured.

System ROMs

The System ROMs contain specialized software which is used by MS-DOS for such things as video I/O and disk I/O. At the time of this writing (Refer to the COMPAQ Computer Service Bulletin Index to determine the current version of the available MS-DOS) there have been 2 revisions of System ROM released: Revision B and Revision C.

The Rev B ROM was originally released with the system. It will allow all currently available versions of MS-DOS to operate, as long as the MS-DOS does not require a fixed disk drive.

The Rev C ROM was released with the COMPAQ PLUS Portable Computer. It will support all available versions of MS-DOS and will permit the use of fixed disk drives. The Rev C ROM is required if a fixed disk drive is to be available under MS-DOS 2.0.

To upgrade a processor board to use Rev C ROMs, first determine the revision level of the processor board. Refer to Figure 5-2 for location of the processor board's revision designator J111. J111 should normally be jumpered pin 2 to pin 3.

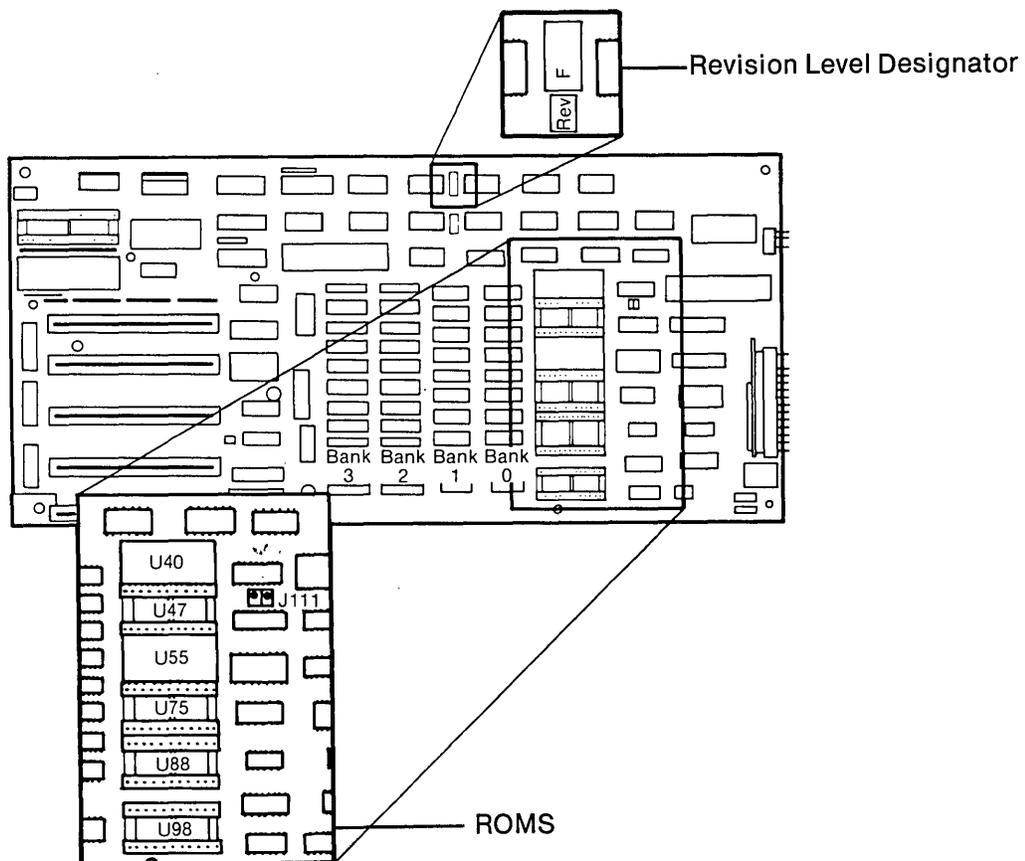


Figure 5-2. Location of Processor Board Revision Level Designator and ROMs.

Once the processor board's revision level has been determined, use the following table to determine where to install the Rev C ROMs:

PROCESSOR BOARD REVISION LEVEL			
ROM ¹ LOCATION	REV C ²	REV D THROUGH REV G	REV H ³ AND UP
U40	**	REV C ROM ⁴	REV C ROM
U47	**	REV C ROM ⁴	EMPTY
U55	**	EMPTY	EMPTY
U75	**	EMPTY	EMPTY
U88	**	EMPTY	EMPTY
U98	**	MPTY	EMPTY

¹ Refer to Figure 5-2 for ROM locations on processor board.

² CONTACT COMPAQ DEALER SUPPORT DEPARTMENT.

³ Processor board jumper J111 must be jumpered pins 2-3.

⁴ Rev C ROM's factory installed.

System Board ROM Requirements For Fixed Disk Drive Operation

Processor Board Switches SW1 & SW2

The way in which the processor board "sees" the rest of the COMPAQ Computer system is defined primarily by the combination of switch settings on SW1 and SW2.

SW1 "describes" to the system how many floppy drives will be available, the type of display to be expected, and whether or not an 8087 co-processor is to be used.

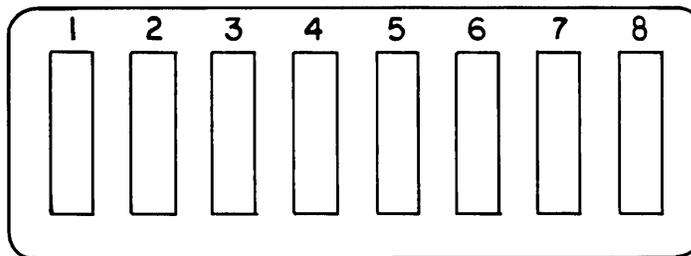
Setting SW2 is only required with Rev B System ROM's. It is used to "describe" the total amount of memory available to the system. The Rev C System ROM's cause the processor board to "ignore" SW2. Instead, the Power On Self-Test determines how much memory the system has available.

The locations of SW1 and SW2 are shown on Page 5-4.

5-4 Maintenance and Service Guide

The following charts are designed to acquaint you with the various combinations of switch settings that may be used with the COMPAQ Portable Computer. You may also use this information as a reference guide when you troubleshoot the CPU/memory subsystem.

Switch Settings

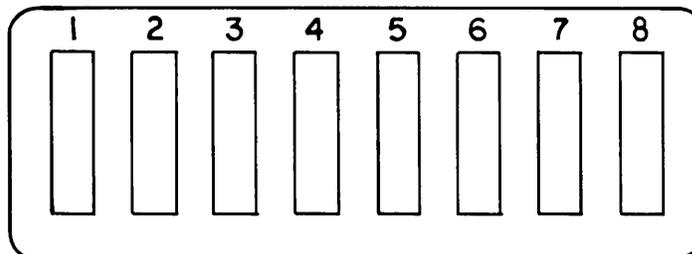


Position:

1-7-8
2
3-4
5-6

Function:

Number of 5¼" disk drives installed.
Reserved for co-processor. Must be on.
Amount of memory on processor board.
Type of monitor being used.



Position:

1-2-3-4
5-6-7-8

Function:

*Quantity of optional memory installed.
Always off.

*Required only if Rev B System ROM's are being used.

HOW TO CONFIGURE THE COMPAQ PORTABLE COMPUTER

SW1:

1	2	3	4	5	6	7	8
0							
						1	1
						0	1
						1	0
						0	0
	1						
		0	0				
				1	0		
				0	0		

ALWAYS OFF (DEFAULT)
 1 DISK DRIVE (DEFAULT)
 2 DISK DRIVES
 3 DISK DRIVES
 4 DISK DRIVES
 ALWAYS ON FOR 8087
 (DEFAULT)
 ALWAYS OFF (DEFAULT)
 COMPAQ VIDEO BOARD
 (DEFAULT)
 OPTIONAL VIDEO
 MONOCHROME BOARDS

SW2:

1	2	3	4	5	6	7	8
1	0	1	1				
1	1	0	1				
1	0	0	1				
1	1	1	0				
1	0	1	0				
1	1	0	0				
1	0	0	0				
0	0	0	0				
				0	0	0	0

128K TOTAL MEMORY (DEFAULT)
 192K TOTAL MEMORY
 256K TOTAL MEMORY
 320K TOTAL MEMORY
 384K TOTAL MEMORY
 448K TOTAL MEMORY
 512K TOTAL MEMORY
 544K - 640K TOTAL MEMORY
 ALWAYS OFF (DEFAULT)

NOTE: 1 = ON
 2 = OFF

Special Note on External Monitors:

You do not need to change any switch settings on the COMPAQ Computer in order to implement external monitors. All required circuitry to support external monitors is functionally active on every standard COMPAQ Computer.

To add an external Monochrome Display, you must reset the switches.

For more information on system/subsystem configuration, contact the COMPAQ Technical Support Department.

Problem Isolation Procedure (PIP)

This procedure is designed to help in determining if the CPU/memory subsystem is functioning properly. The PIP provides a systematic method of identifying and correcting most CPU/memory problems.

As with any troubleshooting procedure, you may encounter some problem that this procedure does not cover. If you complete this PIP without resolving the problem, contact the COMPAQ Technical Support Department for further technical assistance.

If you have not already done so, complete the following actions:

- Step 1. Remove any non-COMPAQ Computer peripheral devices or adapters from the system.
- Step 2. Power-on the system.
- Step 3. Boot the system and load the Advanced Diagnostics diskette. Refer to Chapter 3, SYSTEM CHECKOUT, for more information on loading the Advanced Diagnostics Program.

WERE ANY PROBLEMS ENCOUNTERED IN THE SYSTEM BOOT?

- YES** Refer to Chapter 2, SYSTEM PROBLEM ISOLATION GUIDE, to determine which PIP will assist you in further isolating the cause of the problem.
- NO** If the system booted properly, and contains an AUTOEXEC.BAT file to load the diagnostics, the following menu should appear:

```
The COMPAQ PERSONAL COMPUTER
ADVANCED DIAGNOSTICS MENU
Version 1.00 (c) COPYRIGHT 1982, COMPAQ COMPUTER CORP.
ALL RIGHTS RESERVED

YOUR CHOICES ARE:

0 - RUN THE DIAGNOSTIC TESTS
1 - FORMAT A DISKETTE
2 - COPY A DISKETTE
9 - GO TO THE SYSTEM DISKETTE

Input your choice (0,1,2, or 9)
and press ENTER
?_
```

This menu indicates that the diagnostics are loaded and ready to be executed.

***** CAUTION *****

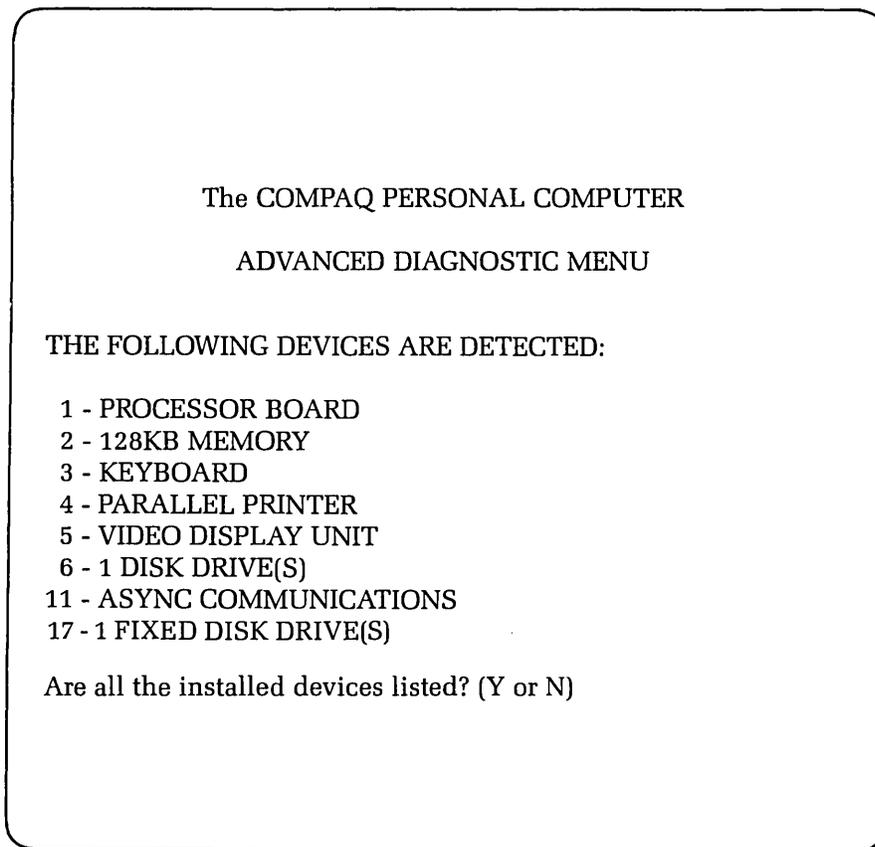
Before continuing to run diagnostics, ensure that your COMPAQ Diagnostics Disk is write protected.

DID YOU GET THE CORRECT MENU AFTER LOADING YOUR DIAGNOSTIC DISKETTE?

NO If the diagnostics did not load automatically, type in DIAG in response to the A>, and then press [ENTER]. This causes the diagnostics to load, if the file DIAG.COM is on your diskette. If the Diagnostics Program still does not load, repeat this procedure with a known-good Advanced Diagnostics diskette. If the problem is not resolved, refer to the PIP in Chapter 8, DISK DRIVE SUBSYSTEM, to further isolate the cause of the problem.

YES This menu indicates that you have successfully loaded the diagnostics and are ready to begin.

In response to the display prompt, Press [0] and then [ENTER] to select RUN THE DIAGNOSTIC TESTS. A display similar to the following should appear on the screen:



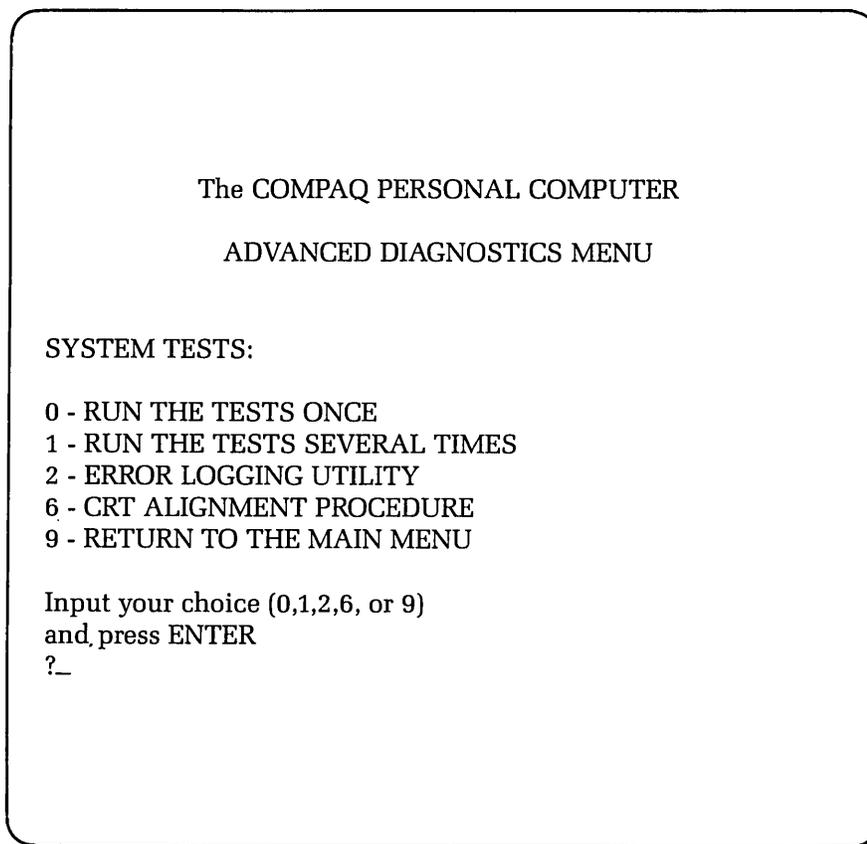
This display allows you to verify the system configuration.

DOES THE DISPLAY ACCURATELY DESCRIBE THE SYSTEM CONFIGURATION?

NO This indicates a possible problem with the setting of the switches (SW1 and SW2) on the processor board. Refer to the configuration portion of this chapter to confirm the positions of SW1 and SW2.

YES Press [Y] and then [ENTER].

The following menu should appear on the screen:

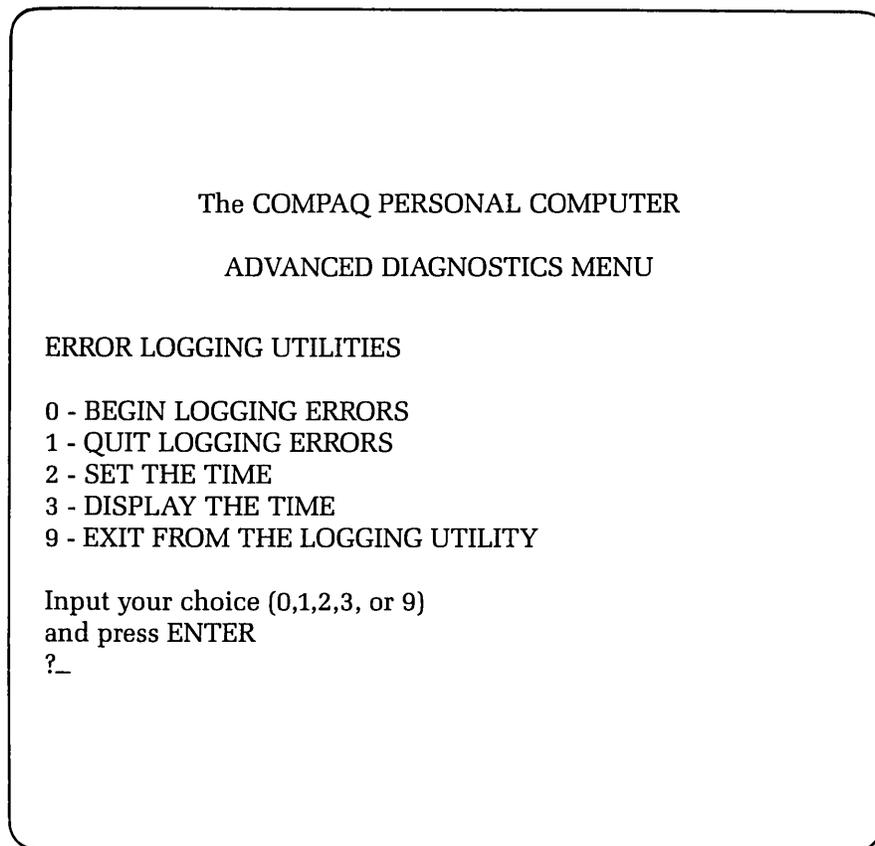


At this point, you can select the mode in which you want to run the tests. You also have the option to log errors to a printer as they are detected.

DO YOU INTEND TO LOG DETECTED ERRORS?

- NO** Decide if you want to run the selected tests once, or repeat the tests several times.
- YES** Select the ERROR LOGGING UTILITY by pressing [2] and then [ENTER].

The following menu should appear on the screen:



Error logging is a convenient way to create a printed version (hard-copy) of all system errors. This utility will automatically log errors to an attached printer only. Use the [0] and [1] keys, accompanied by [ENTER], to start and stop the error-logging function.

The error-logging utility will also record the time at which the error occurred. Use the [2] and [3] keys, accompanied by [ENTER] to make sure that the system clock is set to the current time.

Once the logging function is initiated, return to the previous menu by selecting EXIT FROM THE LOGGING UTILITY by pressing [9] and then [ENTER].

DO YOU WANT TO RUN THE SELECTED TESTS MORE THAN ONE TIME?

NO Select RUN THE TESTS ONCE by pressing [0] and then [ENTER].

YES Select RUN THE TESTS SEVERAL TIMES by pressing [1] and then [ENTER].

A prompt will appear requesting the number of times you wish to run the selected tests (between 1 and 65,535 times). Enter the desired number of test cycles, followed by [ENTER].

Finally, when running the tests several times you may choose to halt program execution each time an error is detected. When this prompt appears on the screen, simply press [Y] or [N], followed by [ENTER].

Selecting either test mode causes a menu similar to the following to appear:

The COMPAQ PERSONAL COMPUTER

ADVANCED DIAGNOSTICS MENU

1 - PROCESSOR BOARD
2 - 128KB MEMORY
3 - KEYBOARD
4 - PARALLEL PRINTER
5 - VIDEO DISPLAY UNIT
6 - 1 DISK DRIVE(S)
11 - ASYNC COMMUNICATIONS
17 - 1 FIXED DISK DRIVE(S)

Input the number(s) of the test(s) you want to run
Separate your choices with commas and then press ENTER

Press ENTER to run all the tests
?__

This menu permits you to select one, or any combination, of subsystems to test. In this case, choose the processor board test and the memory test by pressing the following keys:

1 (one)
, (comma)
2 (two)
ENTER

The first test is the processor board test. The following message appears on the screen:

```
CHECKING - PROCESSOR BOARD
```

At the completion of the processor board test, the memory test begins. The following display appears on the screen:

```
PROCESSOR BOARD 100  
CHECKING - MEMORY 128KB
```

At the completion of the memory test, the following display appears on the screen:

```
MEMORY 200
```

The 100 in the processor board message, and the 200 in the memory message, are codes indicating that the tests were successfully completed. Any other display or message indicates a problem requiring further troubleshooting.

DID ANY ERROR MESSAGES APPEAR DURING THE TESTS?

- NO** This indicates that you have completed this PIP, and the CPU/memory subsystem is functioning properly.
- YES** Check the following code formats to further isolate the problem.

DID THE ERROR CODE HAVE A 1XX FORMAT?

- YES** This indicates that there is a problem with the processor board functions, and it should be replaced. Refer to the Removal and Replacement Procedures located at the end of this chapter for more information on how to replace the processor board.
- Once you have replaced the processor board and set the configuration switches properly, start this PIP again.
- NO** Check the next code format.

DID THE ERROR CODE HAVE AN XXYY 20X FORMAT?

- NO** Compare the display error code to those listed in the SYSTEM PROBLEM ISOLATION GUIDE in Chapter 2. Then refer to the indicated PIP to further isolate and resolve the problem.
- YES** This indicates a malfunction in one or more memory chips on the processor board. Use the following table to cross-reference the error code to the actual U-designator of the defective chip.

ERROR CODE	LOCATION WITHIN SYSTEM	FUNCTION WITHIN MEMORY	LOCATION OF PROBABLE FAILED ITEM
0000 201	REPLACE PROCESSOR BOARD		
0001 201	REPLACE PROCESSOR BOARD		
0002 201	REPLACE PROCESSOR BOARD		
0004 201	REPLACE PROCESSOR BOARD		
0008 201	REPLACE PROCESSOR BOARD		
0010 201	REPLACE PROCESSOR BOARD		
0020 201	REPLACE PROCESSOR BOARD		
0040 201	REPLACE PROCESSOR BOARD		
0080 201	REPLACE PROCESSOR BOARD		
0000 201	REPLACE PROCESSOR BOARD		
1001 201	REPLACE PROCESSOR BOARD		
1002 201	REPLACE PROCESSOR BOARD		
1004 201	REPLACE PROCESSOR BOARD		
1008 201	REPLACE PROCESSOR BOARD		
1010 201	REPLACE PROCESSOR BOARD		
1020 201	REPLACE PROCESSOR BOARD		
1040 201	REPLACE PROCESSOR BOARD		
1080 201	REPLACE PROCESSOR BOARD		
<hr/>			
2000 201	ON-BOARD RAM,	Bank 2, Parity Bit P	U37
2001 201	ON-BOARD RAM,	Bank 2, Parity Bit 0,	U95
2002 201	ON-BOARD RAM,	Bank 2, Parity Bit 1,	U85
2004 201	ON-BOARD RAM,	Bank 2, Parity Bit 2,	U78
2008 201	ON-BOARD RAM,	Bank 2, Parity Bit 3,	U72
2010 201	ON-BOARD RAM,	Bank 2, Parity Bit 4,	U68
2020 201	ON-BOARD RAM,	Bank 2, Parity Bit 5,	U61
2040 201	ON-BOARD RAM,	Bank 2, Parity Bit 6,	U52
2080 201	ON-BOARD RAM,	Bank 2, Parity Bit 7,	U44
3000 201	ON-BOARD RAM,	Bank 3, Parity Bit P,	U36
3001 201	ON-BOARD RAM,	Bank 3, Parity Bit 0,	U94
3002 201	ON-BOARD RAM,	Bank 3, Parity Bit 1,	U84
3004 201	ON-BOARD RAM,	Bank 3, Parity Bit 2,	U77
3008 201	ON-BOARD RAM,	Bank 3, Parity Bit 3,	U71
3010 201	ON-BOARD RAM,	Bank 3, Parity Bit 4,	U67
3020 201	ON-BOARD RAM,	Bank 3, Parity Bit 5,	U60
3040 201	ON-BOARD RAM,	Bank 3, Parity Bit 6,	U51
3080 201	ON-BOARD RAM,	Bank 3, Parity Bit 7,	U43

Once all corrections have been completed and all boards have been reinstalled in the system, begin this PIP again to verify proper operation of the CPU/memory subsystem.

5-14 Maintenance and Service Guide

The following table relates extended memory error codes to address and data bits, yielding a particular device on a RAM expansion board. The first two digits of the code represent the first two digits of the five digit 20-bit memory address. The second two form a bit mask denoting the failed bit within that address range. Thus, if the positions of the RAM devices on the expansion board are known, the specific failed device can be determined.

CODE	BEGINNING ADDRESS	CODE	DATA BIT
40yy	256K	xx00	Parity
48yy	288K	xx01	Data 0
50yy	320K	xx02	Data 1
58yy	352K	xx04	Data 2
60yy	384K	xx08	Data 3
68yy	416K	xx10	Data 4
70yy	448K	xx20	Data 5
78yy	480K	xx40	Data 6
80yy	512K	xx80	Data 7

Removal and Replacement Procedures

Processor Board Assembly

***** WARNING *****

Before opening the unit's case to any removal, replacement, or maintenance procedures, disconnect the line cord from the ac outlet and set the ON/OFF switch to the OFF position. Otherwise, dangerous voltages may be present throughout the system.

STEP:

ACTION:

1

Place the computer on a level surface, such as a table or workbench with the handle assembly facing you (see Figure 5-3).

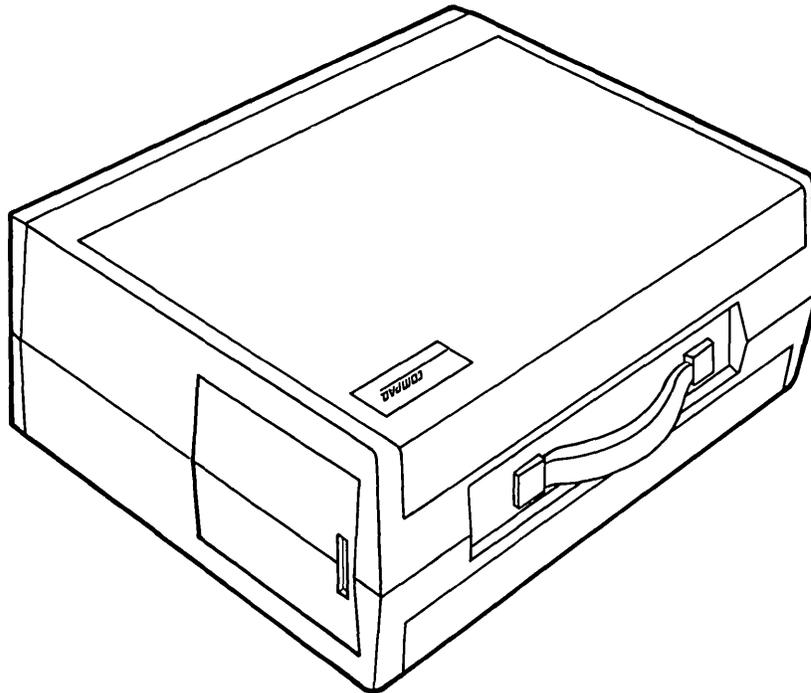


Figure 5-3. Computer On Work Surface.

STEP:

ACTION:

2

Open the access cover by pressing down on the unit's plastic cover with your hand placed next to the COMPAQ name plate (see Figure 5-4). As pressure is applied, the plastic cover bulges at the connecting seam which runs directly above the handle. Partially insert a plastic card under the cover at the bulge and release the pressure. When the plastic cover bulges, reach under the cover and pull upward and outward, then slide the cover out.

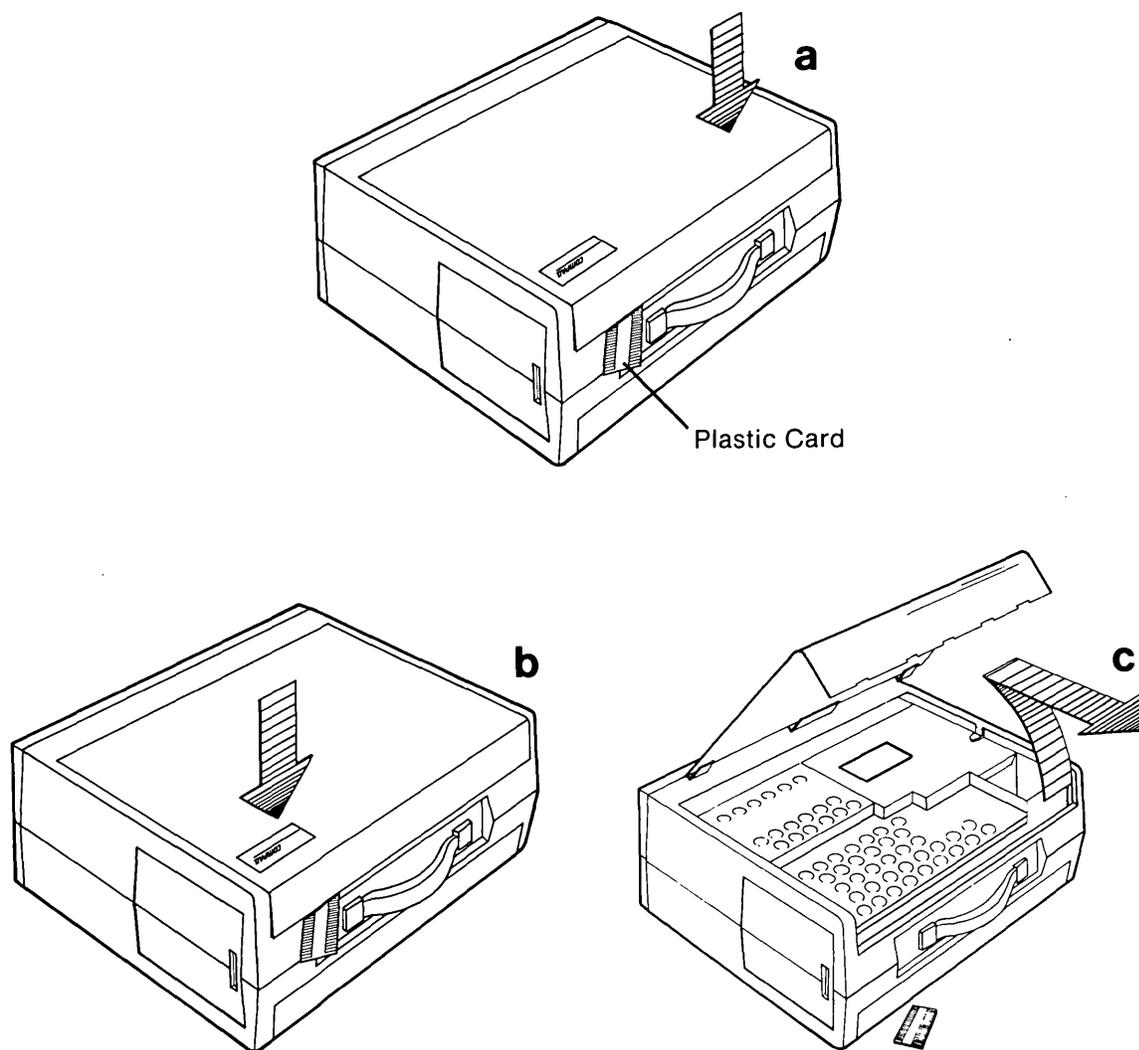


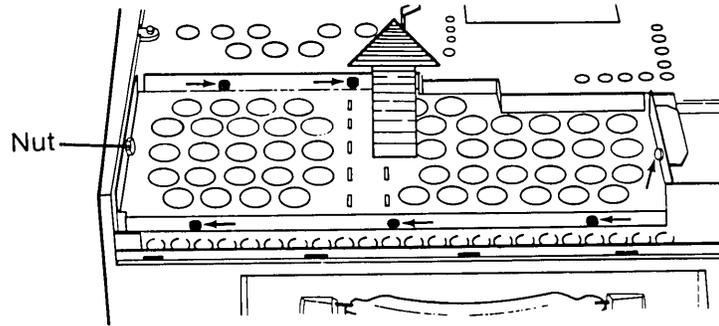
Figure 5-4. Removing Top Cover.

STEP:

ACTION:

3

Loosen (DO NOT REMOVE) the six (6) Phillips screws and the one (1) 1/4" nut which secure the card cage access plate (see Figure 5-5).



Removing Card Cage Access Plate

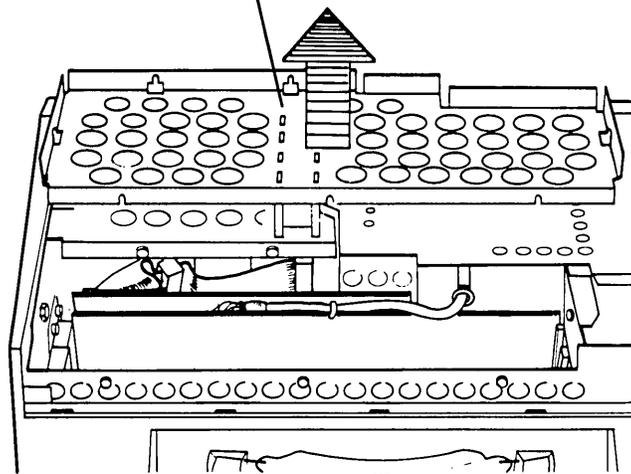


Figure 5-5. Card Cage Access Plate.

STEP:

ACTION:

Gently remove the card cage access plate by lifting it up and away from the system (see Figure 5-5b).

4

Disconnect the disk drive cable from the floppy/printer adapter board by pressing on the finger tabs located on either side of the connectors (see Figure 5-6).

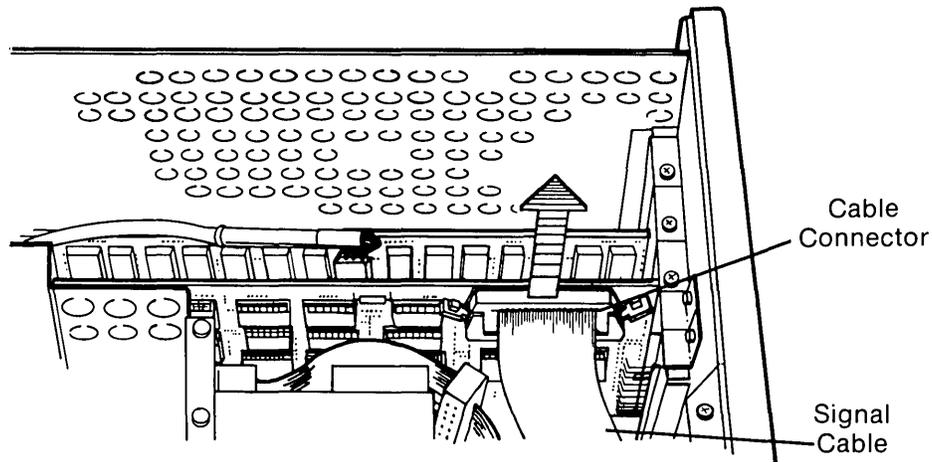


Figure 5-6. Signal Cable Removed From Floppy/Printer Adapter Board.

STEP:

ACTION:

5

Disconnect the VDU cable from the VDU adapter board (see Figure 5-9). Be careful not to pull the cable.

The cable tie holding the VDU cable to the VDU adapter board must be cut before the connector can be disengaged from the VDU adapter board.

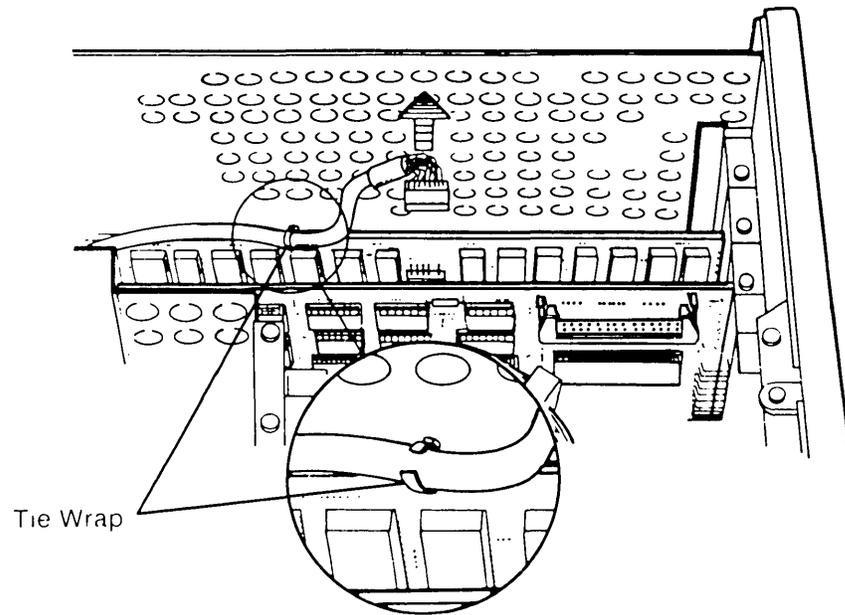


Figure 5-9. Disconnecting the VDU Cable From the VDU Adapter Board.

STEP:

ACTION:

- 6 Remove the retaining screws that secure the floppy/printer adapter board and the VDU adapter board to the system chassis (see Figure 5-10).

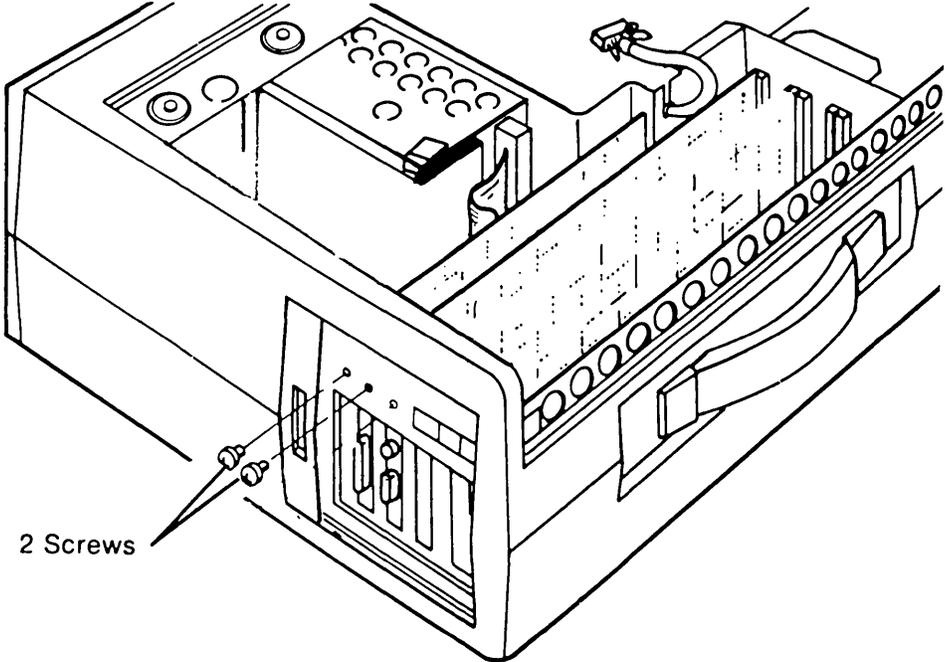


Figure 5-10. Removing the Screws Which Hold the Floppy/Printer Adapter Signal Cable Removed From Floppy/Printer Adapter Board.

STEP:

ACTION:

7

Gently remove the adapter boards by pulling them away from the processor board (see Figure 5-11).

Similarly, remove any other adapter boards which may occupy any additional expansion slots in the processor board.

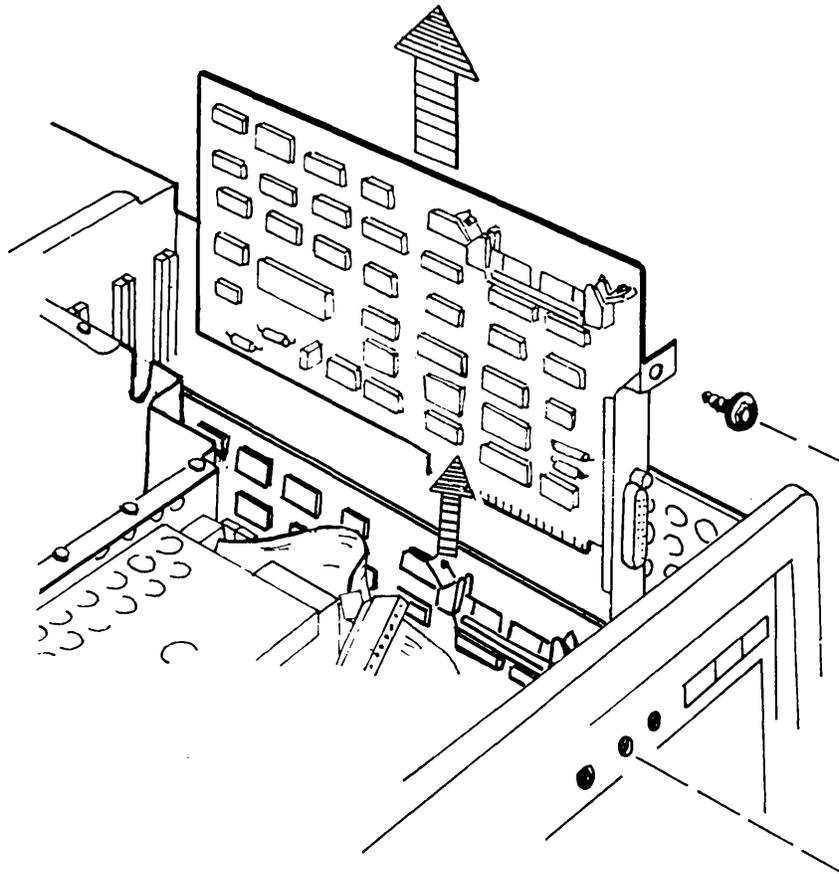


Figure 5-11. Removing the Floppy/Printer Adapter Board.

STEP:

ACTION:

- 8 Turn the computer over so that the base of the system is facing upward. Using the same procedure outlined in STEP 2, remove the bottom plastic access cover to expose the base of the system chassis.

- 9 Place the computer so that the display is facing downward against the work surface. Locate and loosen (DO NOT REMOVE) the two (2) screws which secure the narrow access cover for all the processor board connectors. Remove the narrow access cover by lifting it away from the system chassis (see Figure 5-12).

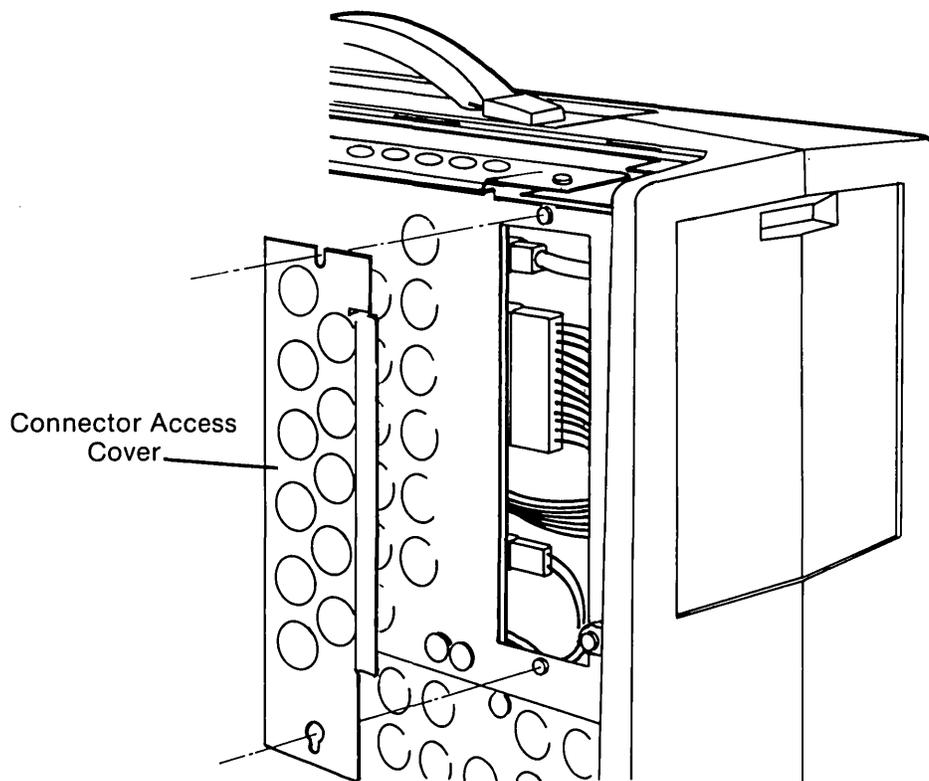


Figure 5-12. Processor Board Connector Access Cover.

STEP:

ACTION:

- 10 Locate and disconnect the following processor board connectors: power connector, speaker connector, and keyboard connector (see Figure 5-13).

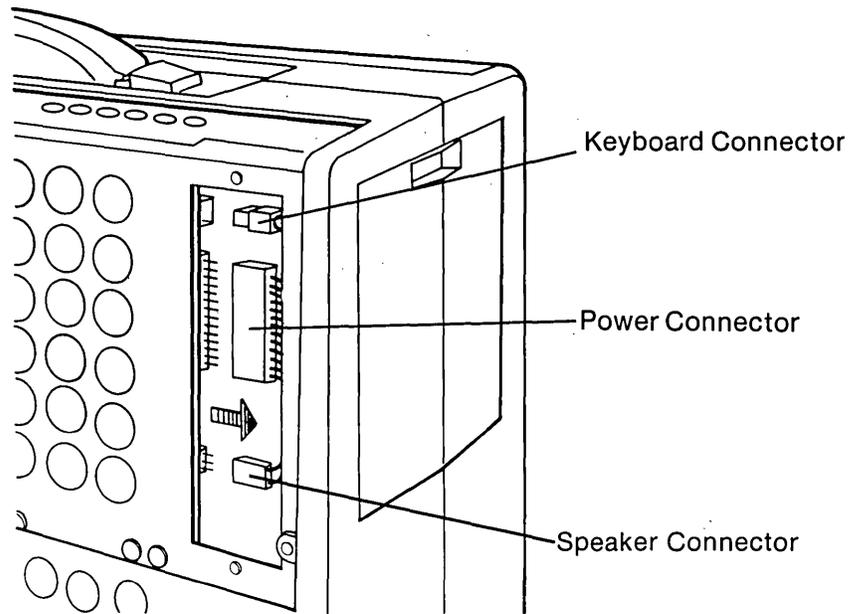


Figure 5-13. Disconnecting the Power Connector, Speaker Connector, and Keyboard Connector.

STEP:

ACTION:

14

Locate and remove the four (4) screws which secure the processor board mounting plate to the system chassis (see Figure 5-14 a & b).

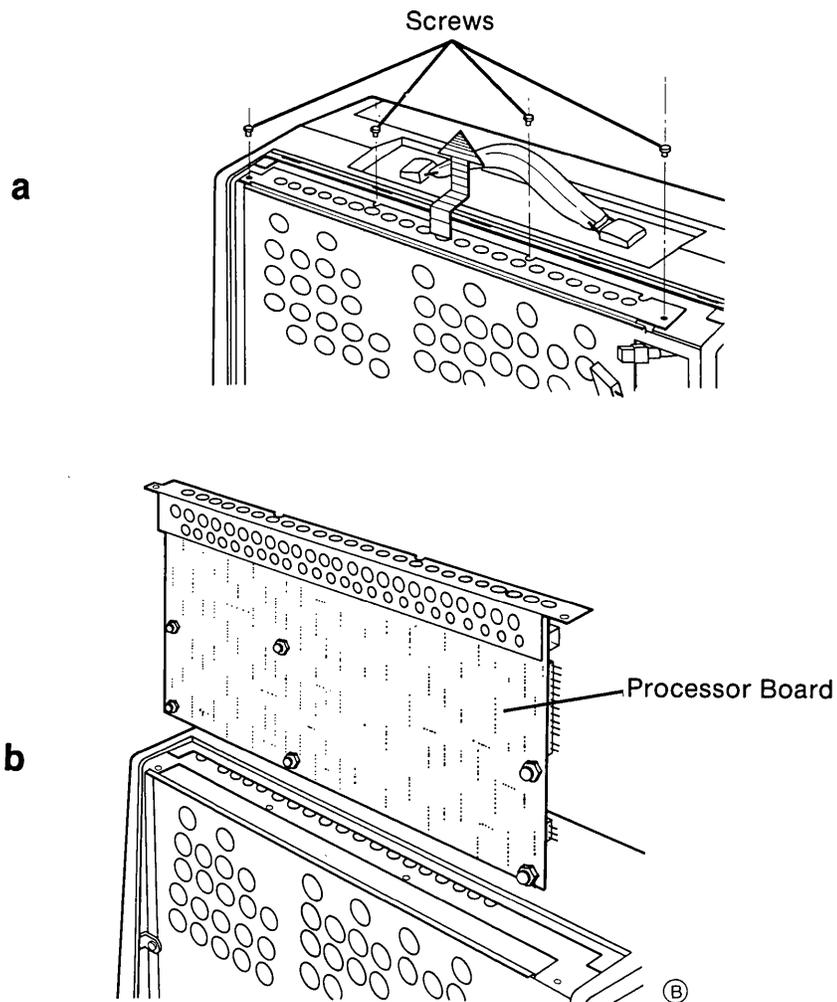


Figure 5-14. Removing the Processor Board.

Carefully slide the processor board out of the system (see Figure 5-14b).

IMPORTANT: Six nylon standoffs are attached to the processor board. These standoffs must clear their mounting holes as the processor board is removed.

To replace the processor board, reverse Steps 1 through 14

Removal and Replacement Procedures

Optional Memory Chips

*** WARNING ***

Before opening the unit's case to perform any removal, replacement, or maintenance procedures, disconnect the line cord from the ac outlet and set the ON/OFF switch to the OFF position. Otherwise, dangerous voltages may be present throughout the system.

STEP:	ACTION:
1	Refer to the processor board Removal and Replacement Procedures for instructions on how to remove the processor board.
2	Using an IC puller, carefully remove any socketed memory chips which have been determined to be defective (see Figure 5-15).
3	Replace the defective memory chip by reversing steps 2 through 1.

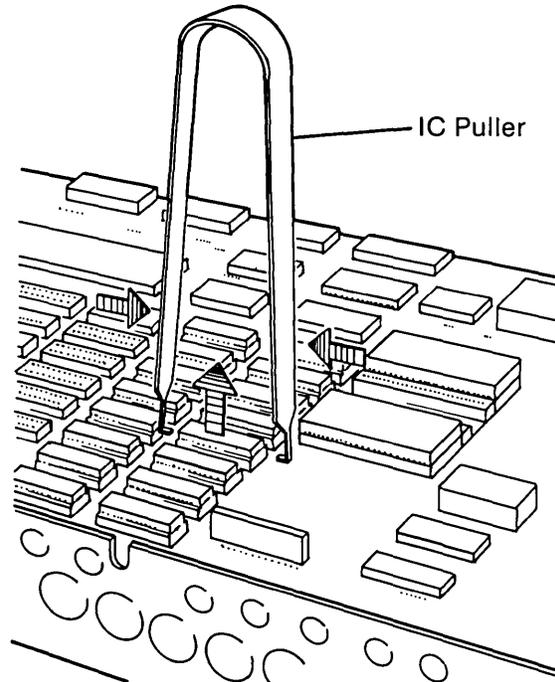


Figure 5-15. IC Puller.

KEYBOARD SUBSYSTEM

Configuration/Interface Information

The keyboard subsystem, as discussed in this chapter, will include the keyboard assembly and the coiled retractable cable which provides an interface between the keyboard and the system chassis (see Figure 6-1).

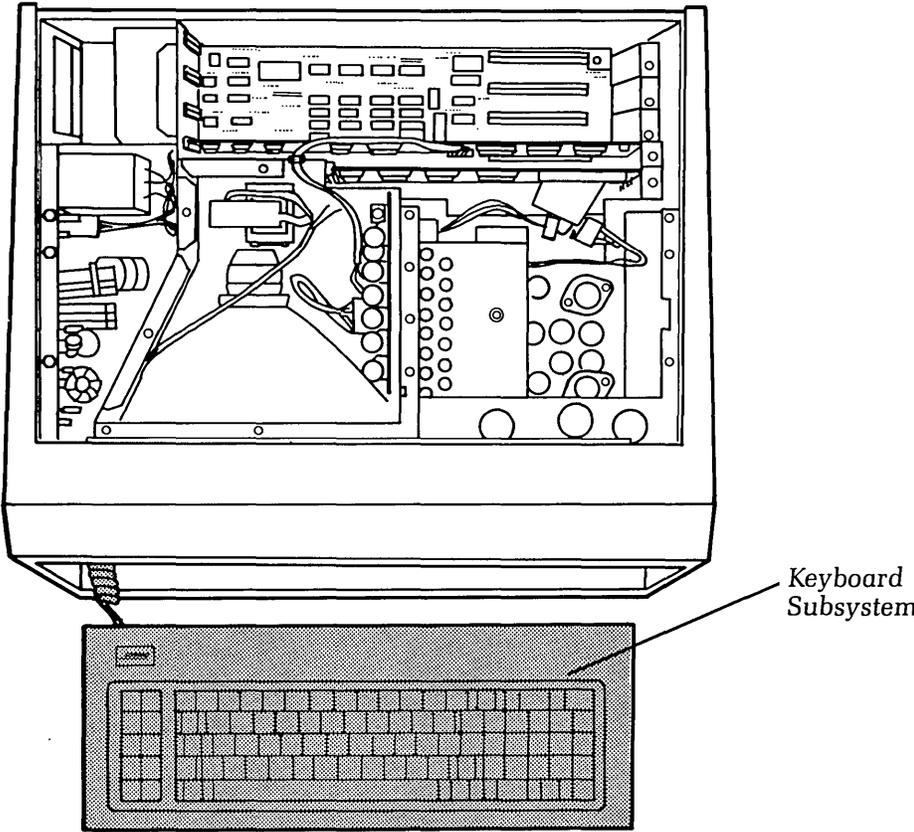


Figure 6-1. Keyboard Subsystem.

6-2 Maintenance and Service Guide

The keyboard is the primary physical interface between the user and the COMPAQ Portable Computer. It is an intelligent unit which incorporates an on-board 8048 microprocessor. This processor handles all 8-bit functions, such as:

- An internal power-on self-test
- Keyboard scan
- Key debounce compensation
- Establishing and maintaining serial communication with the COMPAQ processor board
- Buffering as many as 20 scanned key codes

The keyboard contains 83 capacitive-type keys, including 16 keys which may be easily user-defined by software. All keys except for control keys, are typematic (i.e., "repeating").

The retractable cable provides the interface between the keyboard and the COMPAQ Portable Computer. This interface contains the following signals:

- Power (+12 VDC)
- Serial IN
- Serial OUT
- 2 signal ground wires
- System Reset Signal

For more information on system/subsystem configuration, contact the COMPAQ Technical Support Department.

Problem Isolation Procedure (PIP)

This procedure is designed to help you in determining if the keyboard subsystem is functioning properly. The PIP for keyboard malfunctions provides a systematic method of identifying and correcting most keyboard problems.

As with any troubleshooting procedure, you may encounter some problem that this procedure does not cover. If you complete this PIP without resolving the problem, contact the COMPAQ Technical Support Department for further technical assistance.

PRELIMINARY TESTING

Power-off the system and inspect the keyboard assembly for any damage to the keys or case.

IS THERE ANY SIGNIFICANT PHYSICAL DAMAGE TO THE KEYBOARD ASSEMBLY?

- YES** Replace the damaged parts as required. Refer to the Removal and Replacement Procedure for the keyboard assembly, located at the end of this chapter.
- NO** Power-on the system. During the power-on self-tests, the system monitors the keyboard to verify that it is active. If it detects a keyboard problem, a 3XX (or dd 3XX) message appears on the display at the completion of power-on self-tests.

KEYBOARD TESTING

The power-on self-tests check to see if the keyboard is active and if any keys are “stuck”. It cannot check to see that each key position is working properly. To verify full keyboard function, run the keyboard test program contained on the Advanced Diagnostics Program Diskette.

If you have not already done so, complete the following procedure:

- Step 1. Remove any non-COMPAQ Computer peripheral devices or adapters from the system.
- Step 2. Power-on the system.
- Step 3. Boot the system and load the Advanced Diagnostics diskette. Refer to Chapter 3, SYSTEM CHECKOUT, for more information on loading the Advanced Diagnostics Program.

DID AN ERROR CODE IN A 3XX FORMAT APPEAR ON THE SCREEN DURING THE POWER-ON SELF TESTS?

YES The 3XX format indicates a problem with the keyboard-to-system board interface. The problem area could be the keyboard's controller/decoder, the keyboard cable, or the processor board. Perform the following "quick-check" procedure:

Step 1 – Try typing on the keyboard. If there is no response at all on the screen, the problem is most likely in the keyboard subsystem (such as a loose cable connection, etc.). Check all hardware connections. If all connections are secure, replace the keyboard assembly, as outlined in the Removal and Replacement Procedures located at the end of this chapter, then repeat the testing procedures.

Step 2 – If the procedure outlined in Step 1 did not resolve the problem, or if there appears to be intermittent keyboard-to-system communication, the problem may be in the processor board itself. To replace the processor board assembly, refer to the Removal and Replacement Procedures for the processor board contained in Chapter 5 for more information on how to replace the processor board assembly. When the processor board is replaced, repeat the keyboard testing procedures.

NO Check the next error code format.

DID AN ERROR CODE IN A dd 3XX FORMAT APPEAR ON THE SCREEN DURING THE POWER-ON SELF-TESTS?

YES The dd 3XX format indicates that an individual key is malfunctioning (i.e., "stuck" down). The dd portion of the code indicates the hexadecimal key scan code of the defective key. Refer to the Key Code Chart located at the end of this chapter to help in translating the error code. One possible cause of the problem could be a defective/broken spring under the actual key cap. Replace the keyboard assembly, as outlined in the Removal and Replacement Procedures located at the end of this chapter, then repeat the keyboard testing procedures.

NO Go to the next section - KEYBOARD TESTING.

KEYBOARD TESTING

DID THE SYSTEM BOOT PROPERLY?

NO You may have a defective diagnostics diskette or a diskette that does not contain the correct operating system. Try to boot the system using a diskette that is known to be good.

If the system still does not boot, it is an indication of a probable failure in the disk drive subsystem. Refer to the PIP in Chapter 8, DISK DRIVE SYSTEM, to further isolate the cause of the problem.

YES If the system booted properly, and contains an AUTOEXEC.BAT file to load the diagnostics, the following menu should appear:

```
The COMPAQ PERSONAL COMPUTER

ADVANCED DIAGNOSTICS MENU

Version 1.00 (c) COPYRIGHT 1982, COMPAQ COMPUTER CORP.
ALL RIGHTS RESERVED

YOUR CHOICES ARE:

0 - RUN THE DIAGNOSTIC TESTS
1 - FORMAT A DISKETTE
2 - COPY A DISKETTE
9 - GO TO THE SYSTEM DISKETTE

Input your choice (0,1,2 or 9)
and press ENTER
? _
```

This menu indicates that the diagnostics are loaded and ready to begin.

DID YOU GET THE CORRECT MENU AFTER LOADING YOUR DIAGNOSTICS DISKETTE?

NO

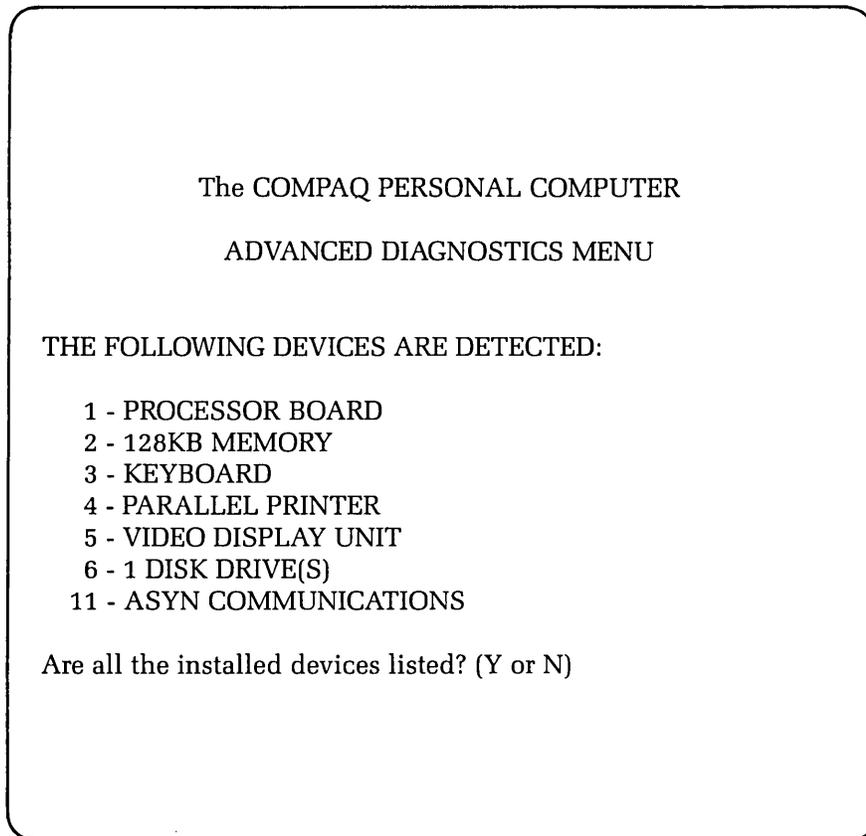
If the diagnostics did not load automatically, type in DIAG, and then press [ENTER]. This causes the diagnostics to load if the diskette contains the file DIAG.COM.

If the diagnostics program still does not load, repeat this procedure with a known-good Advanced Diagnostics Diskette. If the problem is not resolved refer to the PIP in Chapter 8, DISK DRIVE SYSTEM, to further isolate the cause of the problem.

YES

This menu indicates that you have successfully loaded the diagnostics and are ready to begin.

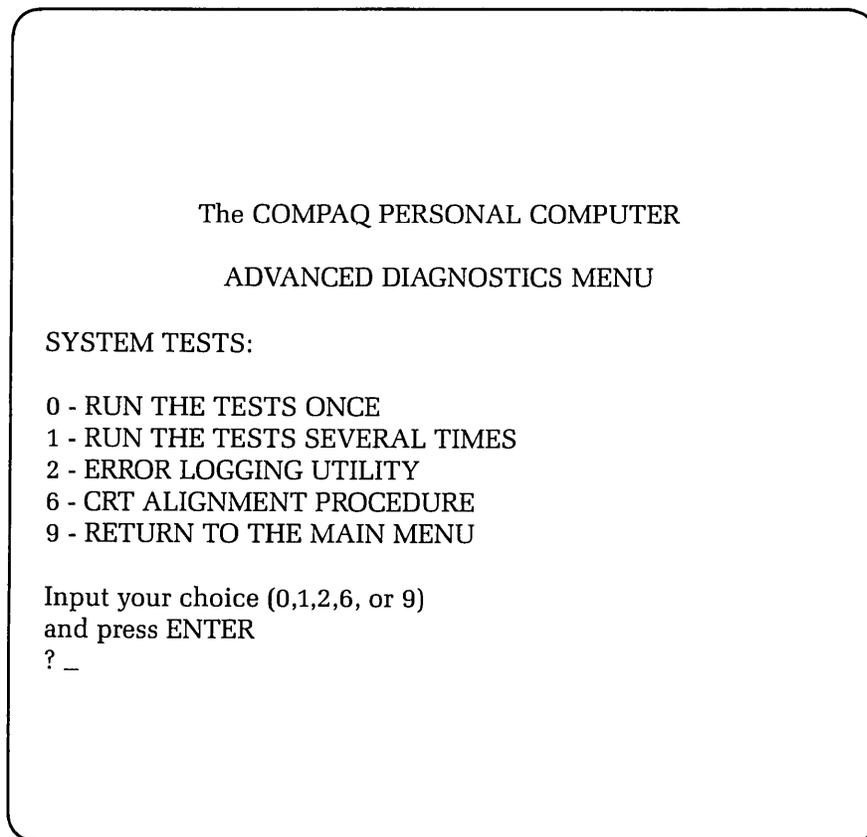
In response to the display prompt, press [0] and then [ENTER] to select RUN THE DIAGNOSTIC TESTS. A display similar to the following should appear on the screen:



DOES THE DISPLAY ACCURATELY DESCRIBE THE SYSTEM CONFIGURATION?

- NO** This indicates a possible problem with the setting of the switches (SW1 and SW2) on the processor board. Refer to the configuration portion of this chapter to confirm the positions of SW1 and SW2.
- YES** Press [Y] and the [ENTER].

The following menu should appear on the screen:



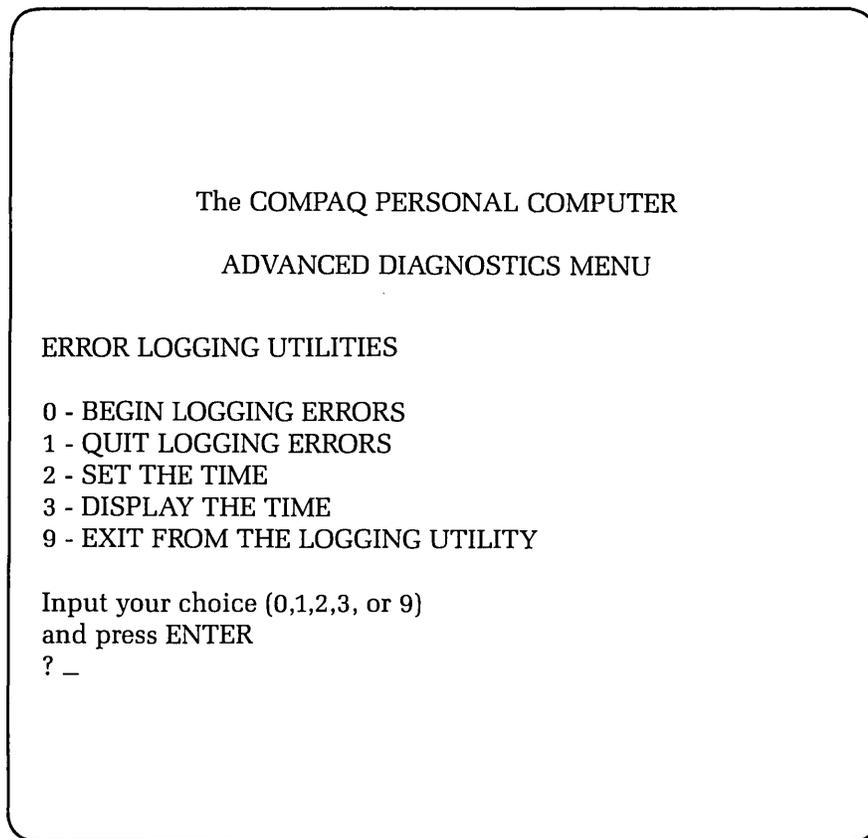
At this point, you can select the mode in which you want to run the tests. You also have the option to log errors to a printer as they are detected.

DO YOU INTEND TO LOG DETECTED ERRORS?

NO Decide if you want to run the selected tests once, or repeat the tests several times.

YES Select the ERROR LOGGING UTILITY by pressing [2] and then [ENTER].

The following menu should appear on the screen:



Error-logging is a convenient way to create a printed version (hardcopy) of all system errors. This utility will automatically log errors to an attached printer only. Use the [0] and [1] keys, accompanied by [ENTER], to start and stop the error-logging function.

The error-logging utility will also record the time at which the error occurred. Use the [2] and [3] keys, accompanied by [ENTER] to make sure the system clock is set to the current time.

Once the logging function is initiated, return to the previous menu by selecting EXIT FROM THE LOGGING UTILITY by pressing [9] and then [ENTER].

DO YOU WANT TO RUN THE SELECTED TESTS MORE THAN ONE TIME?

NO Select RUN THE TESTS ONCE by pressing [0] and then [ENTER].

YES Select RUN THE TESTS SEVERAL TIMES by pressing [1] and then [ENTER].

A prompt will appear requesting the number of times you wish to run the selected tests (between 1 and 65,535 times). Enter the desired number of test cycles, followed by [ENTER].

Finally, when running the tests several times you may choose to halt program execution each time an error is detected. When this prompt appears on the screen, simply press [Y] or [N], followed by [ENTER].

Selecting either test mode causes a menu similar to the following to appear:

The COMPAQ PERSONAL COMPUTER

ADVANCED DIAGNOSTICS MENU

1 - PROCESSOR BOARD
 2 - 128KB MEMORY
 3 - KEYBOARD
 4 - PARALLEL PRINTER
 5 - VIDEO DISPLAY UNIT
 6 - 1 DISK DRIVE(S)
 11 - ASYNC COMMUNICATIONS

Input the number(s) of the test(s) you want to run
 Separate your choices with commas and then press ENTER

Press ENTER to run all the tests
 ? _

This menu permits you to select one, or a combination, of subsystems to test. In this case, select the keyboard test by pressing [3] and then [ENTER].

Each block on the screen represents a key on the keyboard. Pressing a key on the keyboard will cause the corresponding key-block on the screen to change into the character that represents that key. For example, if you press the [SPACEBAR] on the keyboard, the corresponding SPACEBAR block on the screen changes to an S.

In addition to verifying that each key is functional, the keyboard test also checks the key-repeat function. To test the repeat function, hold any key down and the corresponding character on the screen should blink on and off.

DO ALL OF THE KEYS RESPOND CORRECTLY TO THE KEYBOARD TEST?

- YES** The keyboard is functioning properly.
- NO** The keyboard assembly is probably defective and should be replaced. Refer to the Removal and Replacement Procedure for the keyboard assembly located at the end of this chapter for more information on how to replace the keyboard. Once the keyboard assembly has been replaced, repeat the keyboard test.

If none of the steps you have taken so far have resolved the problem, contact the COMPAQ Technical Support Department for further technical assistance.

REMOVAL AND REPLACEMENT PROCEDURE OF KEYBOARD ASSEMBLY

Keyboard Assembly

*** * * WARNING * * ***

Before opening the unit's case to perform any removal, replacement, or maintenance procedures, disconnect the line cord from the ac outlet and set the ON/OFF switch to the OFF position. Otherwise, dangerous voltages may be present throughout the system.

STEP:

ACTION:

1

Place the computer on a level surface, such as a table or workbench with the handle assembly facing you (see Figure 6-2).

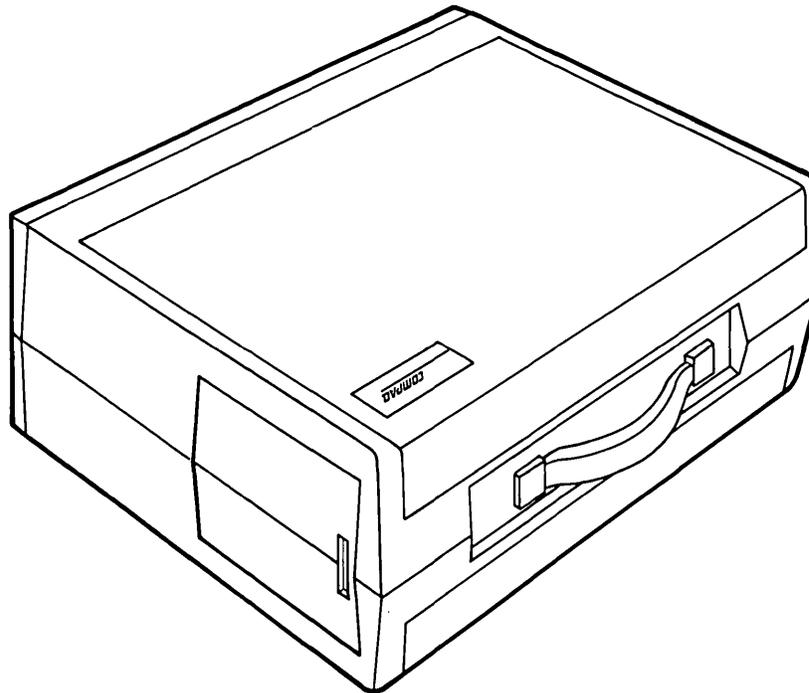


Figure 6-2. Computer On Work Surface.

STEP:

ACTION:

2

Open the lower access cover by pressing down on the plastic cover of the unit with one hand next to the COMPAQ logo (see Figure 6-3a). As pressure is applied, the plastic cover will bulge at the connecting seam which runs directly above the handle. Partially insert a plastic card under the cover at the bulge, and release the hand pressure applied. At the opposite end of the plastic cover (see Figure 6-3b), apply pressure with your hand in the same manner as previously done. When the plastic cover bulges, reach under the cover and pull upward and outward, then slide cover out (see Figure 6-3c).

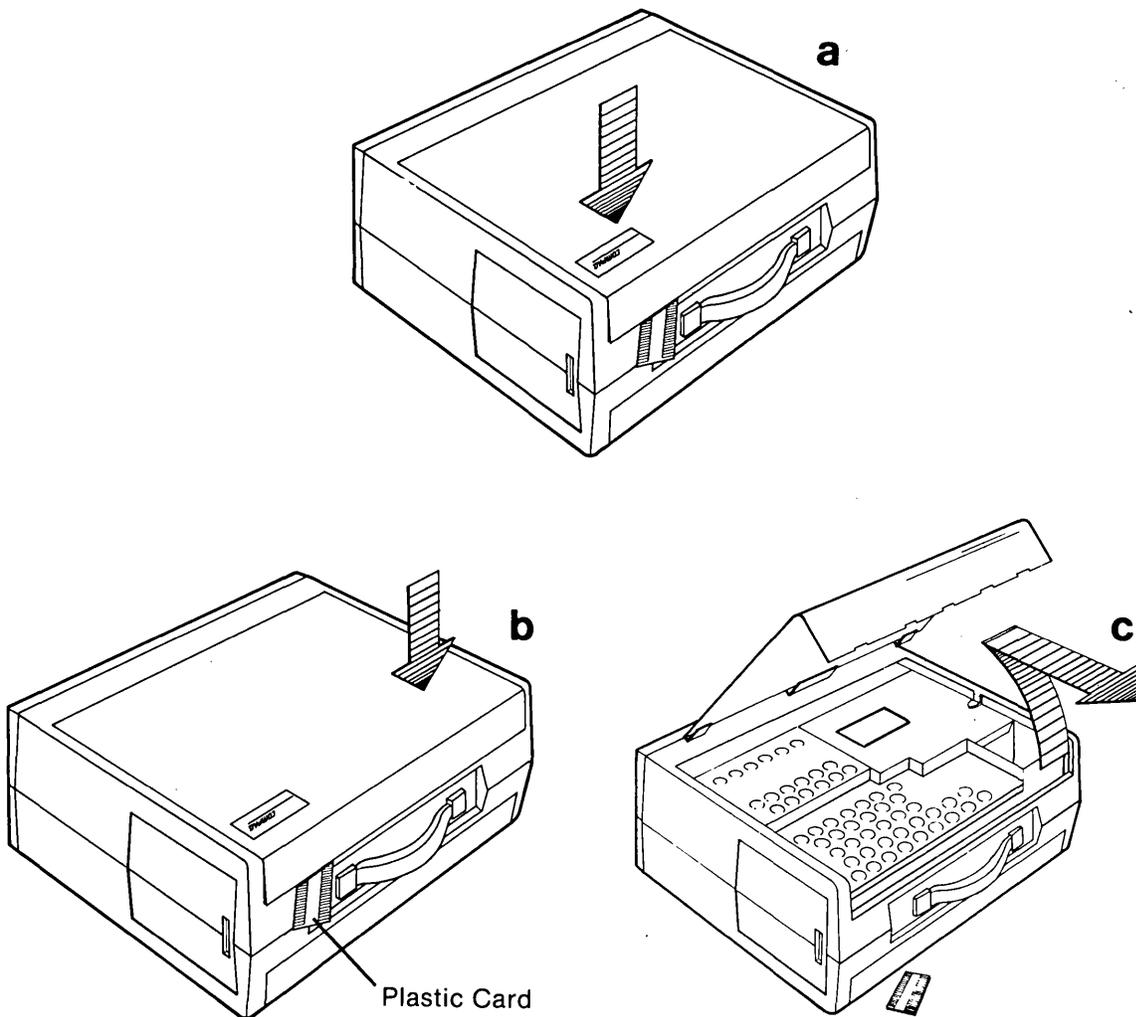


Figure 6-3. Removing Top Cover.

- | STEP: | ACTION: |
|-------|--|
| 3 | Locate and loosen (DO NOT REMOVE) the two screws that secure the narrow access cover for all the processor board connectors. |
| 4 | Remove the narrow access cover by lifting it away from the system chassis (see Figure 6-4). |

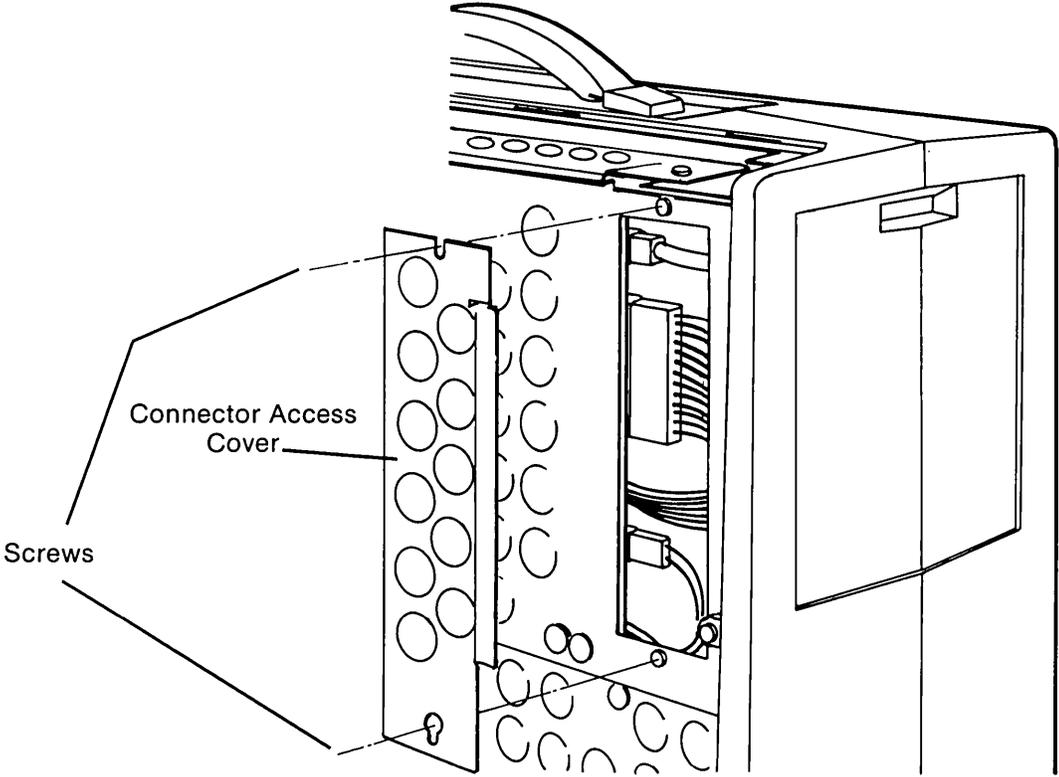


Figure 6-4. Removing the Connector Access Cover.

6-14 Maintenance and Service Guide

STEP:

ACTION:

5

Disconnect the keyboard connector from the processor board (see Figure 6-5).

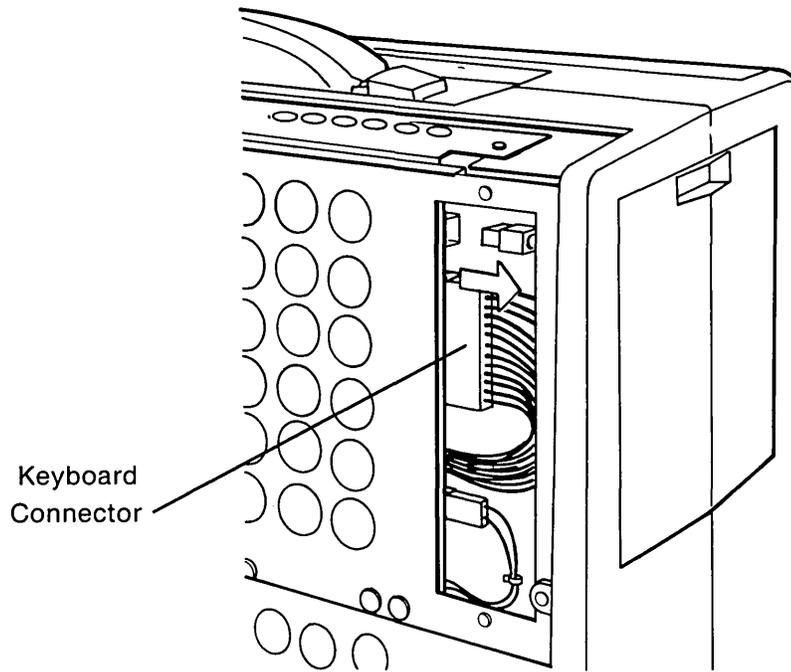


Figure 6-5. Disconnecting the Keyboard Connector From the Processor Board.

STEP:

6

ACTION:

Carefully cut the strain relief cable tie that secures the keyboard cable to the system chassis (see Figure 6-6).

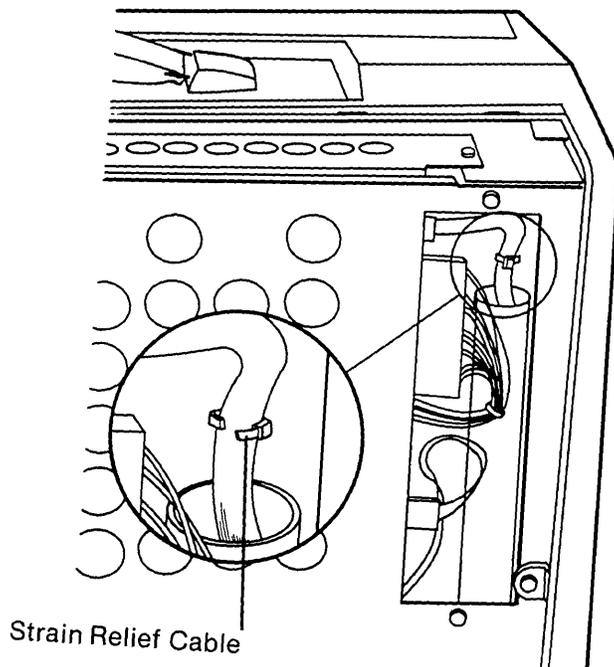


Figure 6-6. Strain Relief Cable.

IMPORTANT: This cable tie must be replaced when the keyboard is reinstalled.

STEP:

7

ACTION:

Place the unit on the work bench so that the display is facing you, and gently pull the keyboard cable out through the front bezel (Figure 6-7).

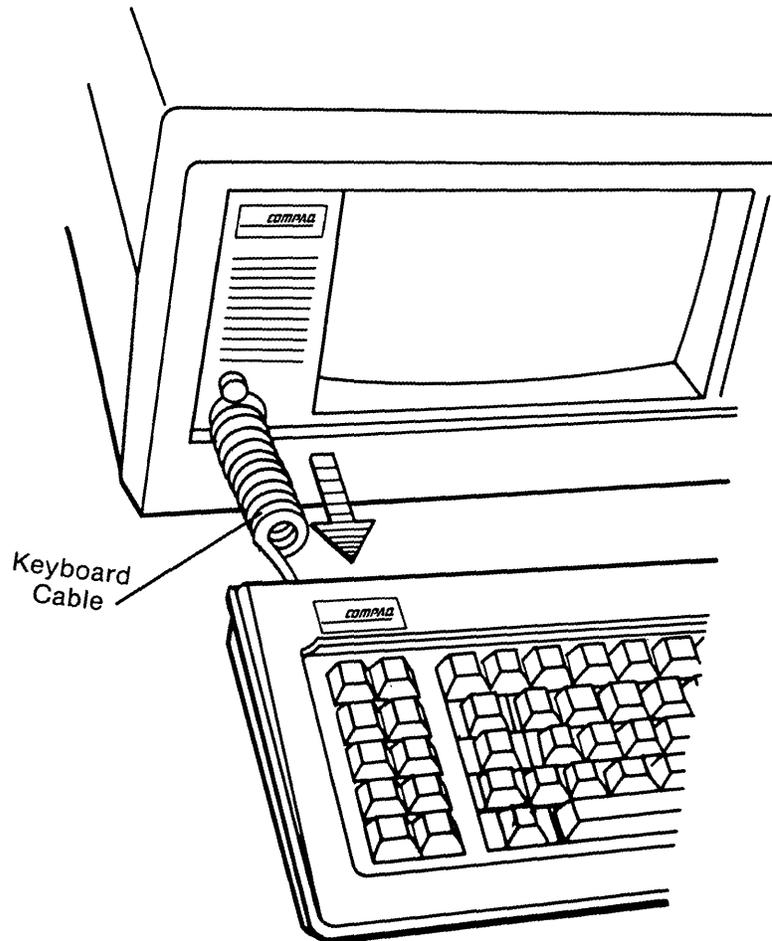
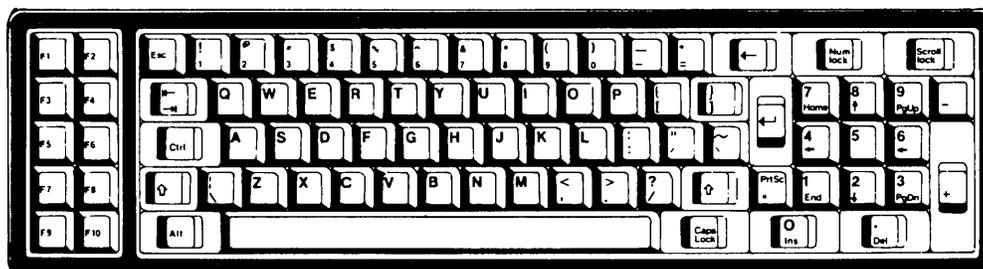


Figure 6-7. Removing Keyboard Cable From Chassis.

To replace the keyboard assembly, reverse Steps 1 through 7.

KEY CODE CHART

HEXADECIMAL SCAN CODE	KEY LOCATION	HEXADECIMAL SCAN CODE	KEY LOCATION
01	ESC	1A	{/
02	!/1	1B	} /
03	@/2	1C	↵ (return)
04	#/3	1D	CTRL
05	\$/4	1E	A
06	%/5	1F	S
07	/6	20	D
08	&/7	21	F
09	*/8	22	G
0A	(/9	23	H
0B)0	24	J
0C	-/	25	K
0D	+/=	26	L
0E	← (BACKSPACE)	27	:/;
0F	⇠ (TAB)	28	"/'
10	Q	29	~/\
11	W	2A	⇧ (SHIFT)
12	E	2B	!/
13	R	2C	Z
14	T	2D	X
15	Y	2E	C
16	U	2F	V
17	I	30	B
18	O	31	N
19	P	32	M
33	</,	4C	5
34	>/.	4D	6/→
35	?/!	4E	+
36	⇧ (SHIFT)	4F	1/END
37	PRTSC/*	50	2/↓
38	ALT	51	3/PG DN
39	SPACEBAR	52	0/INS
3A	CAPS LOCK	53	DEL
3B	F1		
3C	F2		
3D	F3		
3E	F4		
3F	F5		
40	F6		
41	F7		
42	F8		
43	F9		
44	F10		
45	NUM LOCK		
46	SCROLL LOCK/BREAK		
47	7/HOME		
48	8/↑		
49	9/PG UP		
4A	—		
4B	4/←		



VIDEO DISPLAY UNIT (VDU) SUBSYSTEM

Configuration/Interface Information

The video display unit (VDU) subsystem, as discussed in this section, will include the VDU assembly and the VDU board assembly which provides the necessary interface between the screen display and the system processor board (see Figure 7- 1).

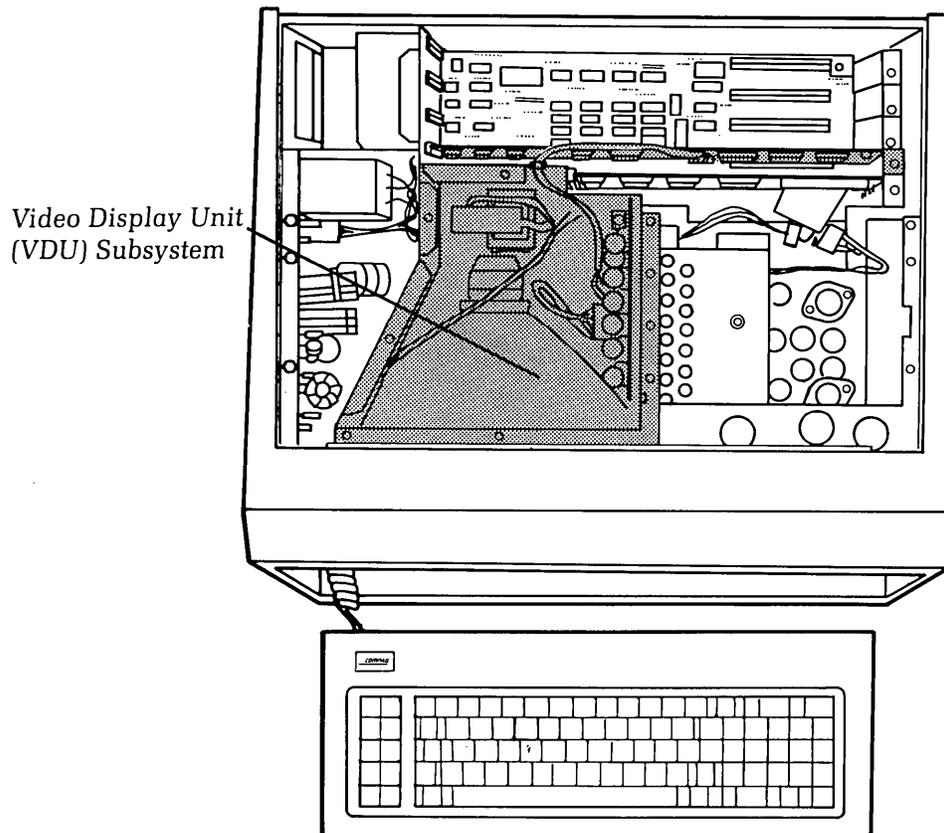


Figure 7-1. VDU Subsystem.

The video display unit is the primary visual interface between the user and the COMPAQ Portable Computer. It is a dual-frequency (18.5 KHz/15.7 KHz), high-resolution green phosphor (P39) display. All circuitry (including CRT adjustments) necessary to physically operate the VDU is contained on a high-voltage video board located within the VDU assembly.

The VDU board assembly provides several system functions. It contains all the necessary circuitry to support an external RGB color monitor, output to an RF modulator, composite video signals, and the use of an external light pen. In addition to these functions, the VDU board is responsible for coordinating and generating all video signals to the VDU assembly, including horizontal sync, vertical sync, TTL video and signal ground. It contains 16-Kbytes of on-board memory to allow individual bit-addressing.

7-2 Maintenance and Service Guide

The VDU board also provides two major modes of screen display:

1. High-Resolution Text - This mode utilizes a screen display matrix of 80 x 25 characters, while creating a character matrix of 14 scan lines, each containing 9 horizontal dots (providing a 720 x 350 screen resolution). Due to the higher frequency requirements, this display mode cannot support an external monitor.
2. Color/Graphics - In this mode, the VDU board may create an 80 x 25 screen matrix or a 40 x 25 screen matrix. In either graphics mode, a character matrix of 8 scan lines, each containing 8 horizontal dots is used, and either mode will support an external color monitor.

NOTE: Due to the complexity of the VDU board, the number of colors and/or gray scale that can be generated will be determined by the particular graphics mode in use. The 40 x 25 screen matrix (320 x 200 resolution) will support more colors or gray scale than the 80 x 25 screen matrix (640 x 200 resolution).

The VDU board assembly also has the ability to generate positive- or negative-polarity sync signals to the external monitor interface, depending on the type of monitor in use. To change the signal polarity, locate the jumper areas shown in Figure 7-2 and refer to the chart to determine the proper jumper settings.

Sync Pulse Polarity	E 4	E 5
HSYNC POSITIVE		Jump 1-2
HSYNC NEGATIVE		Jump 2-3
VSYNC POSITIVE	Jump 2-3	
VSYNC NEGATIVE	Jump 1-2	

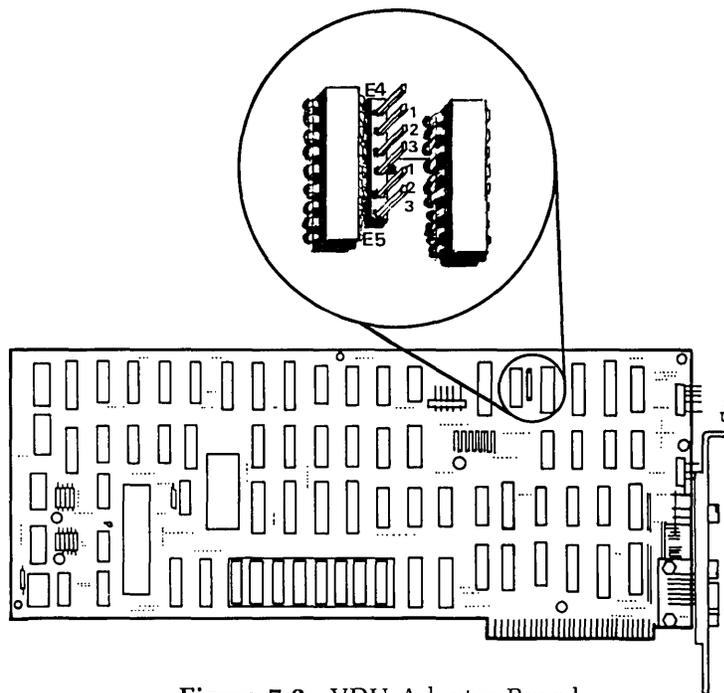


Figure 7-2. VDU Adapter Board.

For more information on system/subsystem configuration, contact the COMPAQ Technical Support Department.

Problem Isolation Procedure (PIP)

This procedure is designed to help you in determining if the video display subsystem is functioning properly. The PIP for display malfunctions provides a systematic method of identifying and correcting most display problems.

As with any troubleshooting procedure, you may encounter some problem that this procedure does not cover. If you complete this PIP without resolving the problem, contact the COMPAQ Technical Support Department for further technical assistance.

Power-off the system and inspect the video display assembly for any obvious damage.

IS THERE ANY SIGNIFICANT PHYSICAL DAMAGE TO THE DISPLAY ASSEMBLY?

YES Replace the damaged parts as required. Refer to the Removal and Replacement Procedure for the VDU assembly, located at the end of this chapter.

NO If you have not already done so, complete the following procedure:

Step 1 - Remove any non-COMPAQ Computer peripheral devices or adapters from the system.

Step 2 - Set the ON/OFF switch to the ON position.

Approximately four seconds after you power-on the system, a cursor should appear in the upper left-hand corner of the screen.

During the power-on self-tests, the system checks the integrity of the VDU Board CRT Controller and the VDU on-board memory.

If an error is detected within the VDU board CRT controller or the first "page" (4 Kbytes) of the VDU board's RAM, it will be indicated by a blank screen and 1 long beep followed by 2 short beeps.

If any errors are detected within the other three "pages" of VDU memory, a 501 error code will be displayed.

DID ANY OF THE ABOVE ERROR CONDITIONS OCCUR DURING THE POWER-ON SELF-TESTS?

YES Replace the VDU board as outlined in the Removal and Replacement Procedure for the VDU board assembly, located at the end of this chapter.

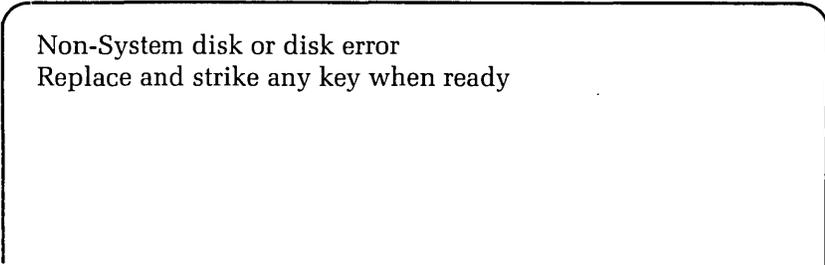
NO Proceed to the next step.

7-4 Maintenance and Service Guide

DID ANY OTHER ERROR MESSAGES OR CONDITIONS OCCUR DURING THE POWER-ON SELF-TESTS?

YES Refer to the System Problem Isolation Guide, in Chapter 2 to determine which will assist you in further isolating the cause of the problem.

NO If the system completed the power-on self-tests successfully, the following message should appear on the screen:



Non-System disk or disk error
Replace and strike any key when ready

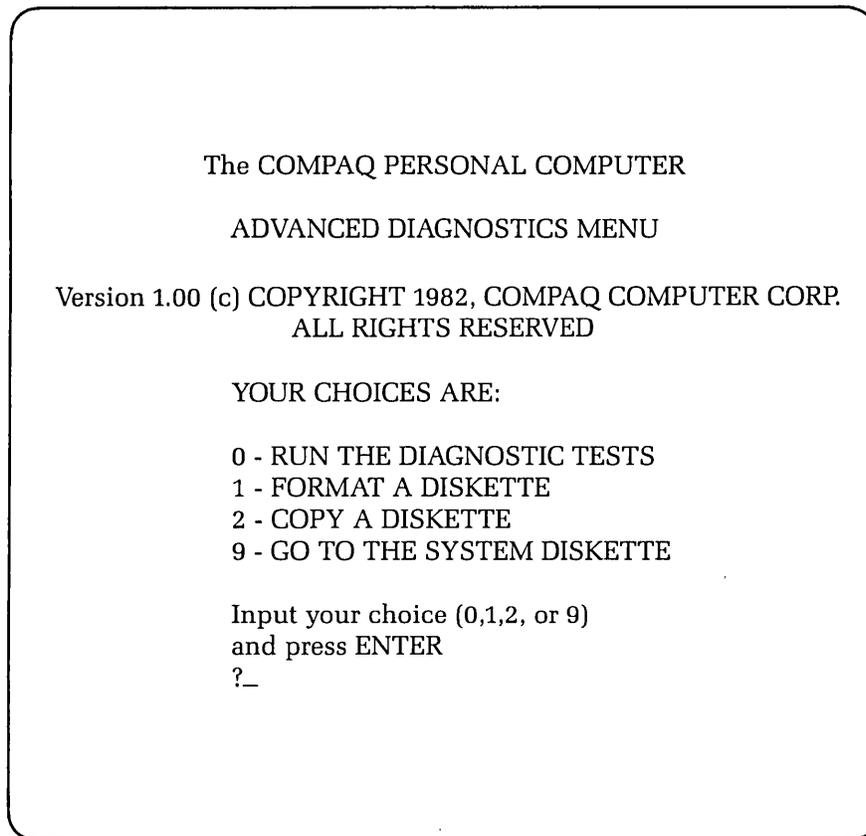
Insert the Advanced Diagnostics diskette into Drive A: and perform a system reset (^ALT/DEL) to boot the system and load the diagnostics program. Refer to Chapter 3, SYSTEM CHECKOUT, for more information on loading the Advanced Diagnostics Program.

DID THE SYSTEM BOOT PROPERLY?

NO You may have a defective diagnostics diskette or a diskette that does not contain the correct operating system. Try to boot the system using a diskette that is known to be good.

If the system still does not boot, it is an indication of a probable failure in the disk drive subsystem. Refer to the PIP in Chapter 8, DISK DRIVE SUBSYSTEM, to further isolate the cause of the problem.

YES If the system booted properly, and contains an AUTOEXEC.BAT file to load the diagnostics, the following menu should appear:



This menu indicates that the diagnostics are loaded and ready to begin.

DID YOU GET THE CORRECT MENU AFTER LOADING YOUR DIAGNOSTICS DISKETTE?

NO

If the diagnostics did not load automatically, type in DIAG, and then press [ENTER]. This causes the diagnostics to load, if the file DIAG.COM is on your diskette.

If the diagnostics program still does not load, repeat this procedure with a known-good Advanced Diagnostics Diskette. If the problem is not resolved refer to the PIP in Chapter 8, DISK DRIVE SUBSYSTEM, to further isolate the cause of the problem.

YES

This menu indicates that you have successfully loaded the diagnostics and are ready to proceed.

ARE THERE ANY MISSING, OR OBVIOUSLY INCORRECT, CHARACTERS IN THE MENU DISPLAY?

YES Replace the VDU board and start the display PIP again. Refer to the Removal and Replacement Procedure for the VDU board assembly located at the end of this chapter.

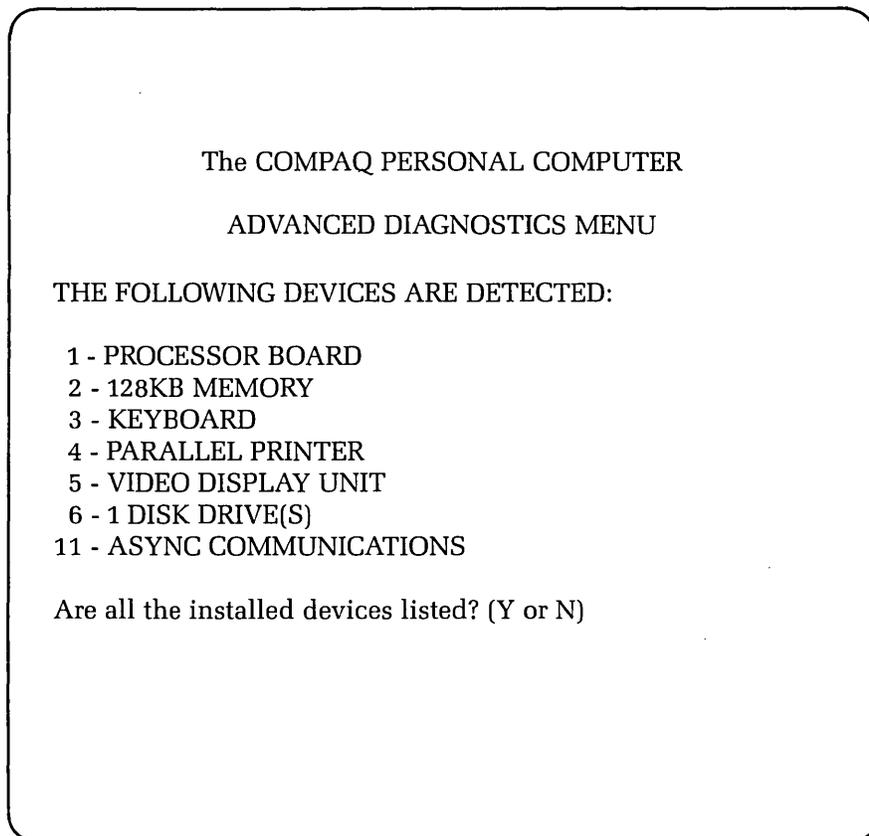
NO Continue the PIP.

IS THERE ANY SIGNIFICANT DISTORTION OF CHARACTERS IN THE SCREEN DISPLAY?

YES Check the display subsystem by running the CRT alignment test. If the alignment test does not resolve the problem, replace the VDU assembly and start the display PIP again. Refer to the Removal and Replacement Procedures located in this chapter.

NO Continue the VDU subsystem PIP.

Press [0] and then [ENTER] to select RUN THE DIAGNOSTIC TESTS. A display similar to the following should appear on the screen:



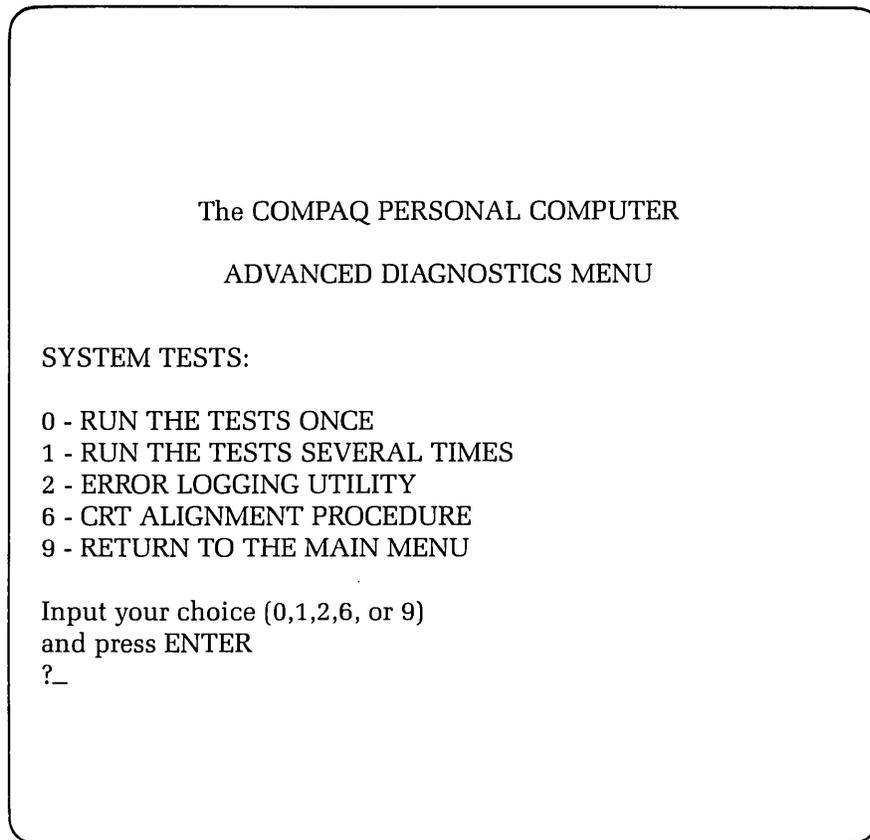
This display allows you to verify the system configuration.

DOES THE DISPLAY ACCURATELY DESCRIBE THE SYSTEM CONFIGURATION?

NO This indicates a possible problem with the setting of the switches (SW1 and SW2) on the processor board. Refer to the configuration portion of Chapter 5, CPU/MEMORY SUBSYSTEM, to confirm the positions of SW1 and SW2.

YES Press [Y] and then [ENTER].

The following menu should appear on the screen:



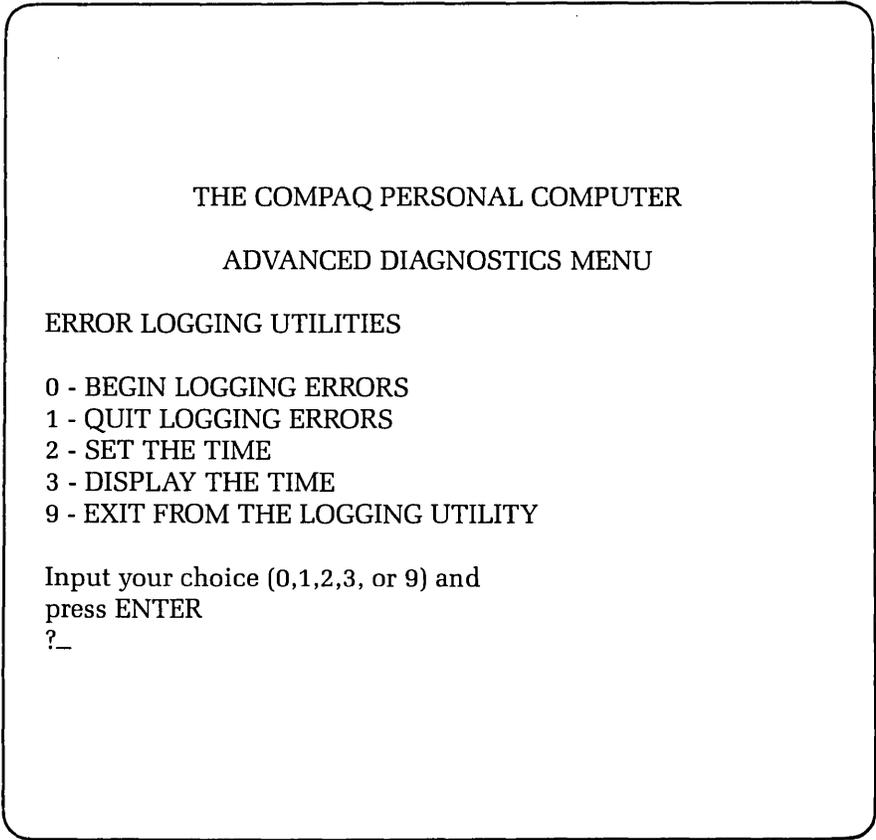
At this point, you can select the mode in which you want to run the tests. You also have the option to log errors to a printer as they are detected.

DO YOU INTEND TO LOG DETECTED ERRORS?

NO Decide if you want to run the selected tests once, or repeat the tests several times.

YES Select the ERROR LOGGING UTILITY by pressing [2] and then [ENTER].

The following menu should appear on the screen:

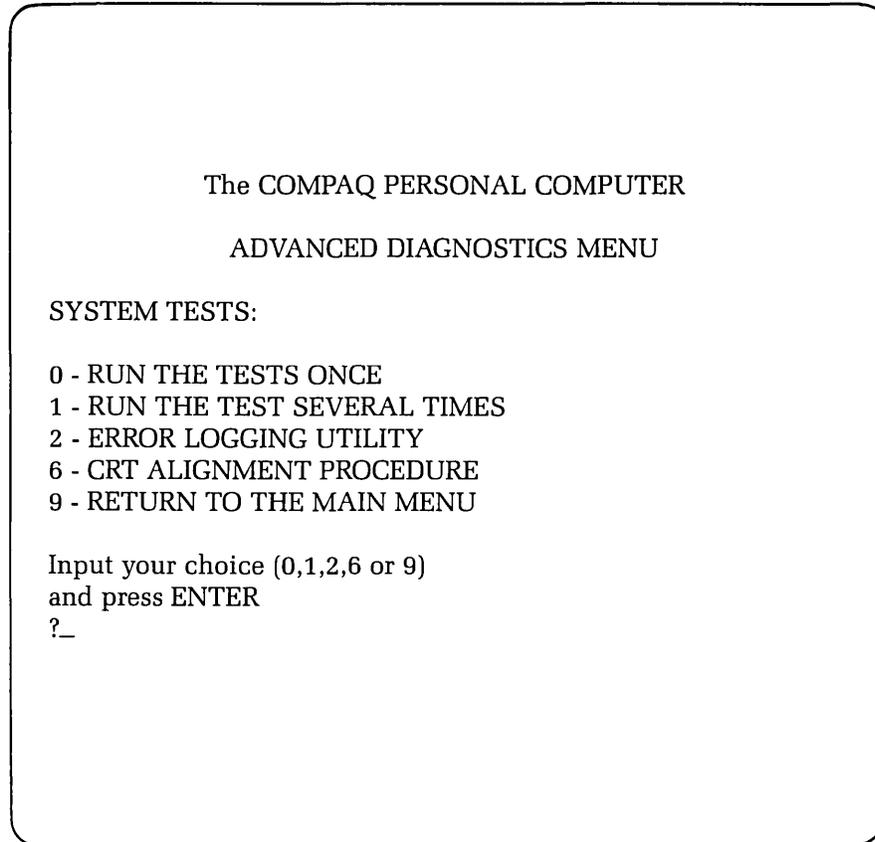


Error logging is a convenient way to create a printed version (hardcopy) of all system errors. This utility will automatically log errors to an attached printer only. Use the [0] and [1] keys, accompanied by [ENTER], to start and stop the error-logging function.

The error-logging utility will also record the time at which the error occurred. Use the [2] and [3] keys, accompanied by [ENTER] to make sure the system clock is set to the current time.

Once the logging function is initiated, return to the previous menu by selecting EXIT FROM THE LOGGING UTILITY by pressing [9] and then [ENTER].

The following menu should appear on the screen:



DO YOU WANT TO RUN THE SELECTED TESTS MORE THAN ONE TIME?

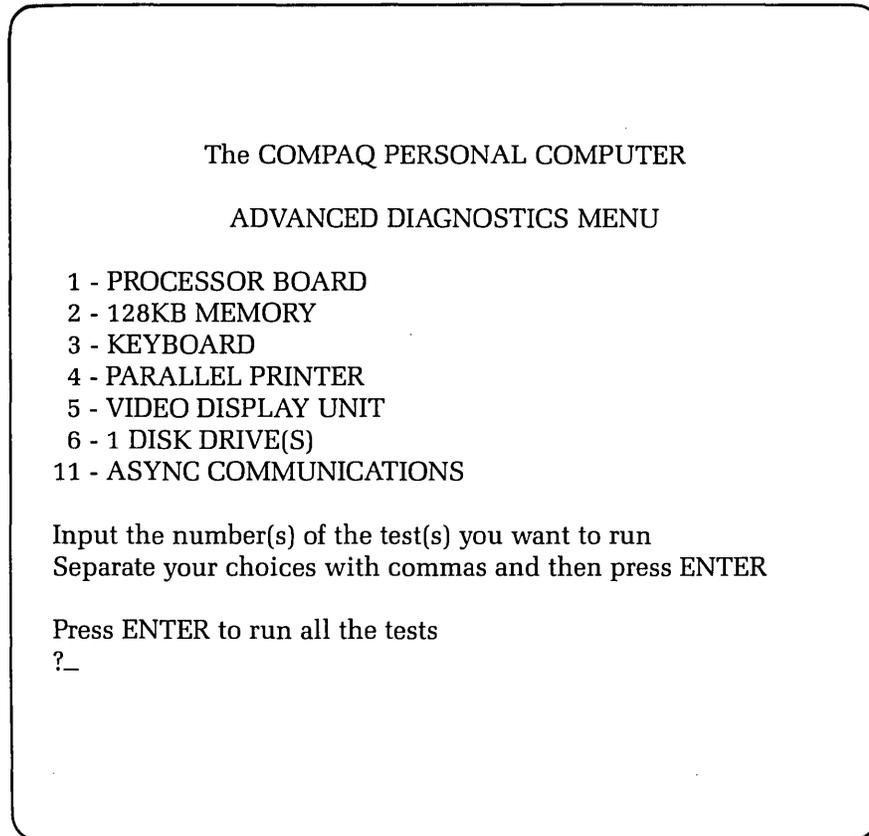
NO Select RUN THE TESTS ONCE by pressing [0] and then [ENTER].

YES Select RUN THE TESTS SEVERAL TIMES by pressing [1] and then [ENTER].

A prompt will appear requesting the number of times you wish to run the selected tests (between 1 and 65,535 times). Enter the desired number of test cycles, followed by [ENTER].

Finally, when running the tests several times you may choose to halt program execution each time an error is detected. When this prompt appears on the screen, simply press [Y] or [N], followed by [ENTER].

Whether you select Y or N, a display similar to the following will appear:



This menu permits you to select one, or a combination, of subsystems to test. In this case, select the display test by pressing [5] and then [ENTER].

The following menu should appear on the screen:

The COMPAQ PERSONAL COMPUTER
ADVANCED DIAGNOSTICS MENU

MANUAL TESTING ROUTINE:

- 0 - VDU CONTROLLER
- 1 - DISPLAY CHARACTERISTICS
- 2 - CHARACTER SET
- 3 - 80 X 25 SCREEN DISPLAY
- 4 - 40 X 25 SCREEN DISPLAY
- 5 - 320 X 200 GRAPHICS DISPLAY
- 6 - 640 X 200 GRAPHICS DISPLAY
- 7 - LIGHT PEN
- 8 - DISPLAY MEMORY PAGES
- 9 - RETURN TO THE DIAGNOSTICS MENU
- 10 - RUN ALL THE TESTS
- 11 - GRAY SCALE/COLOR

Input the number(s) of the test(s) you want to run
Separate your choices with commas and then press ENTER
?_

This menu lists the series of tests that you can use to check the display subsystem. You can select one or a combination of these tests. Select RUN ALL THE TESTS from the menu.

The first test verifies the integrity of the VDU board. If a VDU memory error is detected, a 501 error code message will appear on the screen.

This test verifies that the system can display all of its available character patterns.

Examine the screen for any character(s) that might be improperly displayed. In particular, look at the block characters that appear in the display to determine if there are any extra and/or missing dots.

IS THE CHARACTER SET PROPERLY DISPLAYED?

- NO** Replace the VDU board and start the display PIP again. Refer to the Removal and Replacement Procedure located at the end of this chapter for more information on how to replace the VDU board assembly.
- YES** If the character set is correct, press [Y] and then [ENTER]. This starts the next video test.

This test verifies that the system can operate in the 80 x 25 high-resolution text mode (9 x 14 character matrix).

The following screen display should appear:

```

80 x 25 SCREEN DISPLAY
 9 x 14 CHARACTER CELL
789 : ; (<=) ?@ABCDEFGHIJKLMNPOQRSTUVWXYZ [\]
39 : ; (<=) ?@ABCDEFGHIJKLMNPOQRSTUVWXYZ [\]^
9 : ; (<=) ?@ABCDEFGHIJKLMNPOQRSTUVWXYZ [\]^_
: ; (<=) ?@ABCDEFGHIJKLMNPOQRSTUVWXYZ [\]^_`
; (<=) ?@ABCDEFGHIJKLMNPOQRSTUVWXYZ [\]^_`a
<=> ?@ABCDEFGHIJKLMNPOQRSTUVWXYZ [\]^_`at
=> ?@ABCDEFGHIJKLMNPOQRSTUVWXYZ [\]^_`abc
> ?@ABCDEFGHIJKLMNPOQRSTUVWXYZ [\]^_`abcc
?@ABCDEFGHIJKLMNPOQRSTUVWXYZ [\]^_`abcde
?ABCDEFGHIJKLMNPOQRSTUVWXYZ [\]^_`abcdef
ABCDEFGHIJKLMNPOQRSTUVWXYZ [\]^_`abcdefg
BCDEFGHIJKLMNPOQRSTUVWXYZ [\]^_`abcdefgt
Is the display ok? (Y or N)

```

IS THE 80 x 25 HIGH RESOLUTION TEXT MODE PROPERLY DISPLAYED?

- NO** Replace the VDU board and start the display PIP again. Refer to the Removal and Replacement Procedure located at the end of this chapter for more information on how to replace the VDU board assembly.
- YES** If the display appears to be correct, press [Y] and then [ENTER]. This will start the next video test.

7-14 Maintenance and Service Guide

This test verifies that the system can operate in the 80 x 25 low resolution character display mode (8 x 8 character matrix).

The following screen display should appear:

```
80 x 25 SCREEN DISPLAY
8 x 8 CHARACTER CELL
789: ; <=> ?@ABCDEFGHIJKLMN0PQRSTUVWXYZ [\ ]
39: ; <=> ?@ABCDEFGHIJKLMN0PQRSTUVWXYZ [\ ] ^
3: ; <=> ?@ABCDEFGHIJKLMN0PQRSTUVWXYZ [\ ] ^ _
: ; <=> ?@ABCDEFGHIJKLMN0PQRSTUVWXYZ [\ ] ^ _ `
; <=> ?@ABCDEFGHIJKLMN0PQRSTUVWXYZ [\ ] ^ _ ` a
<=> ?@ABCDEFGHIJKLMN0PQRSTUVWXYZ [\ ] ^ _ ` a t
=> ?@ABCDEFGHIJKLMN0PQRSTUVWXYZ [\ ] ^ _ ` a b c
> ?@ABCDEFGHIJKLMN0PQRSTUVWXYZ [\ ] ^ _ ` a b c c
?@ABCDEFGHIJKLMN0PQRSTUVWXYZ [\ ] ^ _ ` a b c d e
@ABCDEFGHIJKLMN0PQRSTUVWXYZ [\ ] ^ _ ` a b c d e f
ABCDEFGHIJKLMN0PQRSTUVWXYZ [\ ] ^ _ ` a b c d e f g
```

Is the display ok? (Y or N)

IS THE 80 x 25 LOW RESOLUTION MODE PROPERLY DISPLAYED?

NO

Replace the VDU board and start the display PIP again. Refer to the Removal and Replacement Procedure located at the end of this chapter for more information on how to replace the VDU board assembly.

YES

If the display appears to be correct, press [Y] and then [ENTER]. This will start the next video test.

This test verifies that the system can operate in the 40 x 25 low resolution character display mode (8 x 8 character matrix). The following screen display should appear:

```

40 x 25 SCREEN DISPLAY
789: ; (<=>) ?@ABCDEFGHIJKLMN0PQRSTUVWXYZ [\]
39: ; (<=>) ?@ABCDEFGHIJKLMN0PQRSTUVWXYZ [\]^
9: ; (<=>) ?@ABCDEFGHIJKLMN0PQRSTUVWXYZ [\]^_
: ; (<=>) ?@ABCDEFGHIJKLMN0PQRSTUVWXYZ [\]^_`
; (<=>) ?@ABCDEFGHIJKLMN0PQRSTUVWXYZ [\]^_`a
<=> ?@ABCDEFGHIJKLMN0PQRSTUVWXYZ [\]^_`at
=> ?@ABCDEFGHIJKLMN0PQRSTUVWXYZ [\]^_`abc
> ?@ABCDEFGHIJKLMN0PQRSTUVWXYZ [\]^_`abcc
?@ABCDEFGHIJKLMN0PQRSTUVWXYZ [\]^_`abcde
@ABCDEFGHIJKLMN0PQRSTUVWXYZ [\]^_`abcdef
ABCDEFGHIJKLMN0PQRSTUVWXYZ [\]^_`abcdefg
BCDEFGHIJKLMN0PQRSTUVWXYZ [\]^_`abcdefgh

Is the display ok? (Y or N)

```

IS THE 40 x 25 LOW RESOLUTION MODE PROPERLY DISPLAYED?

NO

Replace the VDU board and start the display PIP again. Refer to the Removal and Replacement Procedure located at the end of this chapter for more information on how to replace the VDU board assembly.

YES

If the display appears to be correct, press [Y] and then [ENTER]. This will start the next video test.

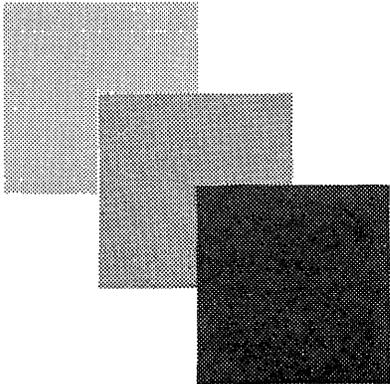
This test verifies that the system can operate in the 320 x 200 color graphics mode, color set 0.

The following screen display should appear:

```

320 x 200 GRAPHICS DISPLAY
COLOR SET 0

```



```

Is the display ok? (Y or N)

```

This display appears as shades of green on the internal monitor.

On an external color monitor, use the chart below to verify correct color display:

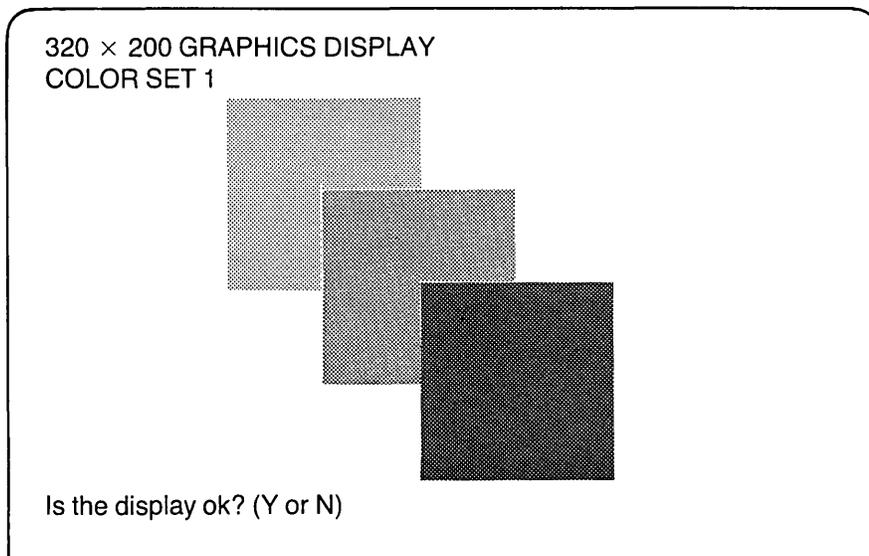
Display Item	Correct Display Color
Left Box	GREEN
Center Box	RED
Right Box	BROWN (DARK YELLOW)
Characters	BROWN (DARK YELLOW)
Background	BLACK

IS THE COLOR/GRAPHICS DISPLAY CORRECT?

- NO** Replace the VDU board and start the display PIP again. Refer to the Removal and Replacement Procedure located at the end of this chapter for more information on how to replace the VDU board assembly.
- YES** If the display appears to be correct, press [Y] and then [ENTER]. This will start the next video test.

This test verifies that the system can operate in the 320 x 200 color graphics mode, color set 1.

The following screen display should appear:



This display appears as shades of green on the internal monitor. On an external color monitor, use the chart below to verify correct color displays.

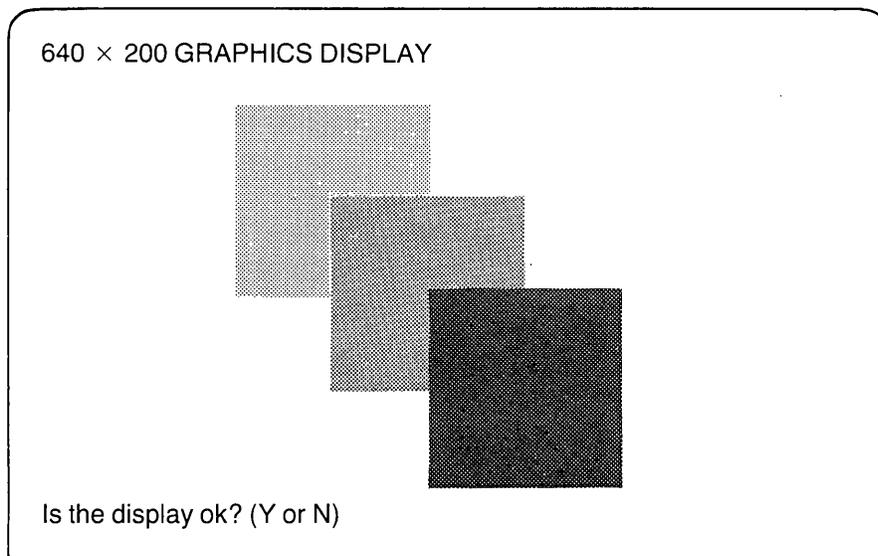
Display Item	Correct Display Color
Left Box	BLUE
Center Box	MAGENTA
Right Box	WHITE
Characters	WHITE
Background	BLACK

IS THE COLOR/GRAPHICS DISPLAY CORRECT?

- NO** Replace the VDU board and start the display PIP again. Refer to the Removal and Replacement Procedure located at the end of this chapter for more information on how to replace the VDU board assembly.
- YES** If the display appears to be correct, press [Y] and then [ENTER]. This will start the next video test.

This test verifies that the system can operate in the 640 x 200 color graphics mode, color set 0.

The following screen display should appear:



This display appears as shades of green on the internal monitor. On an external color monitor, use the chart below to verify correct color displays:

Display Item	Correct Display Color
Left Box	GRAY
Center Box	LIGHT GRAY
Right Box	WHITE
Characters	WHITE
Background	BLACK

IS THE COLOR/GRAPHICS DISPLAY CORRECT?

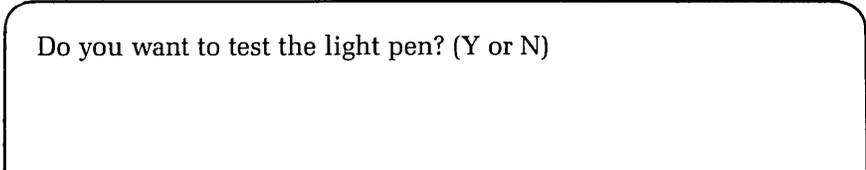
- NO** Replace the VDU board and start the display PIP again. Refer to the Removal and Replacement Procedure located at the end of this chapter for more information on how to replace the VDU board assembly
- YES** If the display appears to be correct, press [Y] and then [ENTER]. This will start the next video test.

7-18 Maintenance and Service Guide

This test verifies the light pen interface. To run this test, a light pen must be connected to the VDU board and an external monitor must be used.

IMPORTANT: Due to the screen persistence of a green phosphor display, a light pen will not function properly with the internal monitor.

The light pen test will begin with the following screen display:



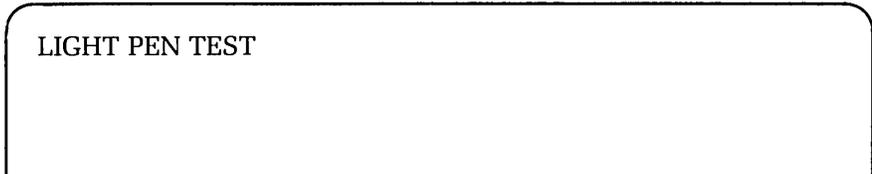
Do you want to test the light pen? (Y or N)

DO YOU INTEND TO RUN THE LIGHT PEN TEST?

NO Press [N] and then [ENTER]. This will start the next video test, described on page 7-17.

YES Press [Y] and then [ENTER].

The following display should appear on the screen:



LIGHT PEN TEST

Using an external monitor, press the center of the block with the light pen

To test the light pen function, activate the light pen at the center of each block as they appear on the screen. If the light pen is able to locate the block, the block will change into an asterisk.

DOES THE SYSTEM PASS THE LIGHT PEN TEST?

NO Verify that the light pen is properly installed and run the test again. If the test still fails, replace the light pen and run the test again. If this fails to correct the problem, replace the VDU board. Refer to the Removal and Replacement Procedure located at the end of this chapter, for more information on how to replace the VDU board assembly.

YES After the light pen test is completed, or if you did not run the light pen test, the next test will begin. This test verifies that the system can address all of the memory contained on the VDU board.

WERE YOU ABLE TO ACCESS ALL EIGHT PAGES OF VIDEO MEMORY?

NO Replace the VDU board and start the display PIP again. Refer to the Removal and Replacement Procedure located at the end of this chapter for more information on how to replace the VDU board assembly.

YES Press [Y] and then [ENTER]. This will start the next video test.

Press [11] to GRAY SCALE/COLOR and then press [ENTER].

This test verifies that the system can display all sixteen shades of the gray scale as well as all eight colors (at two intensities each). You may need to adjust the intensity of the screen to clearly see all shades of gray. This display appears as shades of green on the internal monitor. On an external color monitor, the color listed directly below each block should accurately describe the block color.

IS THE COLOR/GRAY SCALE DISPLAY CORRECT?

NO Replace the VDU board and start the display PIP again. Refer to the Removal and Replacement Procedure located at the end of this chapter for more information on how to replace the VDU board assembly.

YES If the display appears to be correct, press [Y] and then [ENTER]. This concludes the VDU Diagnostics Program. If all tests passed successfully, the VDU subsystem is operating correctly.

If none of the steps you have taken to this point have resolved the problem, contact the COMPAQ Technical Support Department for further technical assistance.

CRT ALIGNMENT PROCEDURE

INTRODUCTION

This procedure is designed to provide the service technician with an orderly, easy-to-follow method of performing any required CRT alignment on the COMPAQ Portable Computer. To complete the alignment procedure, the following equipment will be needed:

- All tools normally required to service the COMPAQ Portable Computer
- COMPAQ Advanced Diagnostics Diskette
- Set of standard television adjustment tools
- COMPAQ Portable Computer Display Template (Part No. 100686-001)

The CRT Alignment Procedure is arranged in a step-by-step outline. Be sure to read the entire procedure carefully and completely before proceeding with any work. Make certain that each step is completed before continuing to the next step.

For additional information on CRT alignment procedures, contact the COMPAQ Technical Support Department.

HOW TO BEGIN

Insert the Advanced Diagnostics Diskette into the COMPAQ Portable Computer and load the Advanced Diagnostics Program. Refer to Chapter 3, SYSTEM CHECKOUT for more information on loading the Advanced Diagnostics Program.

NOTE: All CRT potentiometer adjustments may be made using a small plastic screwdriver, with the exception of the WIDTH control. To adjust the screen display width coil, you must use a plastic Allen wrench.

***** WARNING *****

The Cathode Ray Tube (CRT) may implode violently if glass envelope is damaged or broken. This can cause serious injury to persons in the immediate vicinity of the CRT. Use extreme caution when handling the CRT. Also, extremely high voltages are present in the flyback transformer, yoke assembly, and CRT anode high voltage (HV) lead during normal CRT operation. Serious injury due to high voltage discharge may occur if these areas are touched while power is applied to the CRT. Use care to avoid these areas, if possible.

DID THE SYSTEM BOOT PROPERLY?

NO

You may have a defective diagnostics diskette or a diskette that does not contain the correct Operating System. Try to boot the system using a diskette that is known to be good.

If the system still does not boot, it is an indication of a probable failure in the disk drive subsystem. Refer to the PIP in Chapter 8, DISK DRIVE SUBSYSTEM, to further isolate the cause of the problem.

YES

If the system booted properly, and contains an AUTOEXEC. BAT file to load the diagnostics, the following menu should appear:

The COMPAQ PERSONAL COMPUTER
ADVANCED DIAGNOSTICS MENU
Version 1.00 (c) COPYRIGHT 1982, COMPAQ COMPUTER CORP.
ALL RIGHTS RESERVED
YOUR CHOICES ARE:
0 - RUN THE DIAGNOSTIC TESTS
1 - FORMAT A DISKETTE
2 - COPY A DISKETTE
9 - GO TO THE SYSTEM DISKETTE
Input your choice (0,1,2, or 9) and press
ENTER
?_

This menu indicates that the diagnostics are loaded and ready to begin.

DID YOU GET THE CORRECT MENU AFTER LOADING YOUR DIAGNOSTIC DISKETTE?

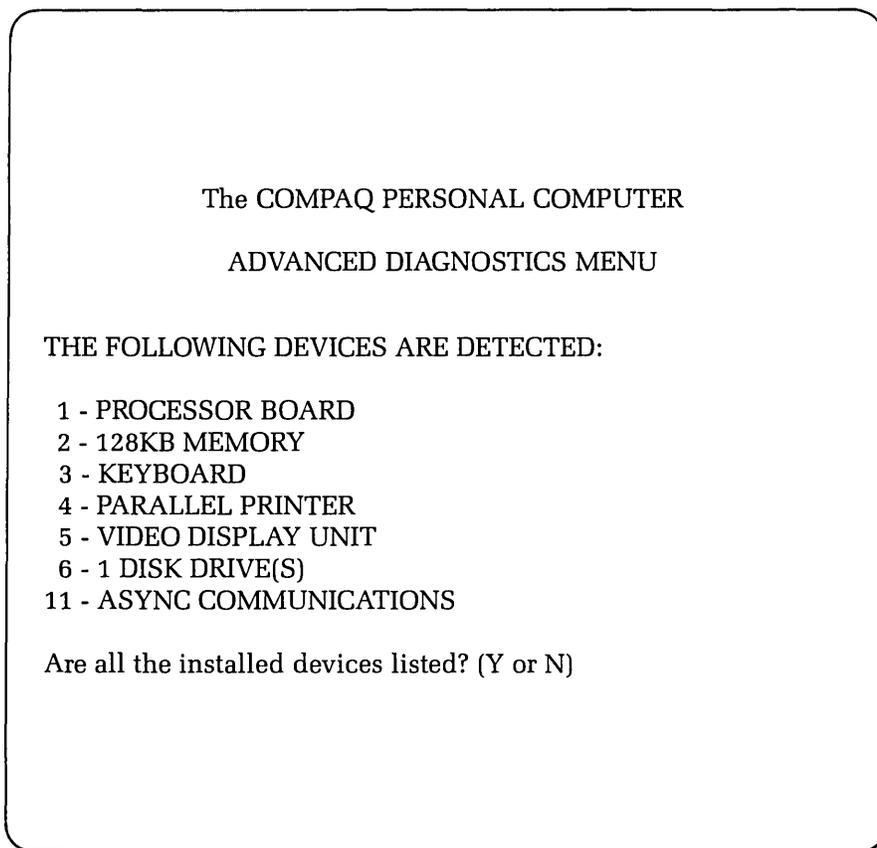
NO

If the diagnostics did not load automatically, type in DIAG, and then press [ENTER]. This causes the diagnostics to load, if the file DIAG.COM is on your diskette.

If the Diagnostics Program still does not load, repeat this procedure with a known-good Advanced Diagnostics Diskette. If the problem is not resolved, refer to the PIP in Chapter 8, DISK DRIVE SUBSYSTEM, to further isolate the cause of the problem.

YES

This menu indicates that you have successfully loaded the diagnostics and are ready to proceed. Press [0] and then [ENTER] to select RUN THE DIAGNOSTICS. A display similar to the following should appear on the screen:



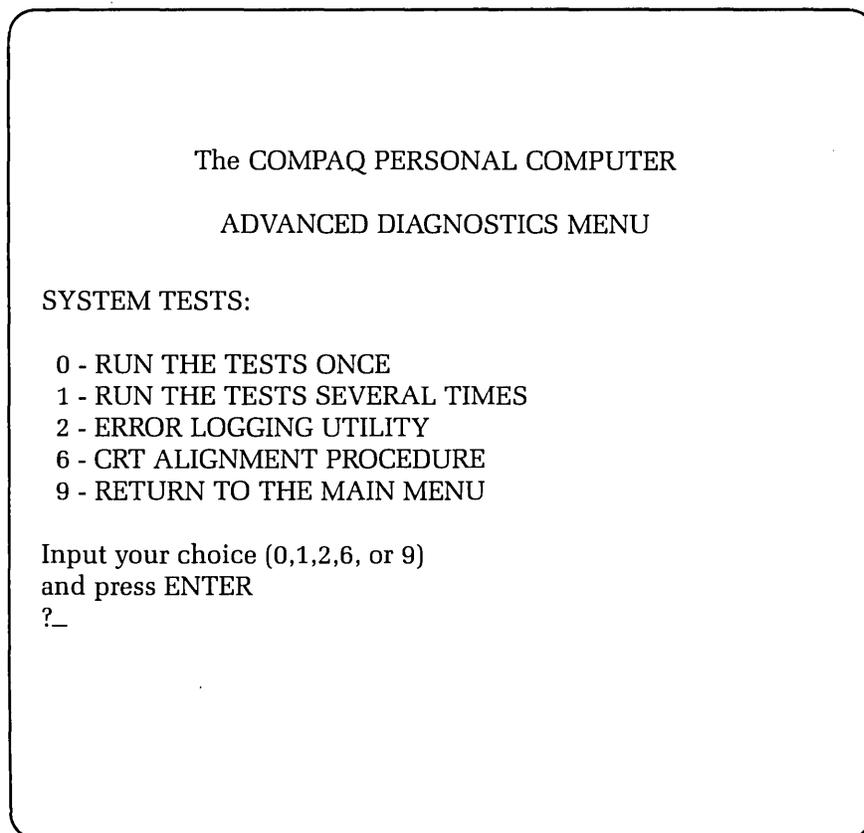
This display allows you to verify the system configuration.

DOES THE DISPLAY ACCURATELY DESCRIBE THE SYSTEM CONFIGURATION?

NO This indicates a possible problem with the setting of the switches (SW1 and SW2) on the processor board. Refer to the configuration portion of Chapter 5, CPU/MEMORY SUBSYSTEM, to confirm the positions of SW1 and SW2.

YES Press [Y] and then [ENTER].

The following menu should appear on the screen:



At this point, you should select option 6. Press [6] and then [ENTER].

7-24 Maintenance and Service Guide

The CRT adjustment program was developed so that the user could “fill” the display screen with any character contained in the COMPAQ Character Generator PROM, including both upper- and lower-case alphabets, numerals, and special control - character codes that can be generated by the keyboard. Another feature of this program is that it will alternate display modes between the high-scan resolution mode (80x25 screen matrix) and the low-scan resolution mode (40x25 screen matrix).

Each time a displayable key is pressed, the corresponding character will completely fill the screen. The next time a displayable key is pressed, the screen will change display modes and the corresponding character will fill the screen.

By using the CRT adjustment program with the following procedure, you will be able to quickly adjust the COMPAQ display to within proper specifications.

- Step 1 - After selecting the CRT adjustment program, the screen should be completely cleared. This is normal program operation. At this time, remove the upper plastic access cover from the system. For more information on how to remove the plastic access cover, refer to the Removal and Replacement Procedure for the VDU board assembly contained in this Chapter.
- Step 2 - Turn the external BRIGHTNESS control located on the front bezel clockwise as far as it will turn.

Step 3 - Using the label on the VDU Assembly access plate as a guide (see Figure 7-3a), locate and adjust the BRITE control until the screen raster appears on the display (see Figure 7-3b). Check this display to make sure it is not tilted in any way (see Figure 7-3c).

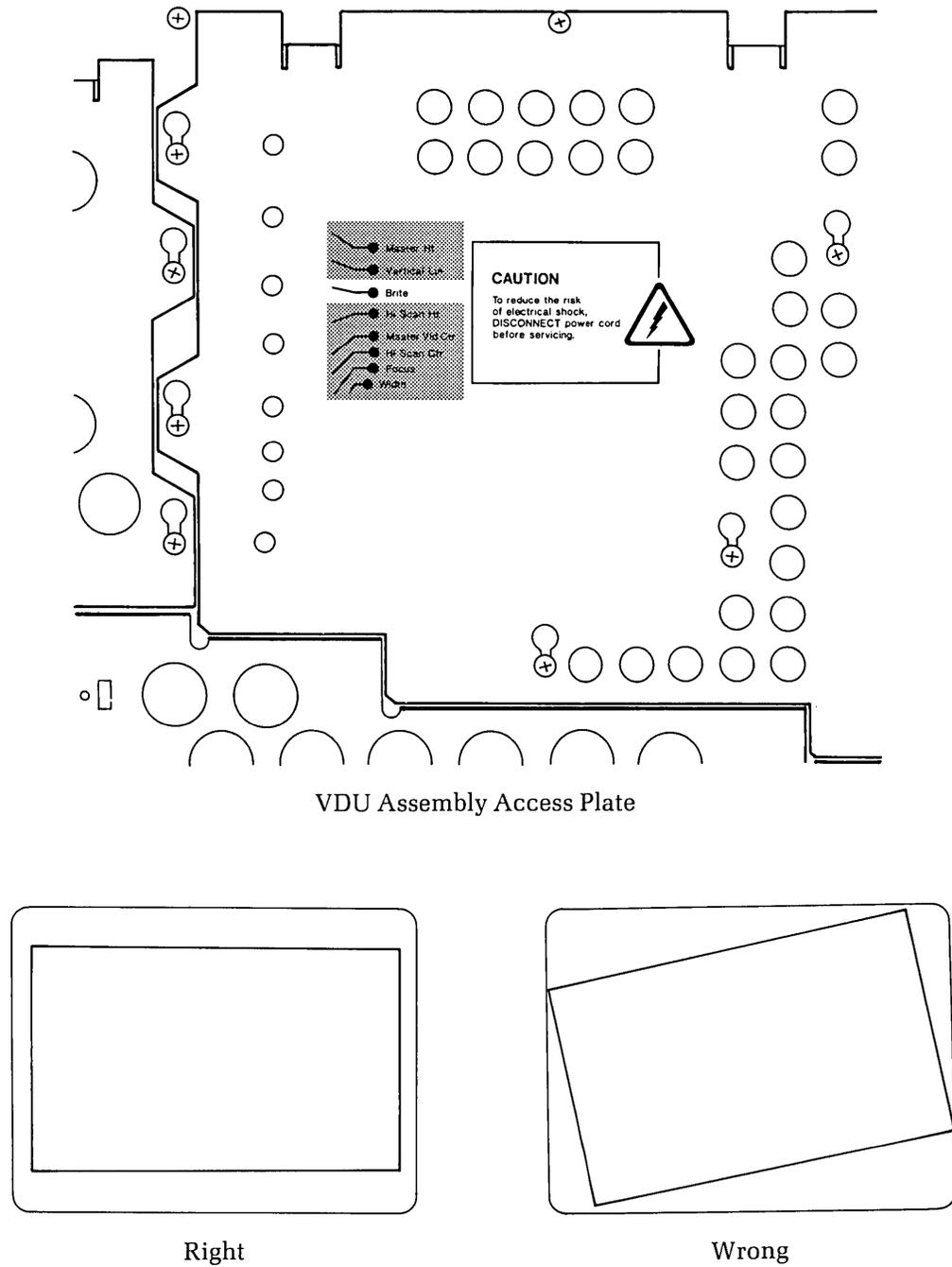


Figure 7-3. VDU Assembly Access Plate - BRITE Control.

Step 4 - Remove the VDU Assembly access plate. Refer to Page 7-53 in this chapter for removal instructions. Adjust the positioning of the screen raster by carefully rotating the yoke assembly (see Figure 7-4). When the raster is correctly displayed, replace the VDU assembly access plate.

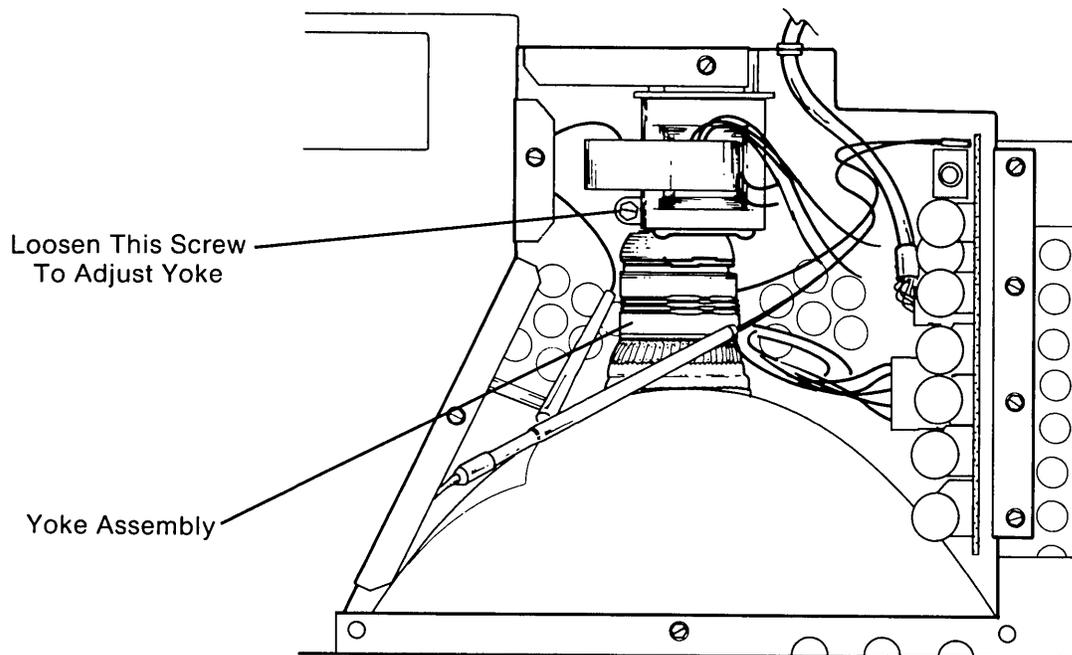


Figure 7-4. Yoke Assembly.

Step 5 - Adjust the BRITE control until the raster is just barely visible on the screen display.

NOTE: Due to the persistence of the green phosphor screen, this adjustment is most effective when completed in a darkened room.

Step 6 - Now turn the external BRIGHTNESS control located on the front bezel counter - clockwise until all of the raster just disappears.

Step 7 - Enter a capital "E" from the keyboard. The screen display should be in high-scan resolution mode and filled with all capital Es.

Step 8 - Using the label on the VDU assembly access plate as a guide (see Figure 7-5), locate and adjust the MASTER HEIGHT control until the top and bottom of the screen display are within minimum specifications. Use the plastic screen template provided with this manual to determine proper screen display specifications.

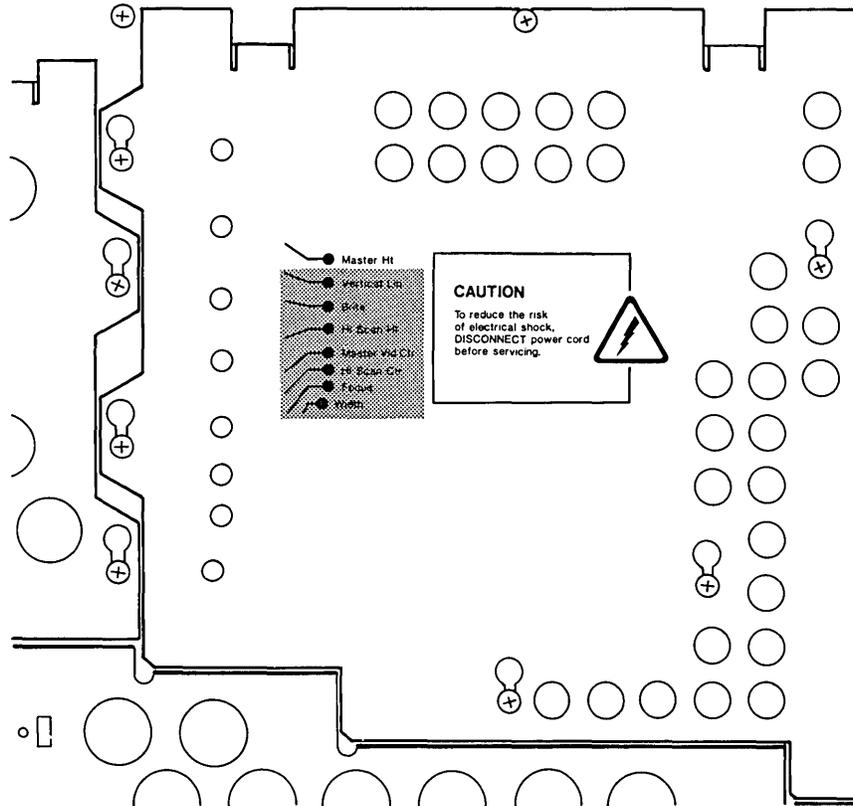


Figure 7-5. VDU Assembly Access Plate - MASTER HEIGHT Control.

Step 9 - Using the label on the VDU assembly access plate as a guide (see Figure 7-6a), locate and adjust the VERTICAL LIN control until the letters at the top of the screen display are the same, uniform height as the letters at the bottom of the screen display (see Figure 7-6b).

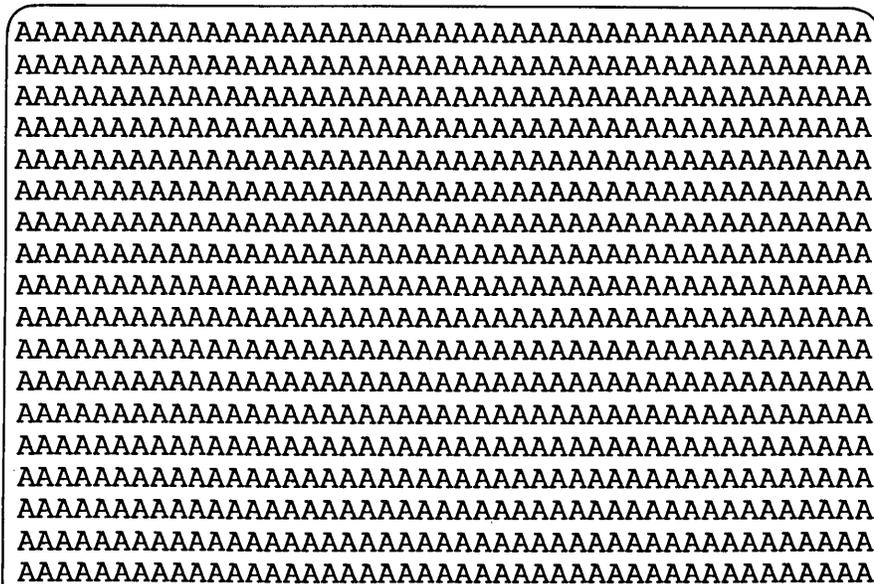
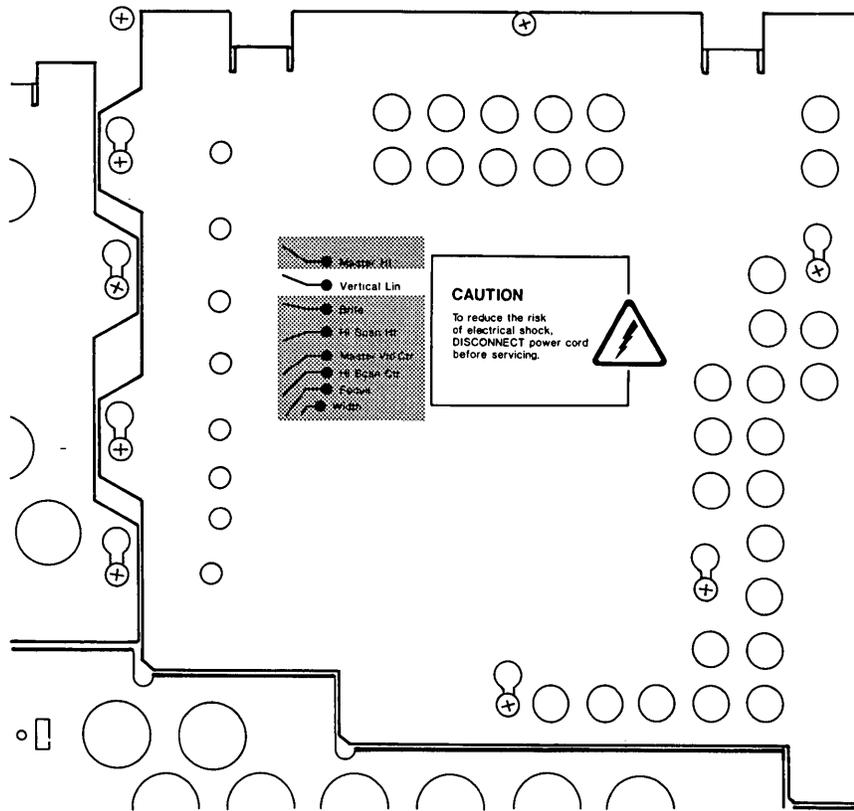


Figure 7-6. VDU Assembly Access Plate - VERTICAL LIN Control.

Step 10 - Now enter a capital "H" from the keyboard. The screen display should now be in high-scan resolution mode (80x25 screen matrix) and filled with all capital Hs.

Step 11 - Once again, verify that the vertical linearity is properly adjusted. If any adjustment is required, use the label on the VDU Assembly access plate as a guide (see Figure 7-7) to locate and adjust the VERTICAL LIN control until the vertical linearity is properly adjusted.

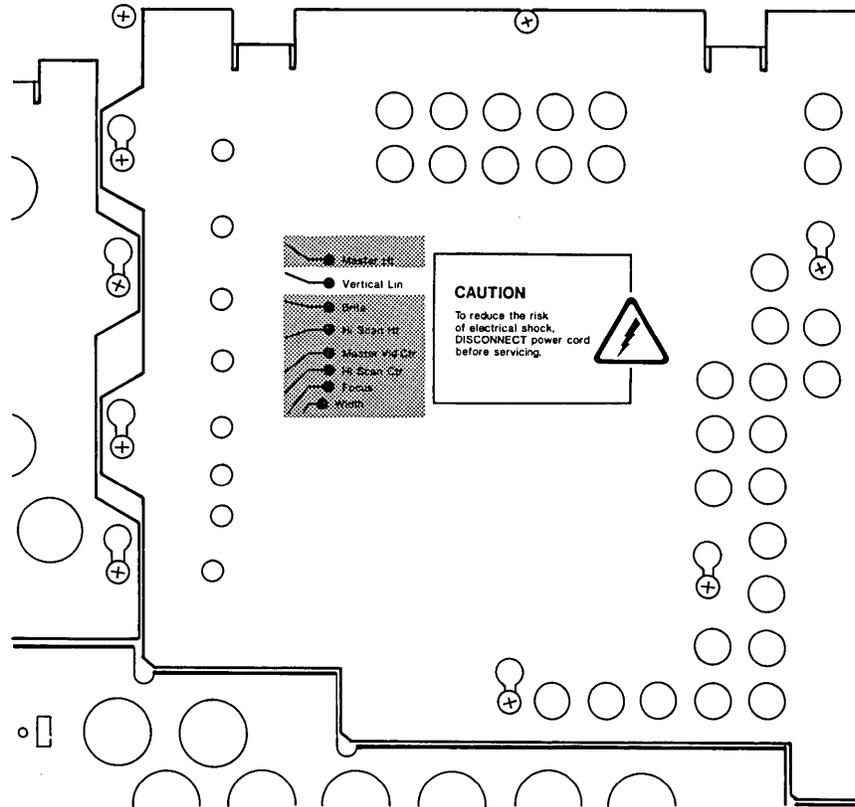


Figure 7-7. VDU Assembly Access Plate - VERTICAL LIN Control.

Step 12 - Using the label on the VDU assembly access plate as a guide (see Figure 7-8a), locate and adjust the MASTER VID CTR control until the display appears to be centered on the screen. Use the display template to determine if the width of the display is within minimum specifications. If it is not within the template specifications, use the label on the VDU Assembly access plate as a guide (see Figure 7-8b) to locate and adjust the WIDTH control until the width of the screen display is within proper specifications.

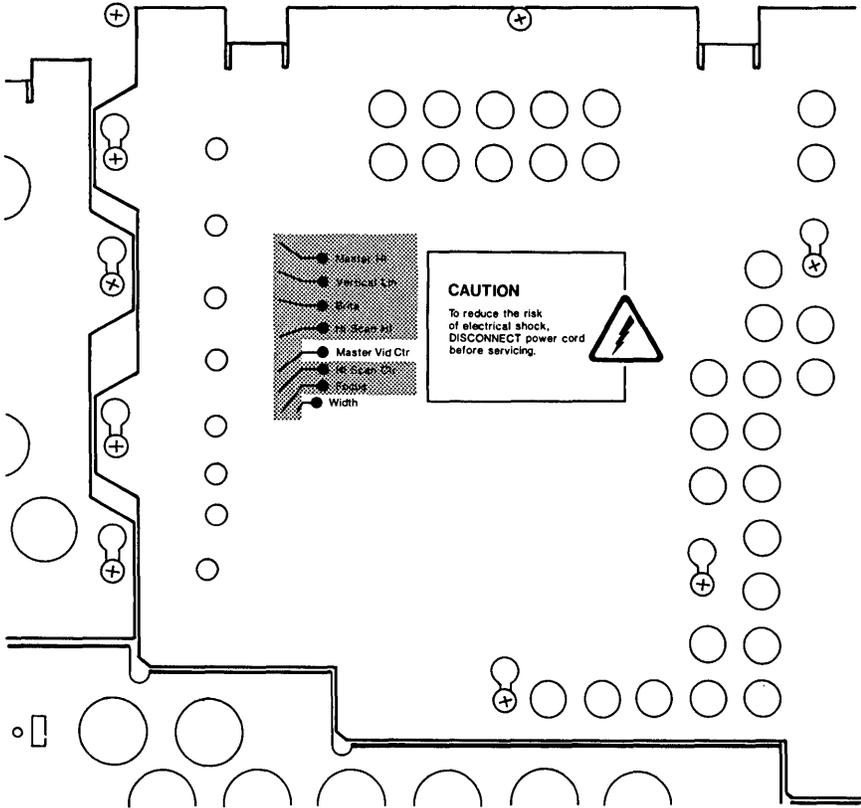


Figure 7-8. VDU Assembly Access Plate - MASTER VID CTR Control and WIDTH CTR.

Step 13 - Using the label on the VDU Assembly access plate as a guide (see Figure 7-9), locate and adjust the HI SCAN HT control until the top and bottom of the screen display are within minimum specifications. Use the plastic screen template provided with this manual to determine proper screen display specifications.

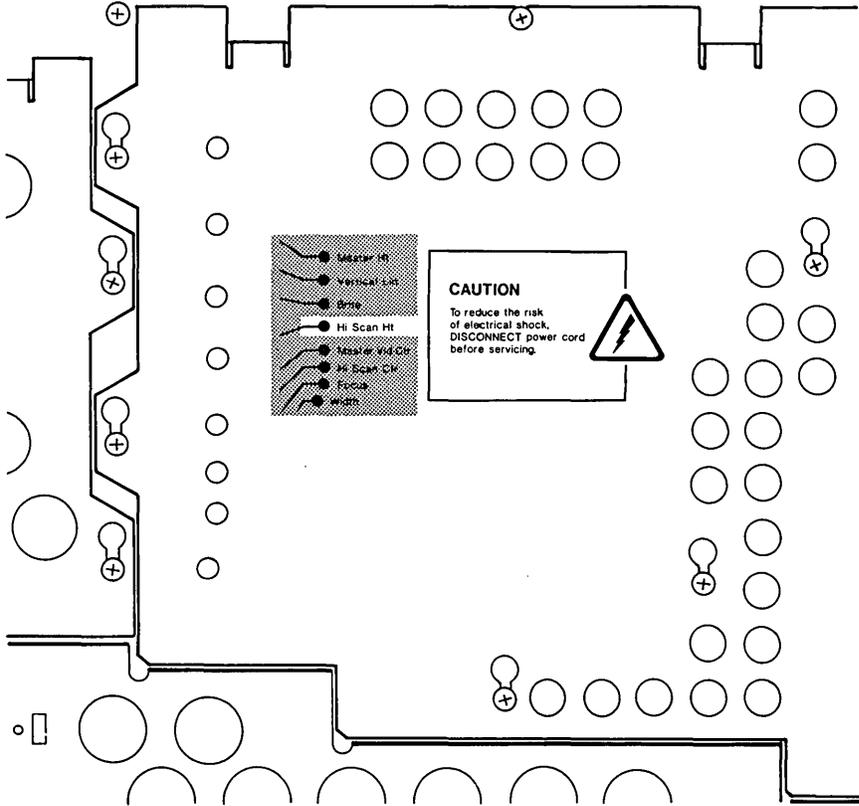


Figure 7-9. VDU Assembly Access Plate - HI SCAN HT Control.

Step 14 - At this time, alternate between low-scan and high-scan resolution modes (using both upper- and lower-case characters) to ensure that the alignment of both display modes is within acceptable template specifications.

NOTE: Some adjustment potentiometers will affect both display modes (e.g., WIDTH, VERTICAL LIN, etc.). Try to achieve a “happy medium” adjustment instead of over-compensating for any one display mode.

Step 15 - Remove the template from the VDU screen. Enter the “#” character from the keyboard (for best results, the screen should be in high-scan resolution display mode). Using the label on the VDU assembly access plate as a guide (see Figure 7-10) locate and adjust the FOCUS control until most of the characters displayed are clear and sharp (not blurred or “fuzzy”). Alternate between focusing the characters in the corners and those in the middle of the screen and adjust the control for an optimum display.

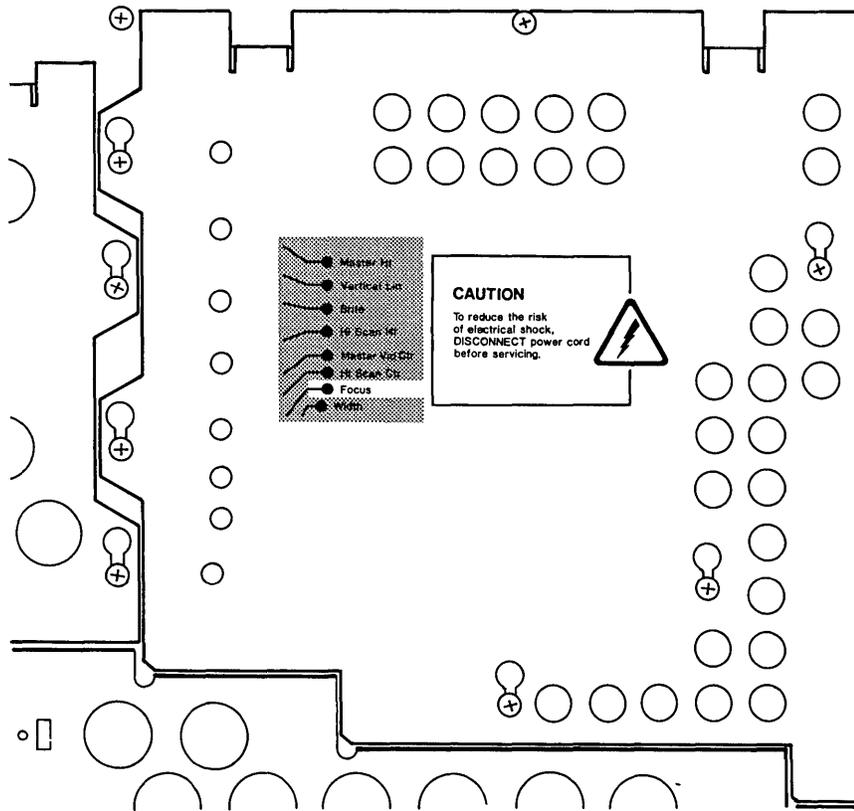


Figure 7-10. VDU Assembly Access Plate - FOCUS Control.

This completes the CRT Adjustment Procedure. For additional technical assistance, contact the COMPAQ Technical Support Department.

Removal And Replacement Procedure For The VDU Subsystem

VDU Board Assembly

*** * * WARNING * * ***

Before opening the unit's case to perform any removal, replacement, or maintenance procedures, disconnect the line cord from the wall ac and set the ON/OFF switch to the OFF position. Otherwise, dangerous voltages may be present throughout the system.

STEP:

ACTION:

1

Place the computer on a level surface, such as a table or workbench with the handle assembly facing you (see Figure 7-11).

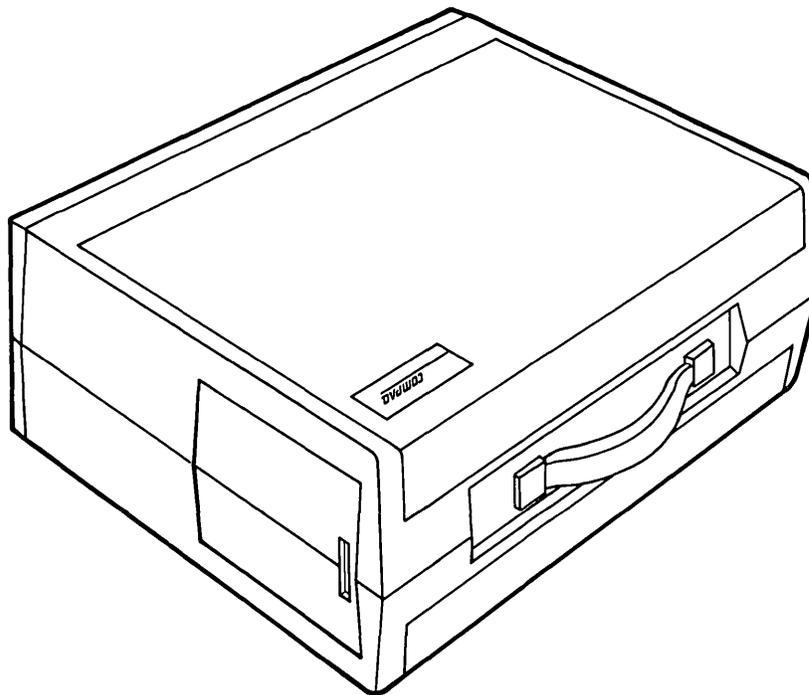


Figure 7-11. Computer On Work Surface.

STEP:

ACTION:

2

Open the access cover by pressing down on the plastic cover of the unit with one hand next to the COMPAQ Computer logo (see Figure 7-18a). As pressure is applied, the plastic cover will bulge at the connecting seam which runs directly above the handle. Partially insert a plastic card under the cover at the bulge, and release the hand pressure applied. At the opposite end of the plastic cover (see Figure 7-18b), apply pressure with your hand in the same manner as previously done. When the plastic cover bulges, reach under the cover and pull upward and outward, then slide cover out (see Figure 7-18c).

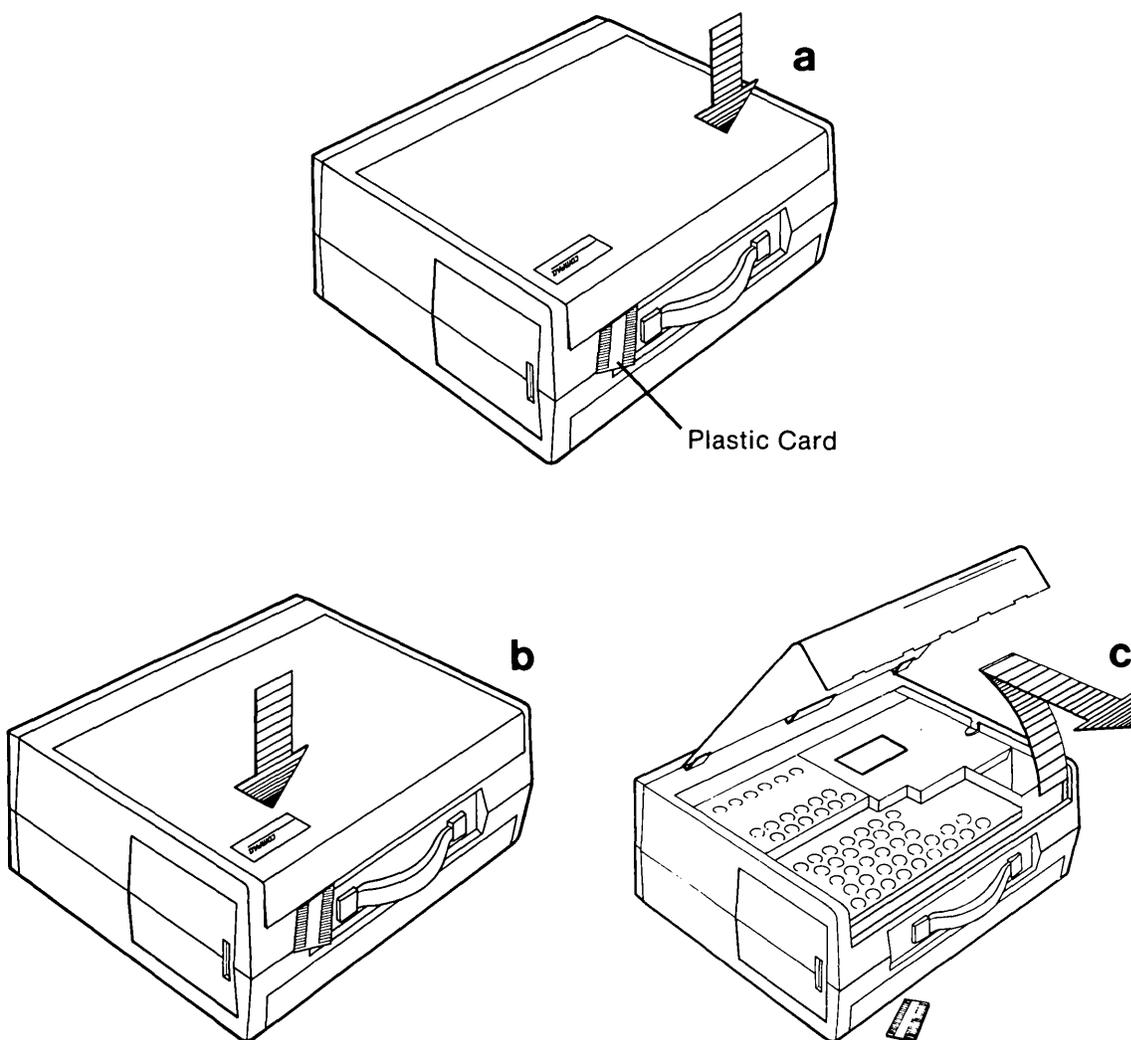


Figure 7-12. Removing Top Cover.

3

Loosen (DO NOT REMOVE) the six (6) Phillips screws and the one (1) 1/4 nut that secure the card cage access plate (see Figure 7-13a). Remove the card cage access plate by gently lifting it up and away from the chassis (see Figure 7-13b).

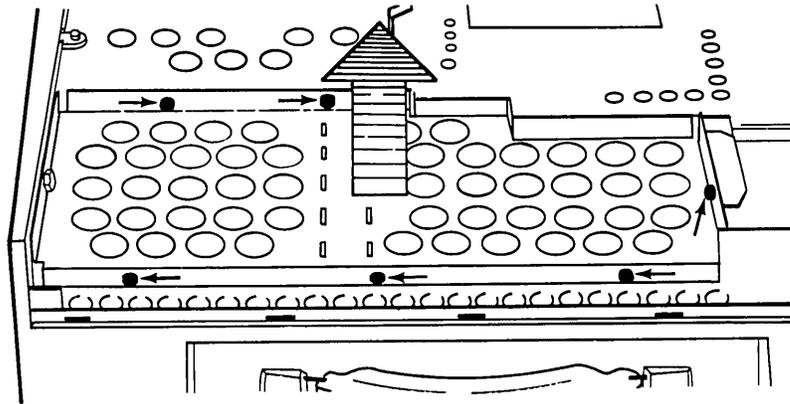


Figure 7-13. Removing the Card Cage Access Plate.

4

Carefully cut the cable-tie securing the VDU signal cable to the VDU board assembly and disconnect all cables from the VDU board (see Figure 7-14).

Important: Make sure you replace the cable-tie when you re-install the VDU board to the system chassis.

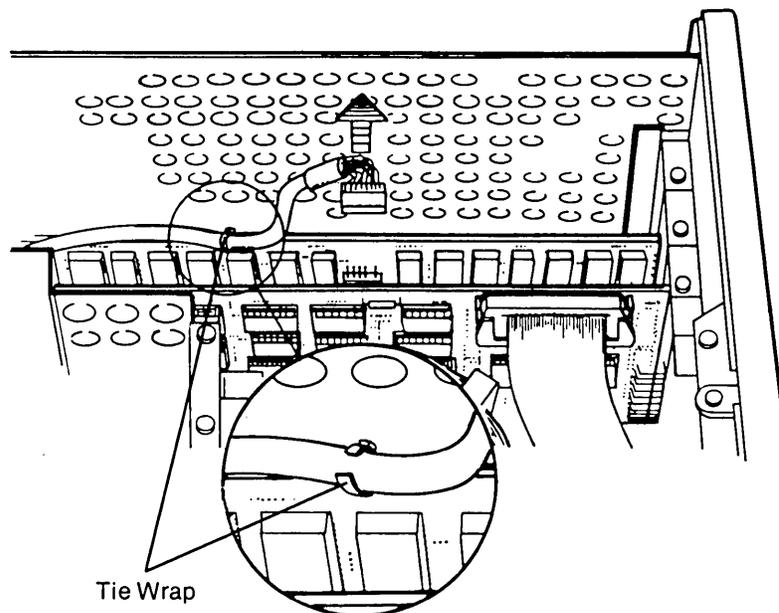


Figure 7-14. Cutting the Cable Tie Which Secures the VDU Signal Cable to the VDU Adapter Board.

7-36 Maintenance and Service Guide

- 5 Remove the retaining screw that secures the VDU adapter board to the system chassis (see Figure 7-15).

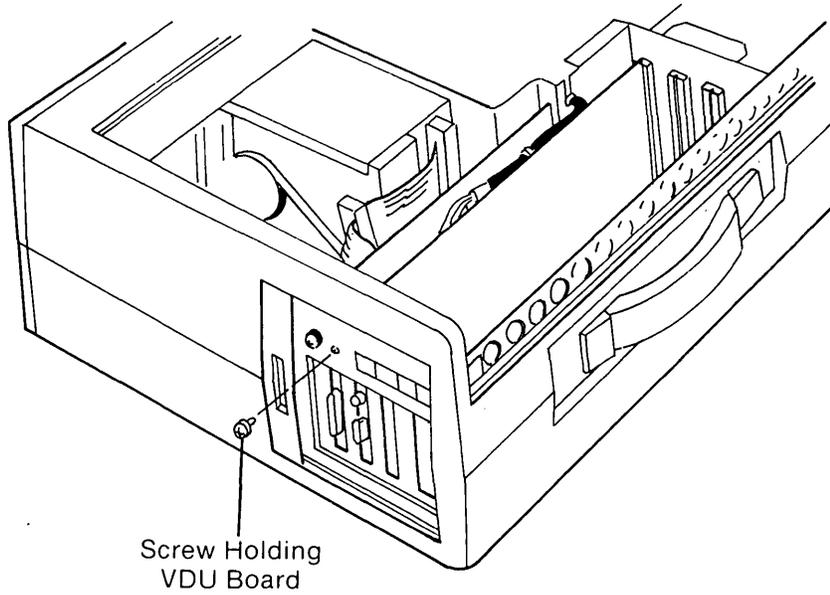


Figure 7-15. Removing the Screws Which Hold the VDU Adapter Board.

- 6 Gently remove the VDU board by pulling it away from the processor board (see Figure 7- 16).

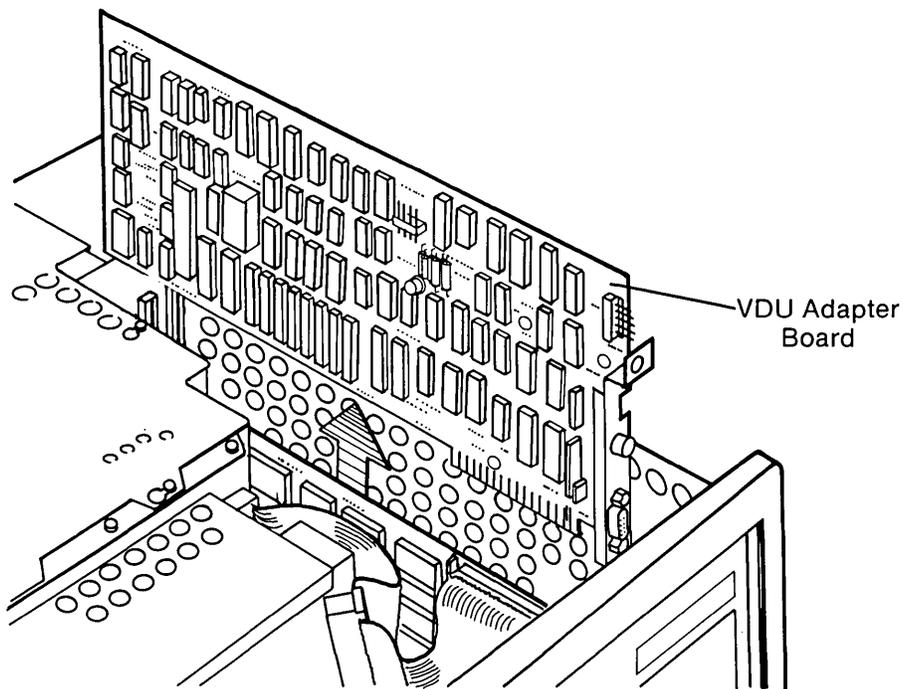


Figure 7-16. Removing the VDU Adapter Board.

To replace the VDU board, reverse Steps 1 through 6.

Removal and Replacement Procedure

VDU Assembly

***** WARNING *****

Before opening the unit's case to perform any removal, replacement, or maintenance procedures, disconnect the line cord from the ac outlet and set the ON/OFF switch to the OFF position. Otherwise, dangerous voltages may be present throughout the system.

- 1 Place the computer on a level surface, such as a table or workbench with the handle assembly facing you (see Figure 7-17).

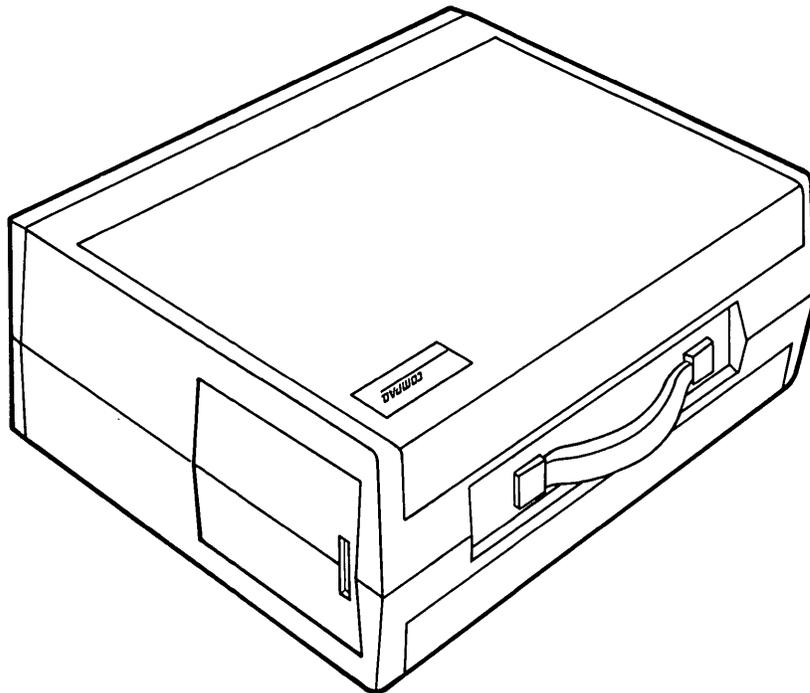


Figure 7-17. Computer On Work Surface.

2

Open the access cover by pressing down on the plastic cover of the unit with one hand next to the COMPAQ logo (see Figure 7-18a). As pressure is applied, the plastic cover will bulge at the connecting seam which runs directly above the handle. Partially insert a plastic card under the cover at the bulge, and release the hand pressure applied. At the opposite end of the plastic cover (see Figure 7-18b), apply pressure with your hand in the same manner as previously done. When the plastic cover bulges, reach under the cover and pull upward and outward, then slide cover out (see Figure 7-18c).

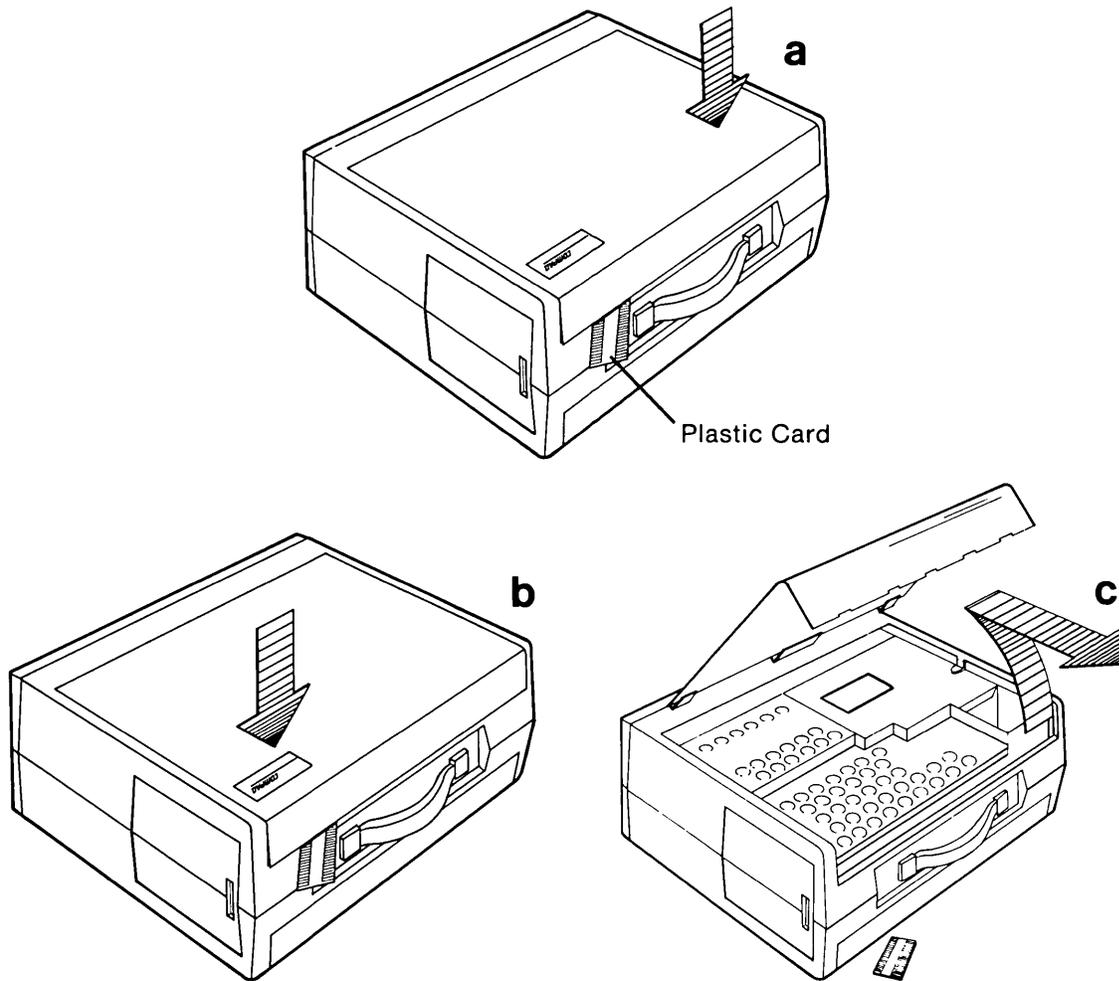
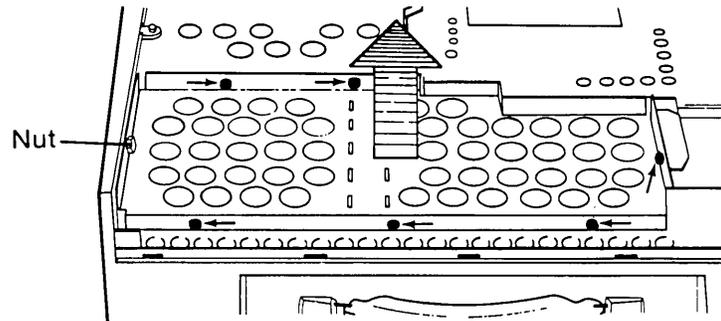


Figure 7-18. Removing Top Cover.

3

Loosen (DO NOT REMOVE) the six (6) Phillips screws and the one (1) 1/4" nut that secure the card cage access plate (see Figure 7-19a). Remove the card cage access plate by lifting it up and away from the chassis (see Figure 7-19b).



Removing Card Cage Access Plate

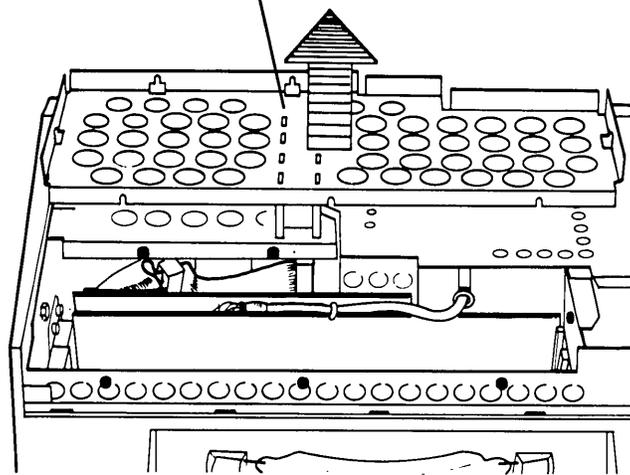


Figure 7-19. Removing the Screws From the Card Cage Access Plate.

4

Loosen (DO NOT REMOVE) the seven (7) screws and two (2) 1/4" nuts securing the VDU assembly access plate. Slide the metal cover toward the rear of the computer and lift it off (see Figure 7-20).

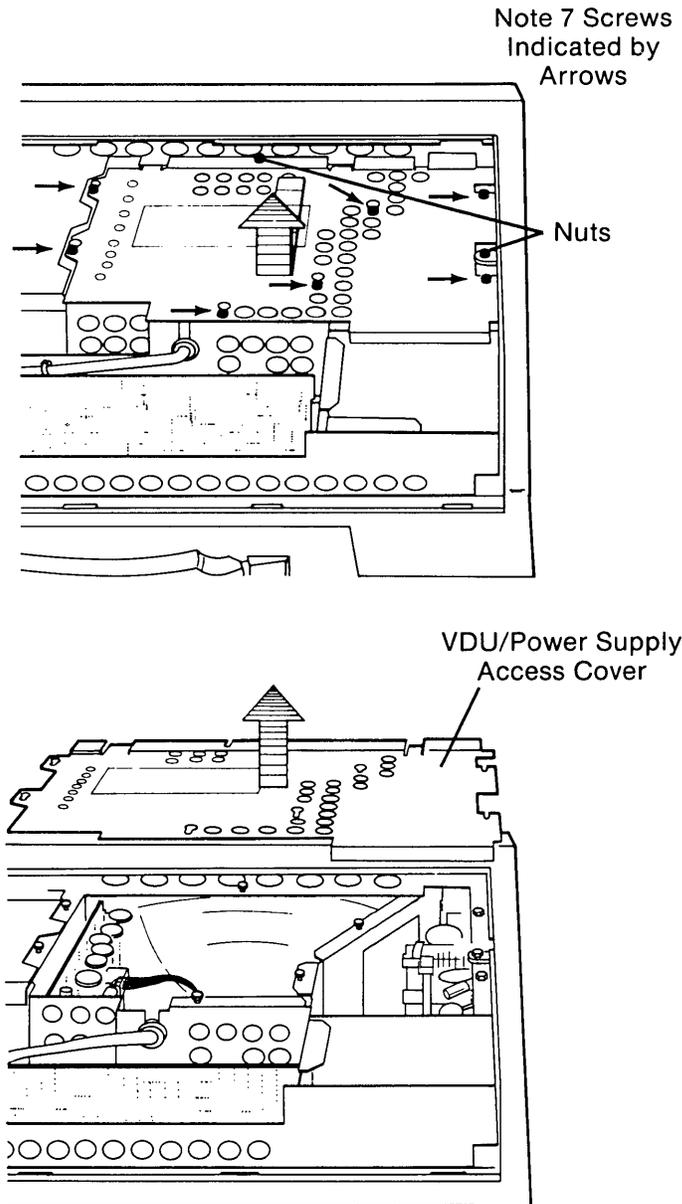


Figure 7-20. Loosening the VDU Power Supply Access Plate.

- 5 Mounted on the VDU board assembly, is a cable-tie which secures the VDU signal cable to the VDU board assembly. Locate this tie wrap and carefully cut it, then disconnect the VDU signal cable from the VDU board (see Figure 7-21).

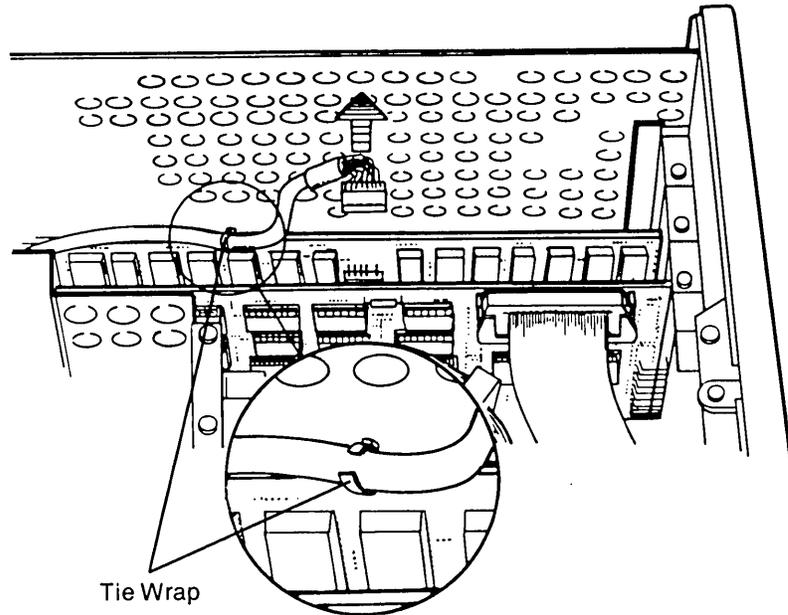


Figure 7-21. Location and Removal of VDU Signal Cable.

- 6 Disconnect the disk drive signal cable from the floppy/printer adapter board by pressing on the finger tabs located on either side of the connectors (see Figure 7-22).

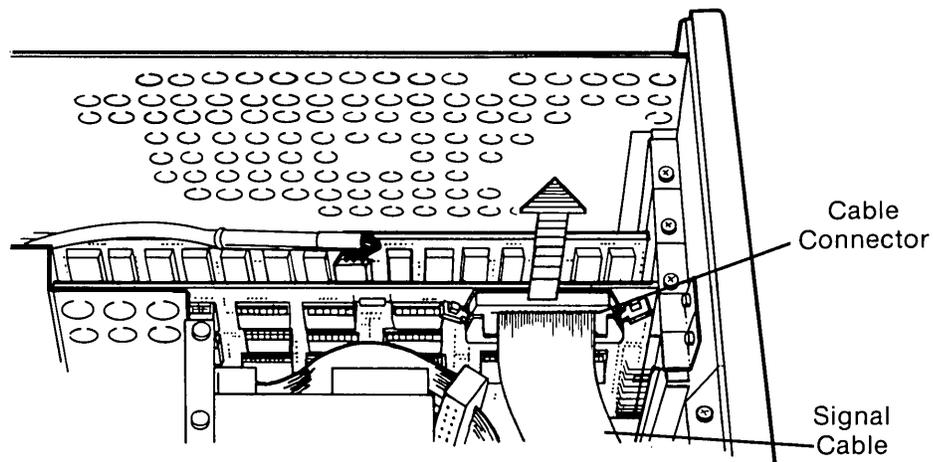
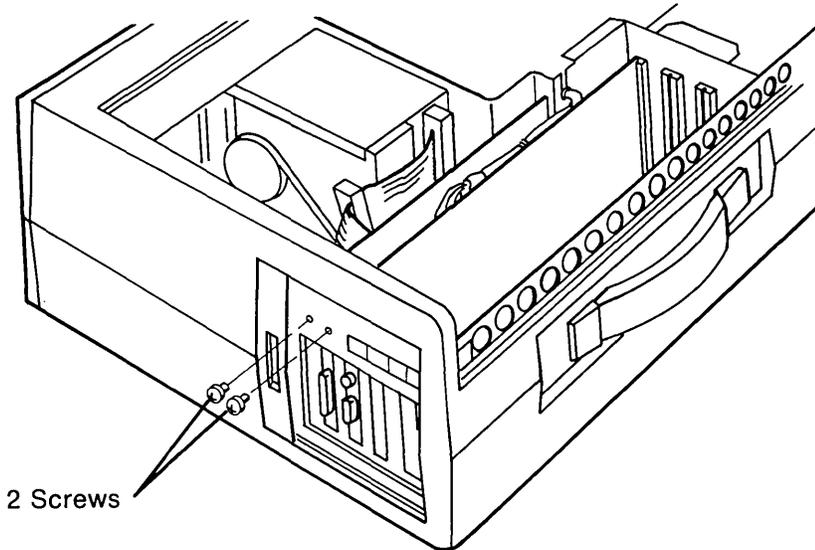


Figure 7-22. Location and Removal of Floppy/Printer Signal Cable.

- 7 Remove the retaining screws which secure the Floppy/Printer adapter board and the VDU board (see Figure 7-23).



***** WARNING *****

When you are disconnecting a cable, pull away by grasping the connector, not the cable.

Figure 7-23. Removing the Screws Which Hold the Floppy/Printer Adapter Board and the VDU Adapter Board.

- 8 Gently remove the Floppy/Printer Adapter Board and the VDU Adapter Board by pulling them away from the processor board (see Figure 7-24).

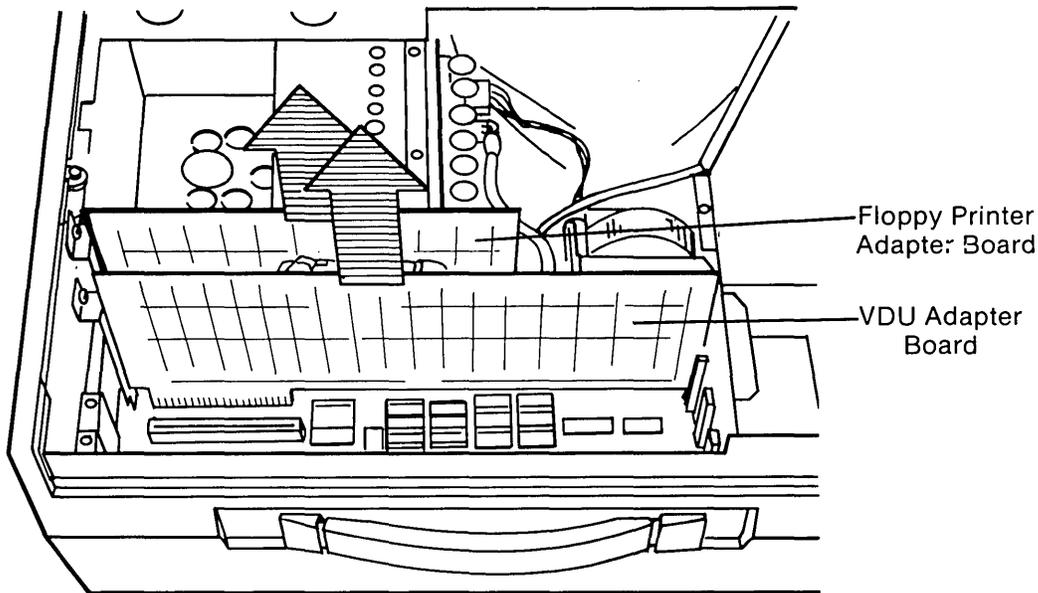


Figure 7-24. Removing the Floppy/Printer Adapter Board and the VDU Adapter Board.

Similarly remove any other adapter boards which may occupy any additional expansion slots in the processor board.

9

Loosen (DO NOT REMOVE) the five (5) screws that secure the disk drive access plate. Remove the disk drive's top rear mounting screw (see Figure 7-25).

Slide the metal access cover toward the rear of the computer and lift it off.

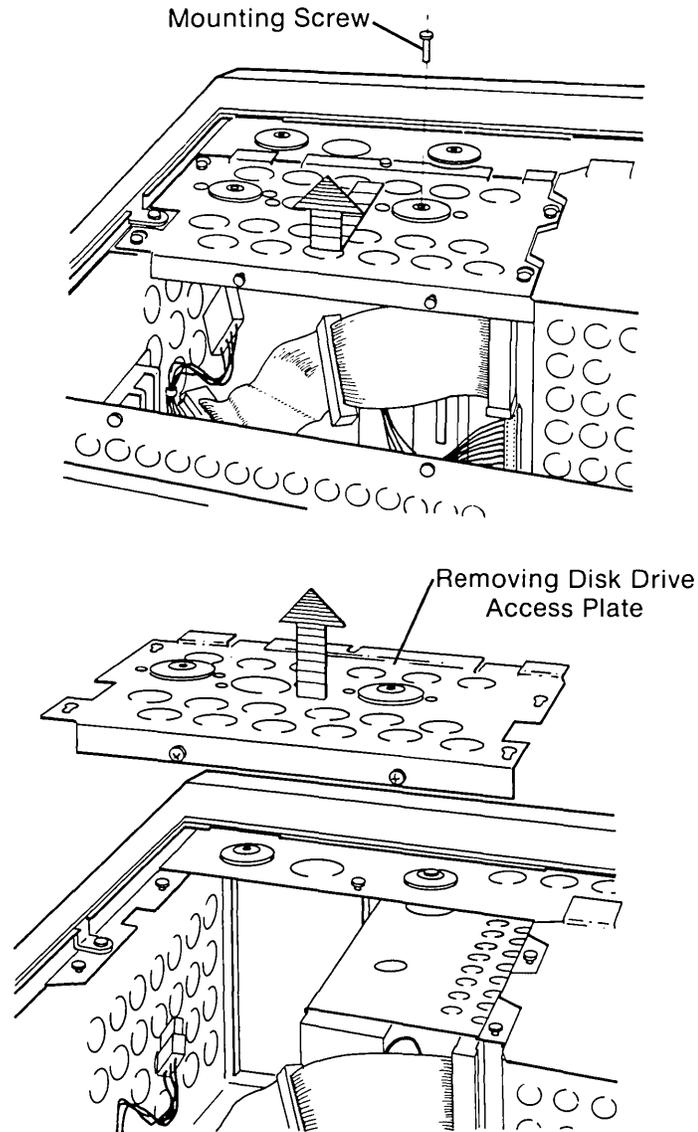


Figure 7-25. Removing the Disk Drive Access Plate.

- 10 Disconnect the signal cable and the power cable from the floppy disk drive (see Figure 7-26).

***** WARNING *****

When you are disconnecting a cable, pull away by grasping the connector, not the cable.

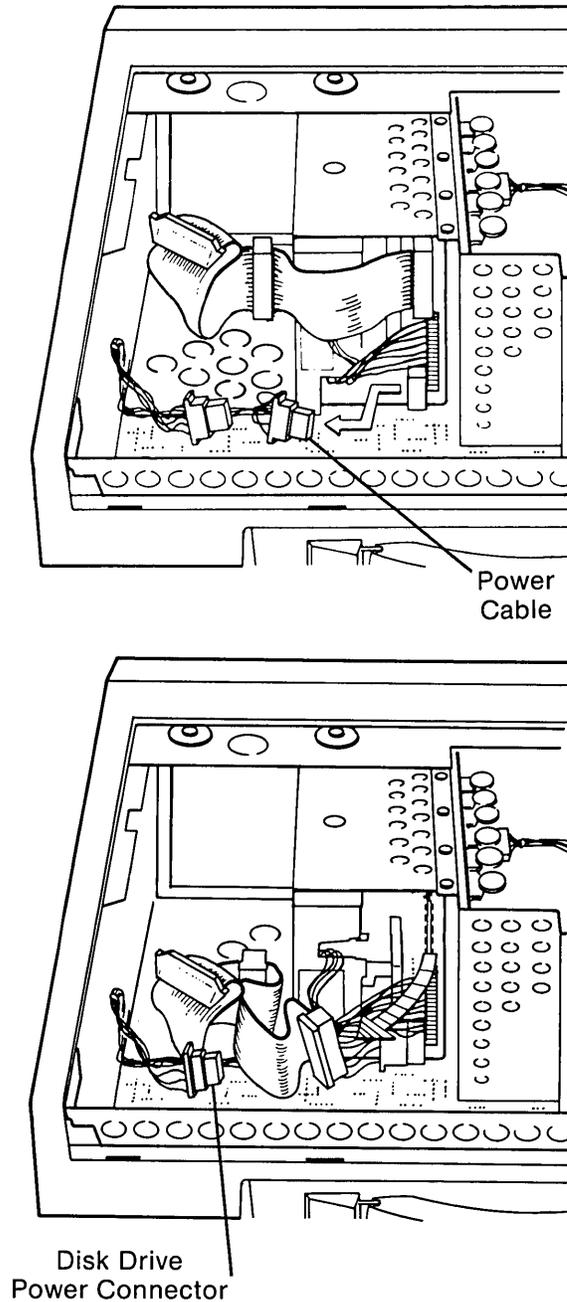


Figure 7-26. Disconnecting Signal Cable and Power Cable From the Floppy Disk Drive.

- 11 Turn the computer over so that the base of the system facing upward outlined in STEP 2, using the same procedure. Remove the bottom plastic access cover to expose the base of the system chassis.
- 12 Place the computer so that the display is facing downward against the work surface. Locate and loosen (DO NOT REMOVE) the two screws which secure the narrow access cover for all the processor board connectors. Remove the narrow access cover by lifting it away from the system chassis (see Figure 7-27).

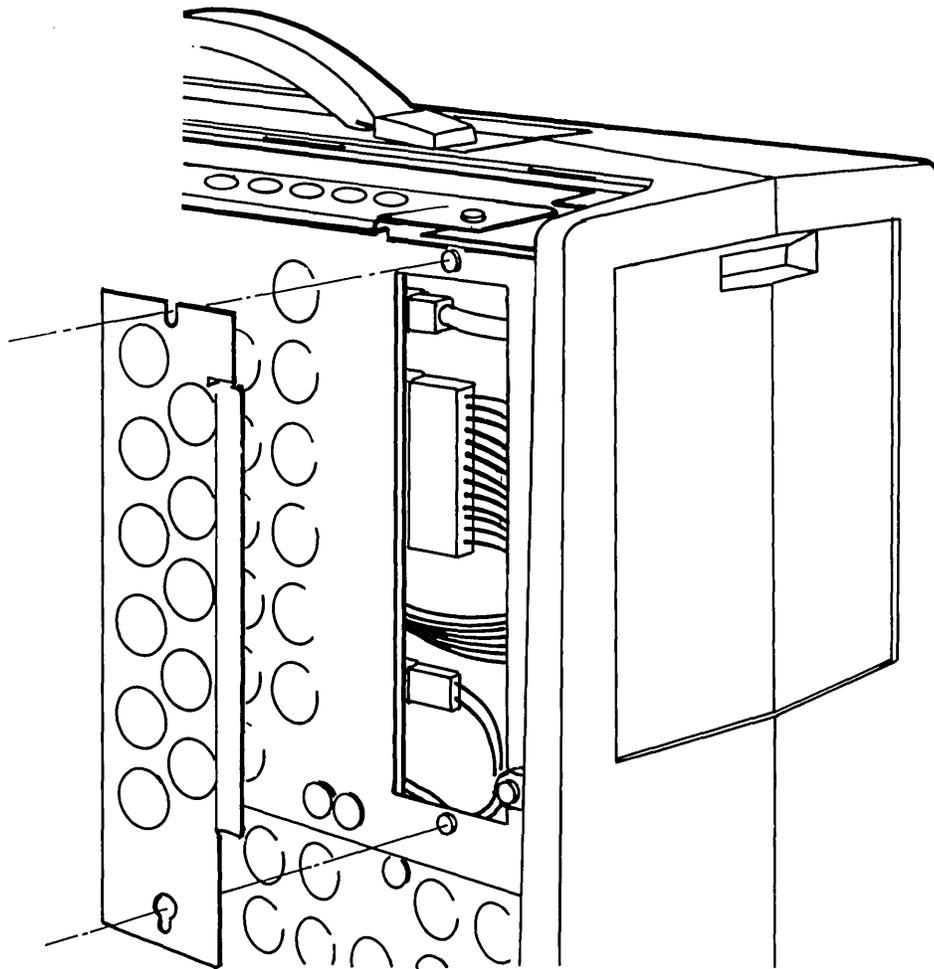


Figure 7-27. Loosening Processor Board Access Plate.

13

Locate and disconnect the speaker connector from the processor board. This connector and cable are attached to the VDU assembly and must slide out as the VDU assembly is removed (see Figure 7-28).

NOTE: The speaker wires are attached to the system chassis by a single cable-tie. This must be cut and removed before the VDU assembly can be removed. This cable-tie should also be replaced when the VDU assembly is re-installed.

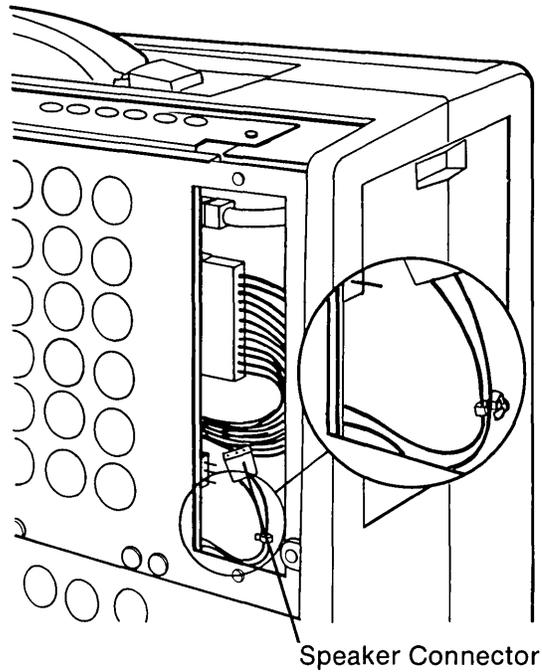


Figure 7-28. Speaker Connector.

14

Locate and remove the two screws which secure the VDU assembly to the bottom of the system chassis (see Figure 7-29).

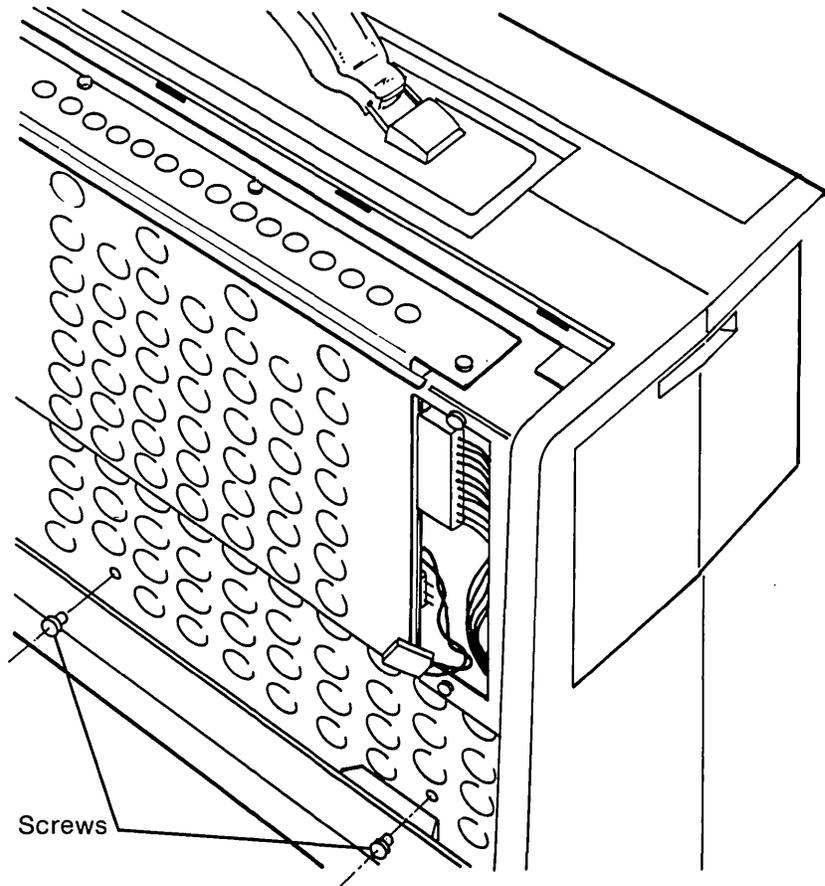


Figure 7-29. Screws Which Hold the VDU Assembly to the Bottom of the System Chassis.

15

Locate and remove the disk drive's bottom mounting screws (see Figure 7-30).

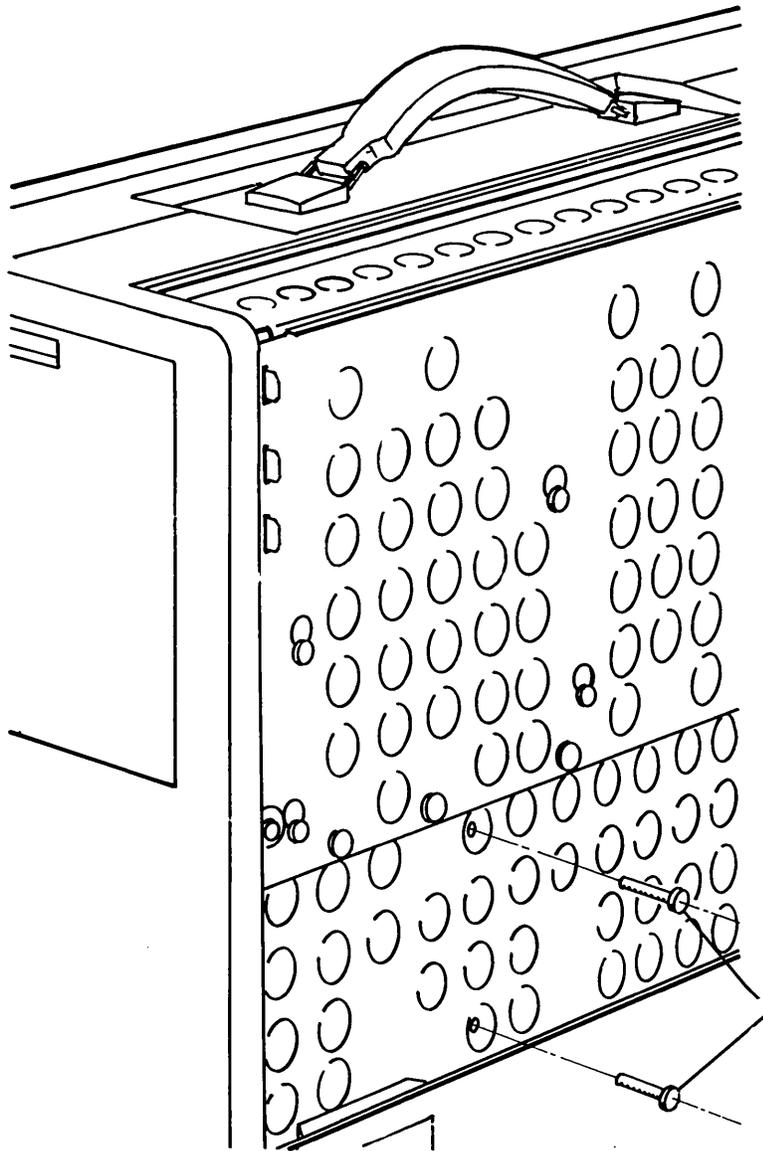


Figure 7-30. Removing the Bottom Mounting Screws From Floppy Disk Drive.

NOTE: If the system contains two disk drives, it is not necessary to remove the second drive in order to remove the VDU assembly.

16

Carefully remove the disk drive from the chassis and place it away from your working area. Place the system on its base. Locate the remaining top disk drive mounting screw (see Figure 7-31).

Carefully slide the disk drive toward the rear of the computer and away from the system chassis (see Figure 7-31).

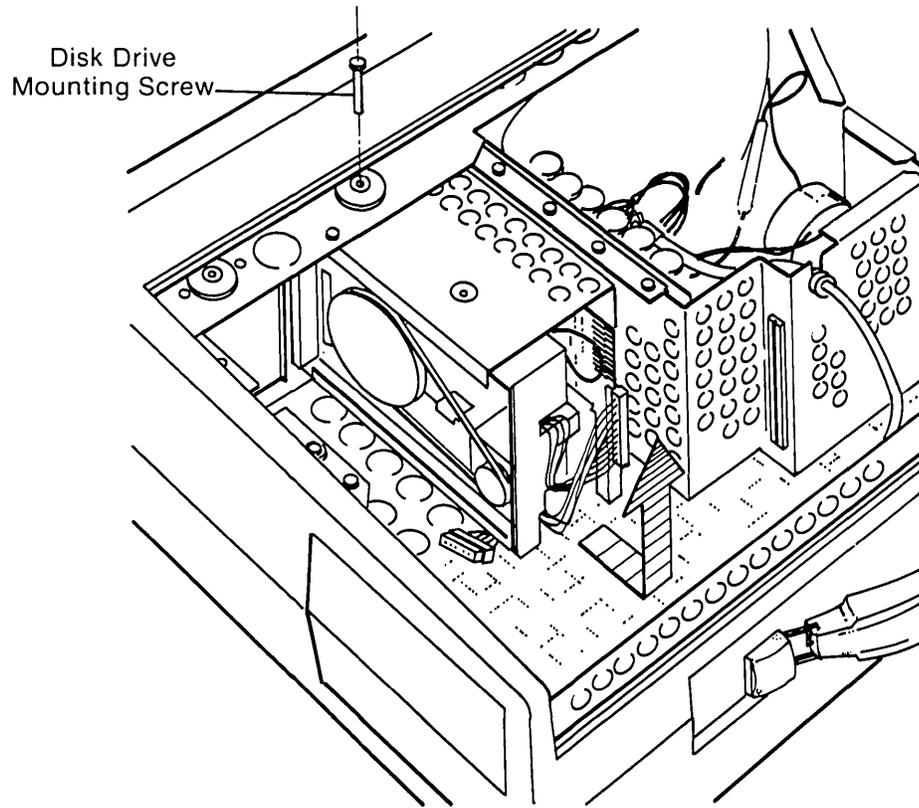


Figure 7-31. Top mounting.

***** CAUTION *****

Be extremely careful not to break the disk drive to system chassis ground strap when removing the disk drive.

17

Open the power compartment access door. Remove the two (2) screws holding the ON/OFF switch assembly in place (Figure 7-32). Lift the switch assembly out and place it on the chassis.

NOTE: It is not necessary to disconnect the switch assembly's ground strap.

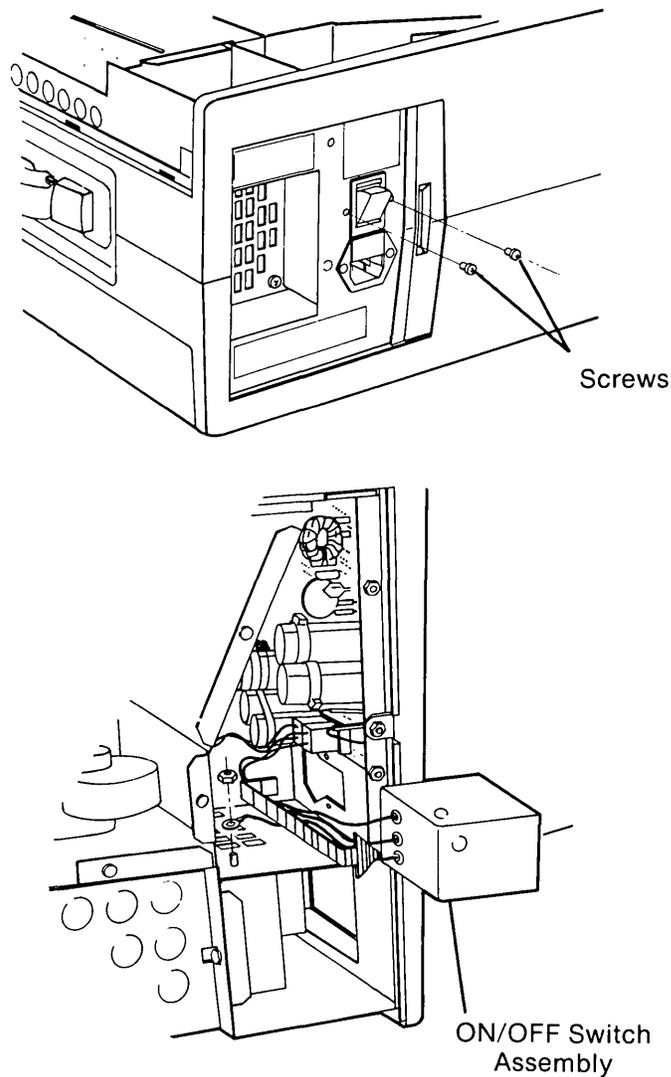


Figure 7-32. Removing the Screws Which Hold the ON/OFF Switch Assembly.

18

Remove the two (2) screws securing the VDU assembly to the wall of the fan assembly housing (see Figure 7-33).

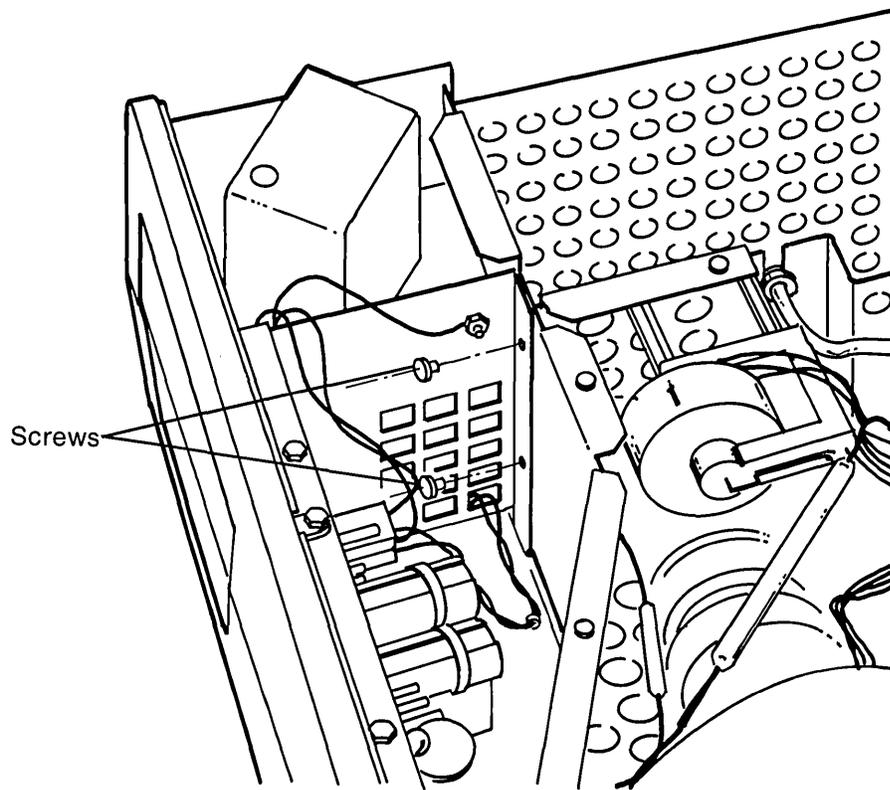


Figure 7-33. Removing Screws Which Hold the VDU Assembly to the Power Supply Housing.

19

Remove the two screws which secure the VDU assembly to the top of the system chassis (see Figure 7-34).

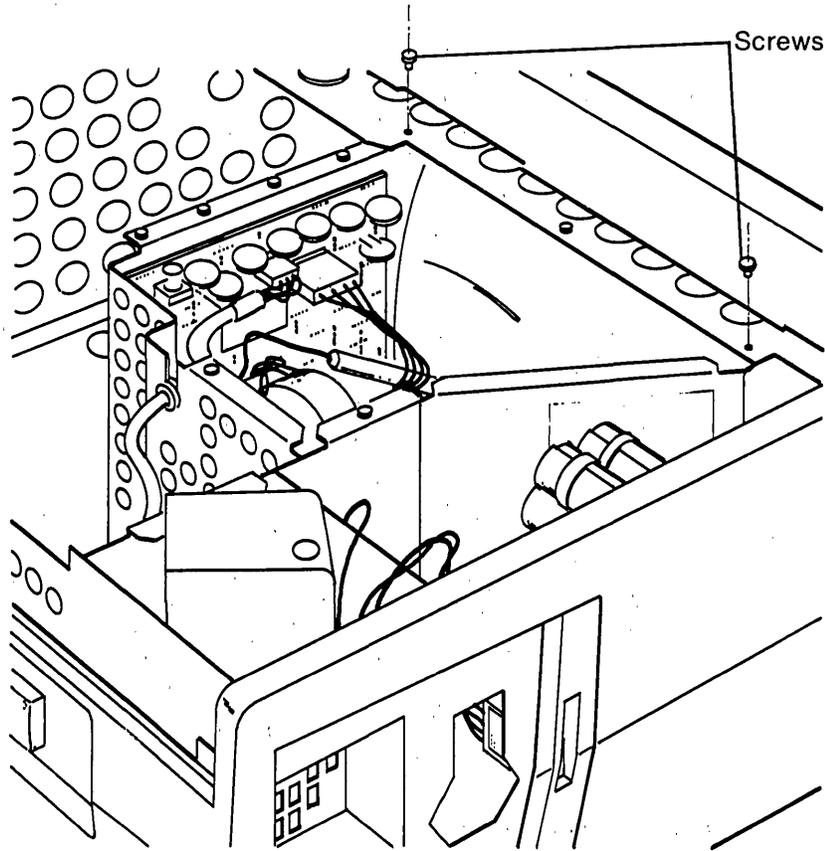


Figure 7-34. Removing Screws Which Hold the VDU Assembly to the top of the System Chassis.

20

Carefully remove the power connector from the high-voltage video board located within the VDU assembly (see Figure 35). This connector must pass through the opening in the base of the VDU assembly.

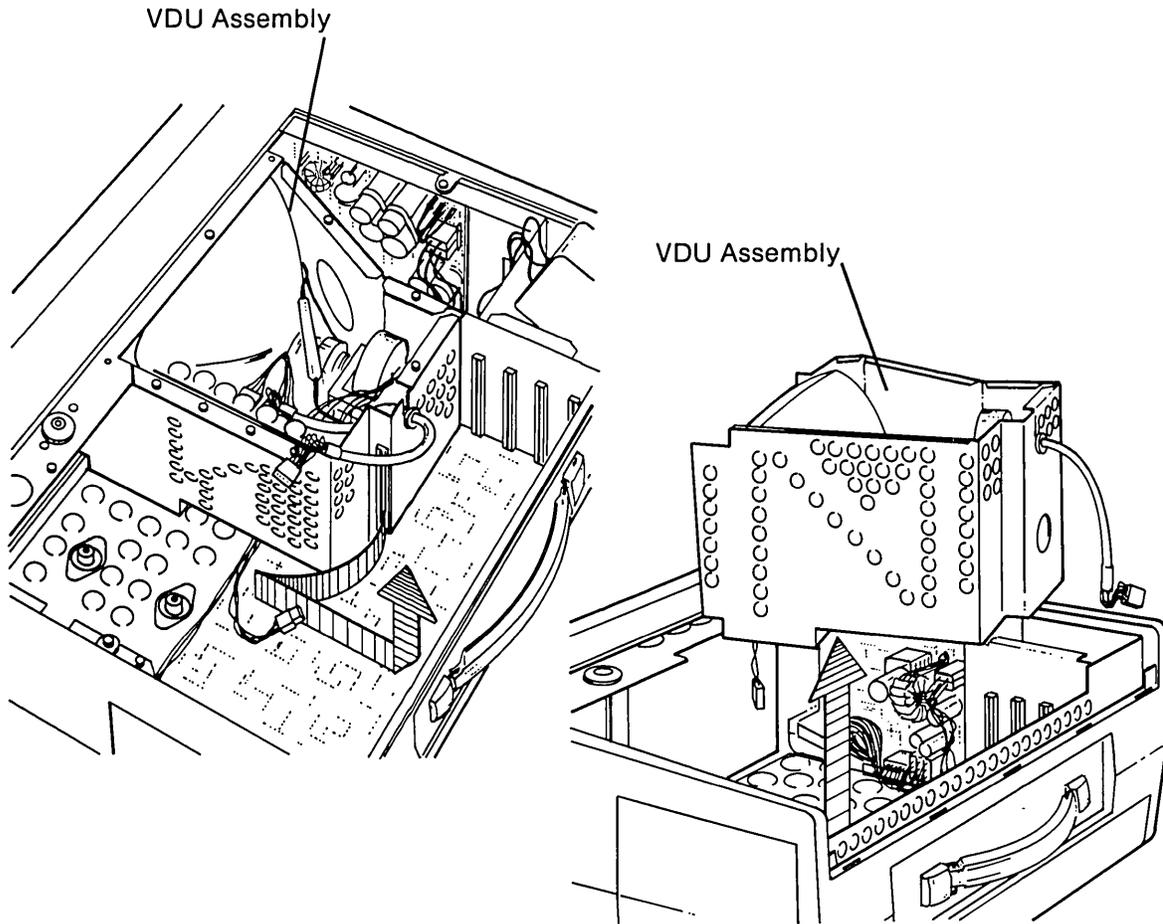


Figure 7-35. Removing the VDU Assembly.

21

Carefully slide the VDU assembly back toward the card cage until there is enough room to lift it up and out of the system (see Figure 7-35).

To replace the VDU assembly, reverse Steps 1 through 21.

DISK DRIVE SUBSYSTEM

Configuration/Interface Information

The disk drive subsystem, as discussed in this chapter, will include the 5-1/4" floppy disk drive assembly and the floppy/printer adapter board assembly, which provide the interface between the disk drive(s) and the processor board assembly (see Figure 8-1).

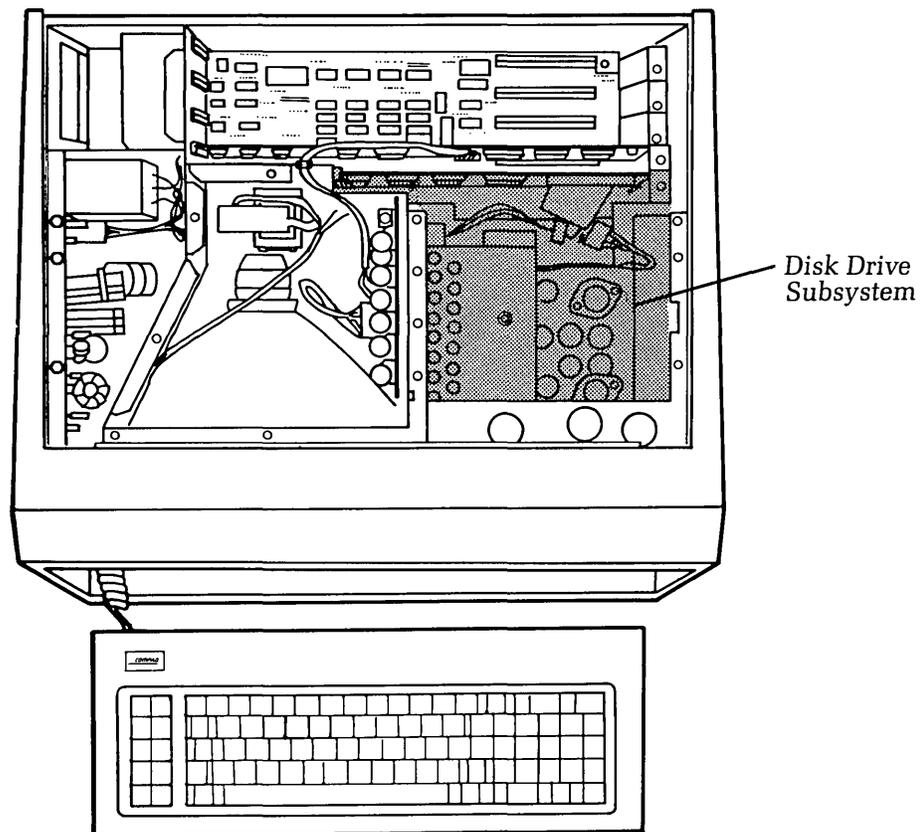


Figure 8-1. Disk Drive Subsystem.

The standard COMPAQ Portable Computer is equipped with one 5 1/4" 320-Kbyte floppy disk drive. A second 320-Kbyte disk drive is available as an option. It is the responsibility of the disk drive to store (write) data, recall (read) data, and erase data when necessary. The disk drive hardware consists of the following:

- Spindle drive (for diskette rotation)
- R/W heads (for reading, writing, and erasing of data)
- R/W head positioner (places R/W head over specified track)
- Disk drive main PCB analog (contains all necessary disk drive electronics)

8-2 Maintenance and Service Guide

The floppy disk drive uses as media the standard 5-1/4" diskette having the following characteristics:

- 320-Kbytes of data storage (formatted)
- Double-sided/double-density
- Soft-sectored
- Reinforced centers
- 48 tracks/inch density
- 40 tracks/side
- Stored data to be MFM-encoded in 512-byte sectors

The floppy/printer adapter board assembly occupies one of the COMPAQ Computer expansion slots. The main function of this board is to receive data to be stored on disk, arrange this data into the appropriate sector format, encode the data into usable information to be transmitted to the disk drive, as well as receiving data from the disk drive and translating the information so that the system may use it. The board is also responsible for mathematically verifying the integrity of data read from a disk. This adapter board will support a maximum of two (2) floppy disk drives, in addition to supplying the necessary circuitry to support a parallel interface port.

For more information on system/subsystem configuration, contact the COMPAQ Technical Support Department.

Problem Isolation Procedure (PIP)

This procedure is designed to help you in determining if the disk drive subsystem is functioning properly. This PIP for disk drive malfunctions provides a systematic method of identifying and correcting most disk drive system problems.

As with any troubleshooting procedure, you may encounter some problem that this procedure does not cover. If you complete this PIP without solving the problem, contact the COMPAQ Technical Support Department for further technical assistance.

PRELIMINARY TESTING

If you have not already done so, complete the following actions:

STEP 1. Remove any non-COMPAQ peripheral devices or adapters from the system.

STEP 2. Power-on the system.

STEP 3. Boot the system and load the Advanced Diagnostics diskette. Refer to Chapter 3, SYSTEM CHECKOUT, for more information on loading the Advanced Diagnostics Program.

WERE ANY PROBLEMS ENCOUNTERED IN THE SYSTEM BOOT?

- YES** Refer to Chapter 2, SYSTEM PROBLEM ISOLATION GUIDE, to determine which PIP will assist you in further isolating the cause of the problem.
- NO** Continue with this section of the PIP.

DID THE SYSTEM BOOT PROPERLY?

- YES** Go to the section titled DISK DRIVE TESTING to continue this PIP.
- NO** Make sure that the diskette in use is capable of booting the system (i.e., contains the correct operating system).

IS THE DISKETTE CAPABLE OF BOOTING THE SYSTEM?

- NO** Insert a diskette capable of booting the system, and start this section of the PIP again.
- YES** Inspect all cable connections to the disk drive subsystem. Make sure that all signal and power connectors are in place and properly seated.

ARE ALL CONNECTORS IN PLACE AND SEATED PROPERLY?

- NO** Correct the discrepancies and start this PIP again.
- YES** Replace the floppy/printer adapter board assembly and start this PIP again. Refer to the Removal and Replacement Procedure for the floppy/printer adapter board assembly, located at the end of this chapter for more information on how to replace the adapter board.

DID REPLACING THE FLOPPY/PRINTER ADAPTER BOARD ALLOW THE SYSTEM TO BOOT?

- YES** Go to the section titled DISK DRIVE TESTING to continue this PIP.
- NO** Replace the disk drive assembly and start this PIP again. Refer to the Removal and Replacement Procedure for the floppy disk drive assembly located at the end of this chapter for more information on how to replace a disk drive assembly.

DID REPLACING THE DISK DRIVE ASSEMBLY ALLOW THE SYSTEM TO BOOT?

- YES** Go to the section titled DISK DRIVE TESTING to continue this PIP.
- NO** If none of the steps you have taken so far have corrected the problem, contact the COMPAQ Technical Support Department for further technical assistance.

DISK DRIVE TESTING

If the system booted properly, and contains an AUTOEXEC.BAT file to load the diagnostics, the following menu should appear:

```
The COMPAQ PERSONAL COMPUTER

      ADVANCED DIAGNOSTICS MENU
Version 1.00 (c) COPYRIGHT 1982, COMPAQ COMPUTER CORP.
      ALL RIGHTS RESERVED

YOUR CHOICES ARE:

0 - RUN THE DIAGNOSTIC TESTS
1 - FORMAT A DISKETTE
2 - COPY A DISKETTE
9 - GO TO THE SYSTEM DISKETTE

Input your choice (0,1,2, or 9)
and press ENTER
?_
```

This menu indicates that the diagnostics are loaded and ready to be executed.

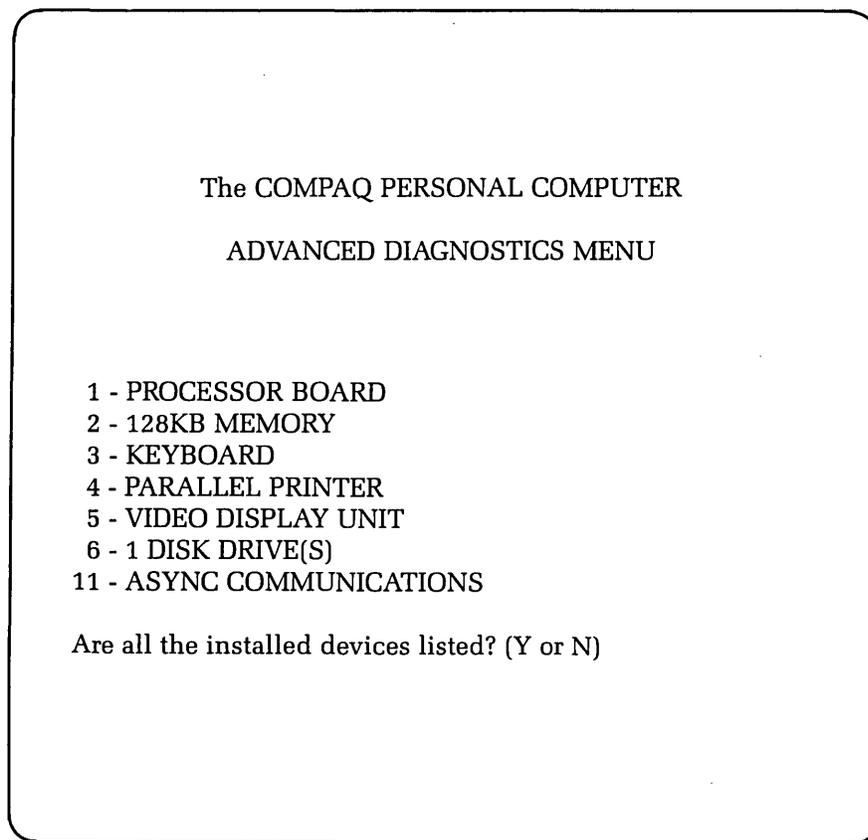
DID YOU GET THE CORRECT MENU AFTER LOADING YOUR DIAGNOSTICS DISKETTE?

NO If the diagnostics did not load automatically, type in DIAG in response to the A>, and then press [ENTER]. This causes the diagnostics to load, if the file DIAG.COM is on your diskette.

If the diagnostics program still does not load, repeat this procedure with a known-good Advanced Diagnostics diskette. If the problem is not resolved, contact the COMPAQ Technical Support Department for further technical assistance.

YES This menu indicates that you have successfully loaded the diagnostics and are ready to begin.

Press [0] and then [ENTER] to select RUN THE DIAGNOSTIC TESTS. A display similar to the following should appear on the screen:



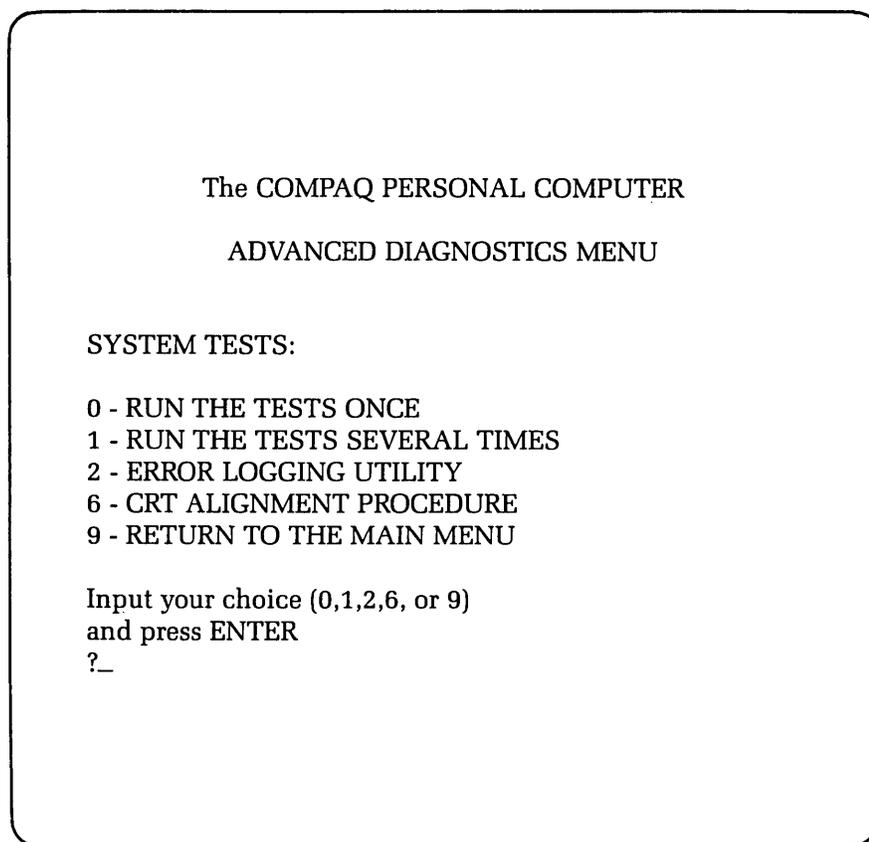
This display allows you to verify the system's configuration.

DOES THE DISPLAY ACCURATELY DESCRIBE THE SYSTEM CONFIGURATION?

NO This indicates a possible problem with the setting of the switches (SW1 and SW2) on the processor board. Refer to the configuration portion of Chapter 5, CPU/MEMORY SUBSYSTEM, to confirm the positions of SW1 and SW2.

YES Press [Y] and then [ENTER].

The following menu should appear on the screen:



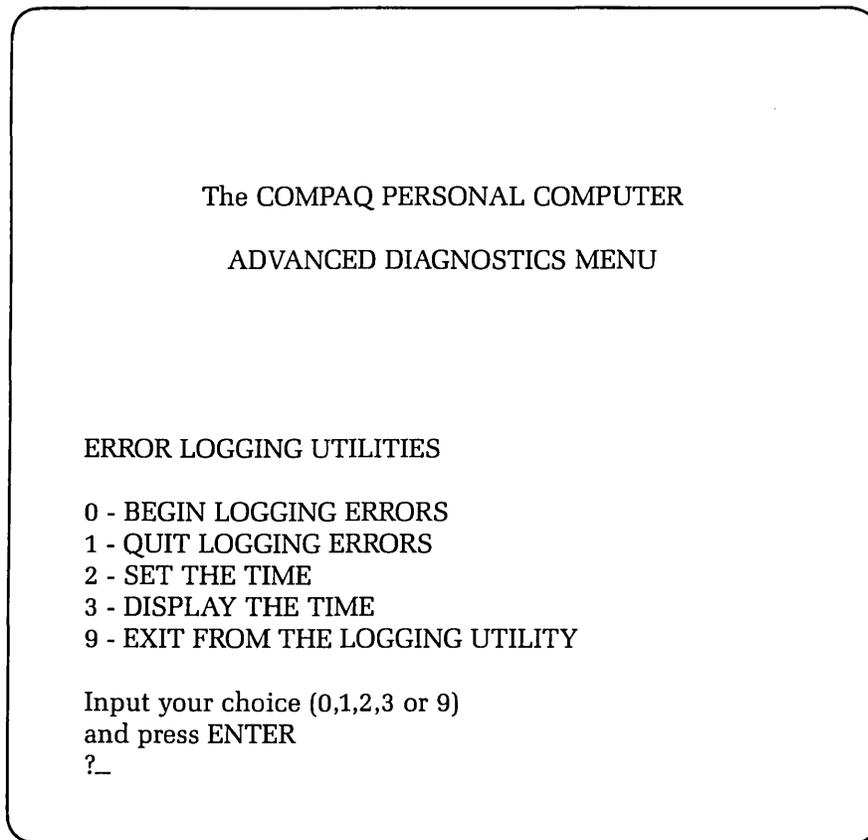
At this point you can select the mode in which you want to run the tests. You also have the option to log errors to a printer as they are detected.

DO YOU INTEND TO LOG DETECTED ERRORS?

NO Decide if you want to run the selected tests once or repeat the tests several times.

YES Select the ERROR LOGGING UTILITY by pressing [2] and then [ENTER].

The following menu should appear on the screen:



Error logging is a convenient way to create a printed version (hardcopy) of all system errors. This utility will automatically log errors to an attached printer only. Use the [0] and [1] keys, accompanied by [ENTER], to start and stop the error-logging function.

The error-logging utility will also record the time at which the error occurred. Use the [2] and [3] keys, accompanied by [ENTER] to make sure the system clock is set to the current time.

Once the logging function is initiated, return to the previous menu by selecting EXIT FROM THE LOGGING UTILITY by pressing [9] and then [ENTER].

8-8 Maintenance and Service Guide

DO YOU WANT TO RUN THE SELECTED TESTS MORE THAN ONE TIME?

NO Select RUN THE TESTS ONCE by pressing [0] and then [ENTER].

YES Select RUN THE TESTS SEVERAL TIMES by pressing [1] and then [ENTER].

A prompt will appear requesting the number of times you wish to run the selected tests (between 1 and 65,535 times). Enter the desired number of test cycles, followed by [ENTER].

Finally, when running the tests several times, you may choose to halt program execution each time an error is detected. When this prompt appears on the screen, simply press [Y] or [N], followed by [ENTER].

Selecting either mode causes a menu similar to the following to appear:

The COMPAQ PERSONAL COMPUTER
ADVANCED DIAGNOSTICS MENU

1 - PROCESSOR BOARD
2 - 128KB MEMORY
3 - KEYBOARD
4 - PARALLEL PRINTER
5 - VIDEO DISPLAY UNIT
6 - 1 DISK DRIVE(S)
11 - ASYNC COMMUNICATIONS

Input the number(s) of the test(s) you want to run
Separate your choices with commas and then press ENTER

Press ENTER to run all the tests
?_

Begin the disk drive diagnostics by pressing [6] and then [ENTER].

Follow the instructions on the screen to execute the desired functional test.

If you chose to run the tests only once, the following menu should appear on the screen:

```

                                The COMPAQ PERSONAL COMPUTER
                                ADVANCED DIAGNOSTICS MENU
                                DISKETTE DIAGNOSTIC MENU

                                OPTION                DRIVE
                                1 - SEQUENTIAL SEEK TEST  A OR B
                                2 - RANDOM SEEK TEST     A OR B
                                3 - VERIFY DISKETTE TEST  A OR B
                                4 - DISK SPEED TEST      A OR B
                                9 - RETURN TO PREVIOUS MENU

                                To return press 9 followed by ENTER
                                To run any test (1,2,3, OR 4):
                                Enter option number, Drive (A,B) followed by ENTER
                                Example: 3.A<ENTER>
                                ?_

```

Once you have entered the appropriate command line (or if you had originally selected to run the test more than one time), a warning message should appear on the screen:

```

*** CAUTION ***
DATA WILL BE DESTROYED
Insert scratch diskette into drive A>: press ENTER when ready.

```

At this point, make sure that the diskette(s) presently in the system does not contain valuable data.

8-10 Maintenance and Service Guide

Remove the Advanced Diagnostics diskette and insert a blank, formatted diskette into the drive. Make sure that these blank diskettes are not write-protected.

DID ANY ERROR MESSAGES APPEAR DURING ANY DISK DRIVE TEST?

NO This concludes the disk drive subsystem PIP. The subsystem is functioning properly.

YES The error message should consist of three (3) highlighted lines:

Line 1 - Describes the type of error the test has detected, and provides the two-digit error code.

Line 2 - The time at which the error was detected.

Line 3 - This is the diagnostic's test summary. It should report an error on the disk with a diagnostic error code.

All disk drive interface error codes will result in a 601 error message. Use the following chart to cross reference the 2- digit error code on line one of the error message to determine the probable error and recommended action.

ERROR CODE	ERROR DESCRIPTION	RECOMMENDED ACTION
01	Timeout error - defective controller and/or defective disk drive assembly.	Replace the defective assembly(s).
02	Defective controller, diskette signal cable, and/or disk drive assembly.	1. Verify signal cable connections. 2. Replace the defective assembly(s).
03	Write protect error system detects write-protected diskette.	1. Use a diskette that is not write-protected. 2. Replace the defective drive.
04	Disk error - the resident diskette is defective and/or not formatted.	Replace and format the resident diskette.

Refer to the appropriate Removal and Replacement Procedures located at the end of this chapter for more information on how to replace any defective assemblies.

If none of the steps you have taken to this point have corrected the problem, contact the COMPAQ Technical Support Department for further technical assistance.

Removal and Replacement Procedures

Floppy/Printer Adapter Board Assembly

* * * **WARNING** * * *

Before opening the unit's case to perform any removal, replacement, or maintenance procedures, disconnect the line cord from the ac outlet and set the ON/OFF switch to the OFF position. Otherwise, dangerous voltages may be present throughout the system.

STEP:

ACTION:

1

Place the computer on a level surface, such as a table or workbench with the handle assembly facing you (see Figure 8-2).

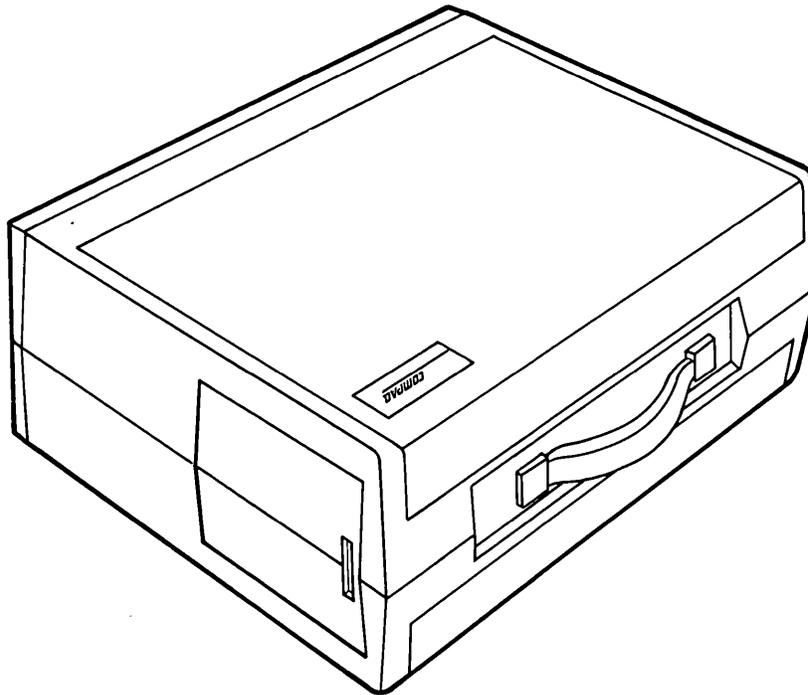


Figure 8-2. Computer On Work Surface.

STEP:

ACTION:

2

Open the access cover by pressing down on the plastic cover of the unit with one hand next to the COMPAQ Computer logo (see Figure 8-3a). As pressure is applied, the plastic cover will bulge at the connecting seam which runs directly above the handle. Partially insert a plastic card under the cover at the bulge, and release the hand pressure applied. At the opposite end of the plastic cover (see Figure 8-3b), apply pressure with your hand in the same manner as previously done. When the plastic cover bulges, reach under the cover and pull upward and outward, then slide cover out (see Figure 8-3c).

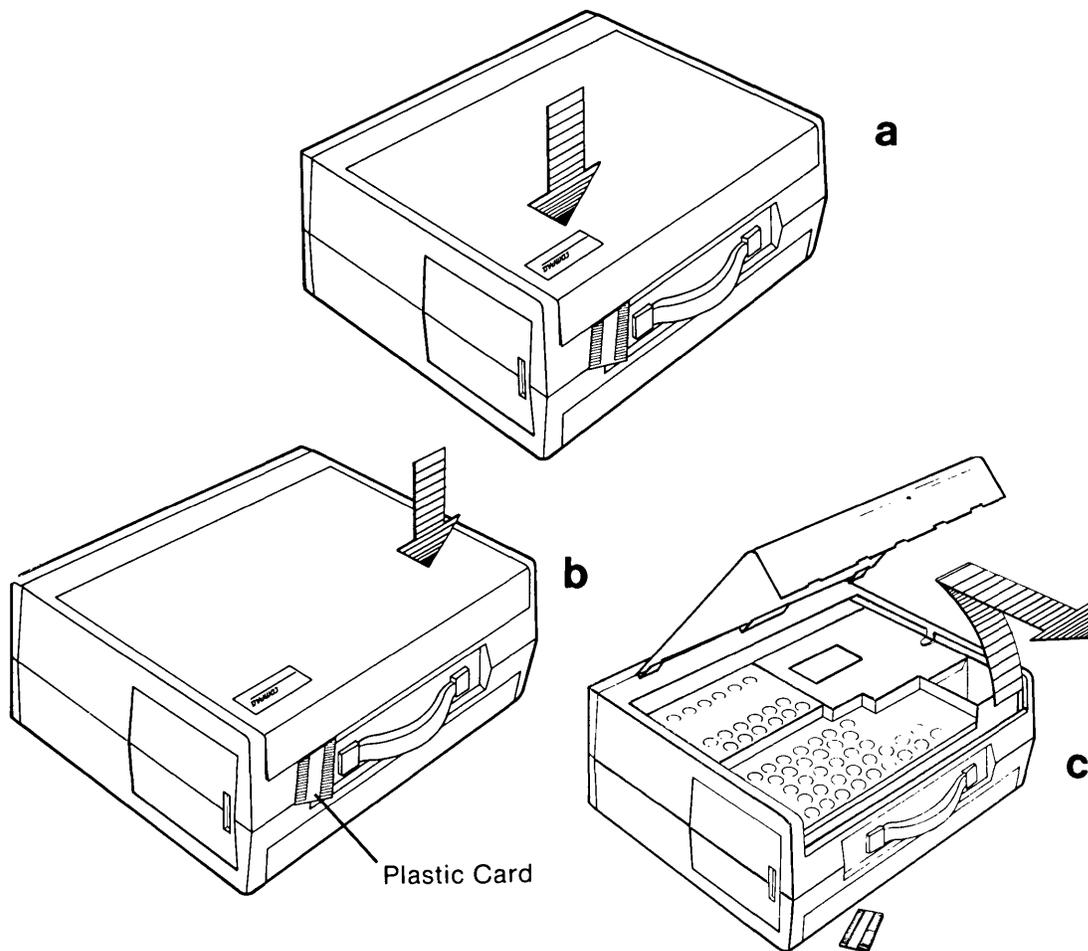


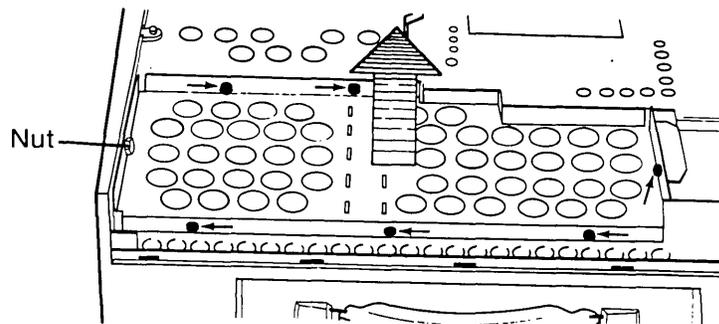
Figure 8-3. Removing Top Cover.

STEP:

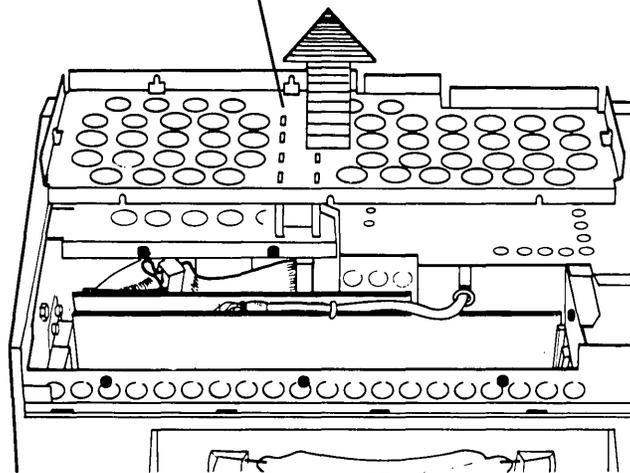
3

ACTION:

Loosen (DO NOT REMOVE) the six (6) phillips screws and the one (1) 1/4" nut that secures the card cage access plate (see Figure 8-4a). Remove the card cage access plate by lifting it up and away from chassis (see Figure 8-4b).



Removing Card Cage Access Plate

**Figure 8-4.** Removing Card Cage Access Plate.

STEP:

ACTION:

4

Carefully disconnect the flat-ribbon signal cable from the floppy/printer adapter board (see Figure 8-5).

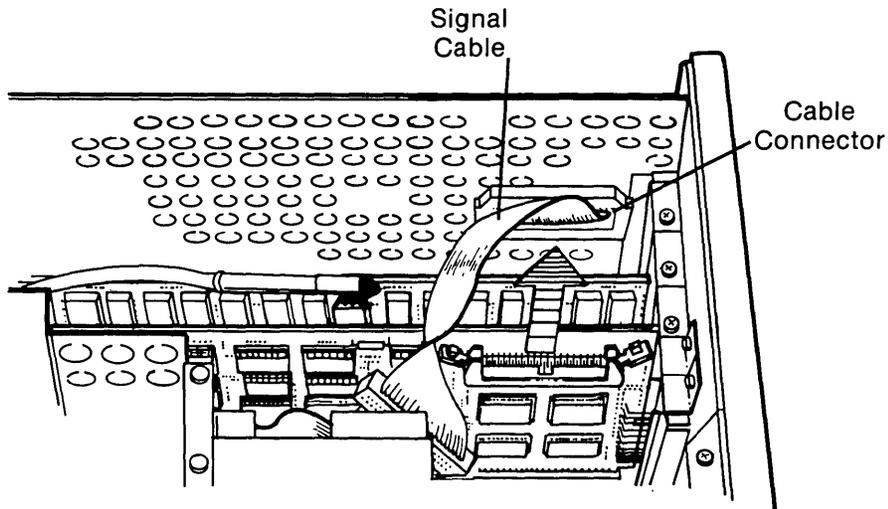


Figure 8-5. Disconnecting the Signal Cable From the Floppy/Printer Adapter Board.

5

Remove the retaining screw that secures the floppy/printer adapter board assembly to the system chassis (see Figure 8-6).

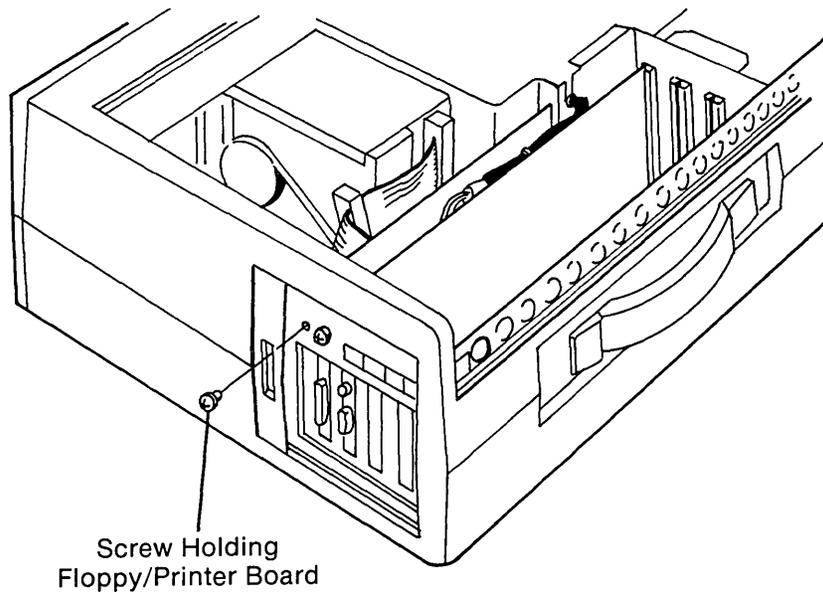


Figure 8-6. Removing the Screw Which Holds the Floppy/Printer Adapter Board.

STEP:

ACTION:

6

Gently remove the floppy/printer adapter board assembly by pulling it away from the processor board (see Figure 8-7).

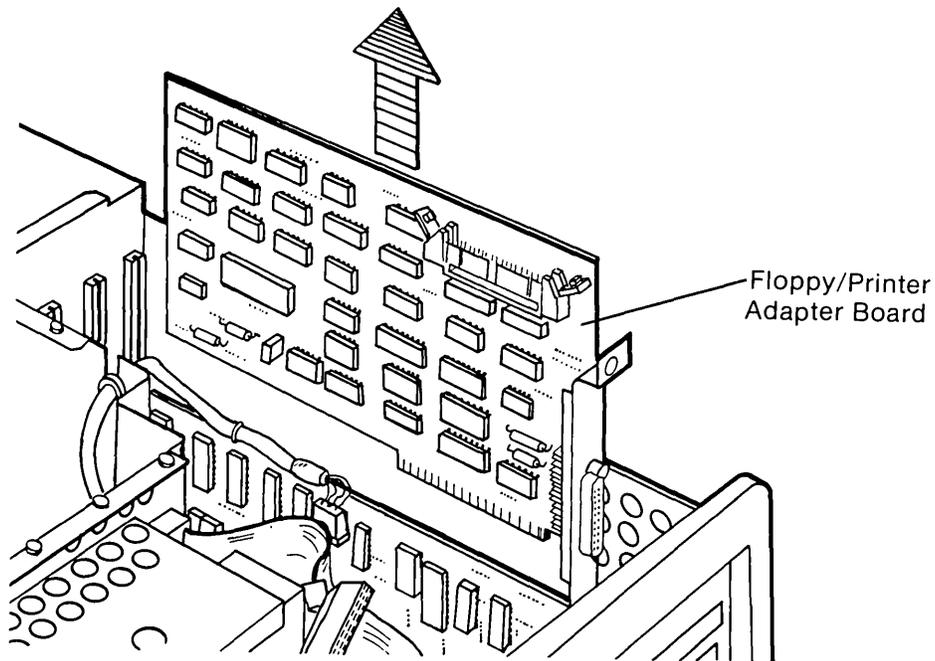


Figure 8-7. Removing the Floppy/Printer Adapter Board.

To replace the floppy/printer adapter board, reverse Steps 1 through 6.

Removal and Replacement Procedures

Floppy Disk Drive Assembly

*** * * WARNING * * ***

Before opening the unit's case to perform any removal, replacement, or maintenance procedures, disconnect the line cord from the ac outlet and set the ON/OFF switch to the OFF position. Otherwise, dangerous voltages may be present throughout the system.

STEP:

ACTION:

1

Place the computer on a level surface, such as a table or workbench with the handle assembly facing you. (see Figure 8-8)

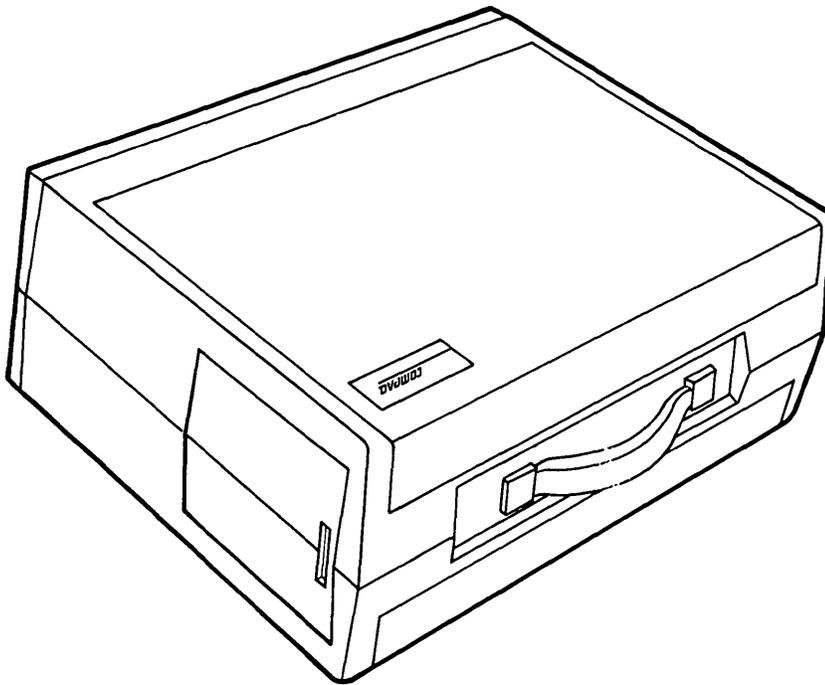


Figure 8-8. Computer On Work Surface.

STEP:

2

ACTION:

Open the access cover by pressing down on the plastic cover of the unit with one hand next to the COMPAQ Computer logo (see Figure 8-9a). As pressure is applied, the plastic cover will bulge at the connecting seam which runs directly above the handle. Partially insert a plastic card under the cover at the bulge, and release the hand pressure applied. At the opposite end of the plastic cover (see Figure 8-9b), apply pressure with your hand in the same manner as previously done. When the plastic cover bulges, reach under the cover and pull upward and outward, then slide cover out (see Figure 8-9c).

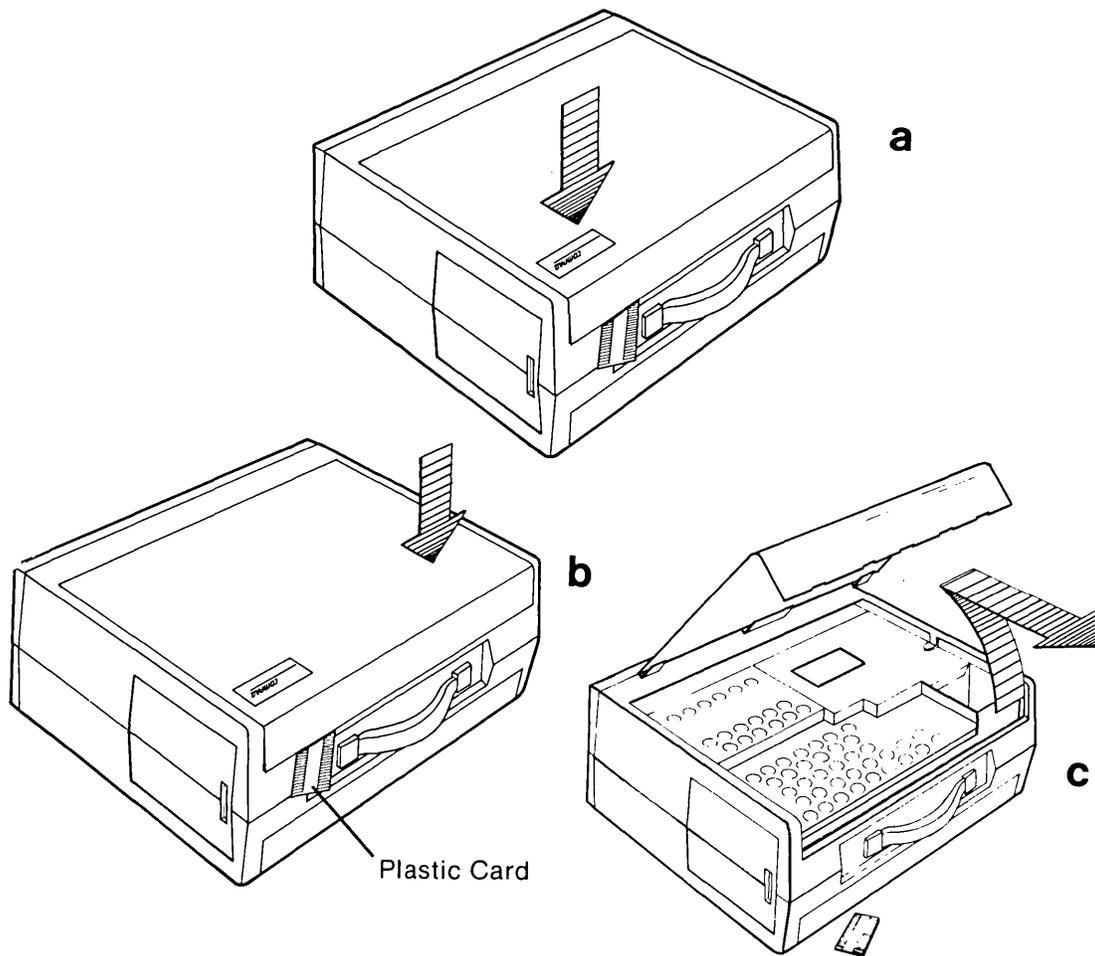


Figure 8-9. Removing Top Cover.

STEP:

ACTION:

3

Loosen (DO NOT REMOVE) the six (6) phillips screws and the one (1) 1/4" nut that secures the card cage access plate (see Figure 8-10a). Remove the card cage access plate by lifting it up and away from chassis (see Figure 8-10b).

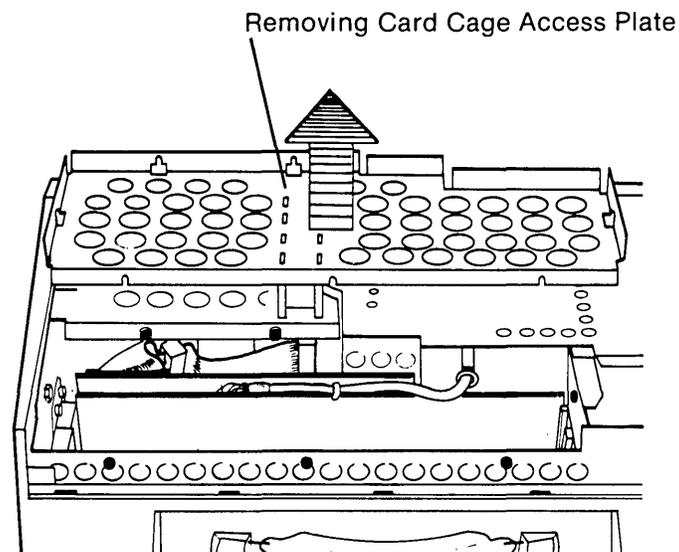
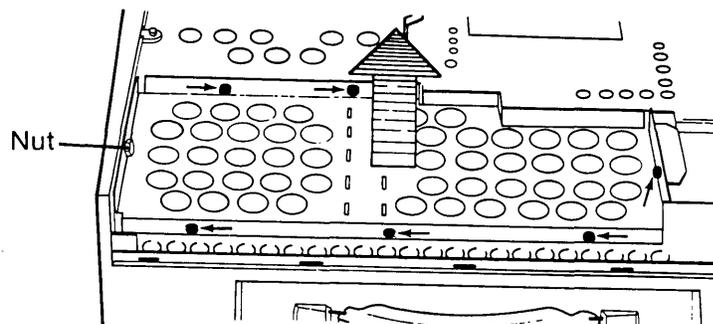


Figure 8-10. Removing Card Cage Access Plate.

STEP:

ACTION:

- 4 Disconnect the disk drive cable from the floppy/printer adapter board by pressing on the finger tabs located on either side of the connectors (see Figure 8-11).

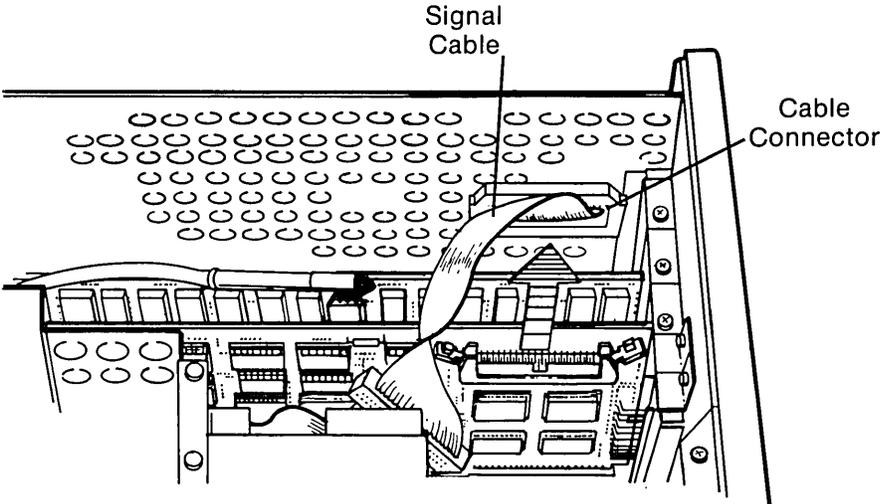


Figure 8-11. Disconnecting the Signal Cable From the Floppy/Printer Adapter Board.

- 5 Disconnect the VDU cable from the VDU board (see Figure 8-12).
The cable tie holding the VDU cable to the VDU board must be cut before the connector can be disengaged from the VDU board.

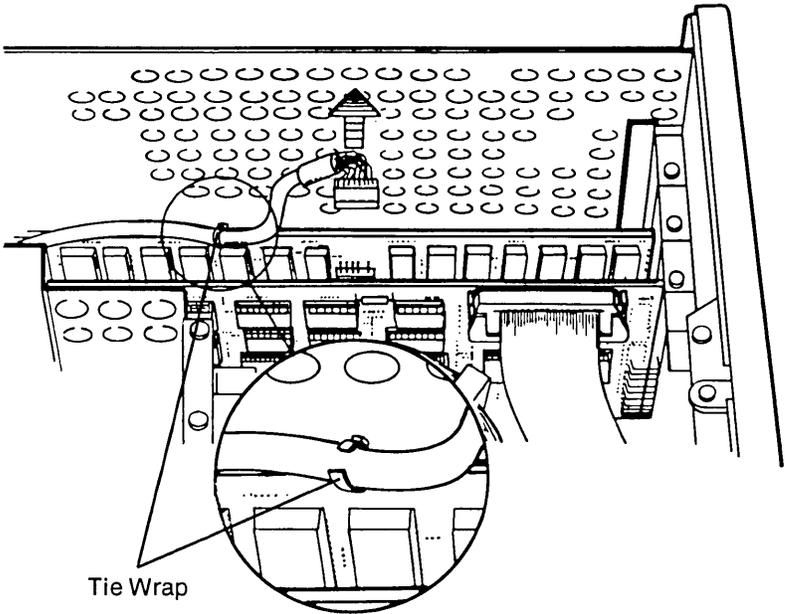


Figure 8-12. Disconnecting the VDU Cable From the VDU Adapter Board.

STEP:

ACTION:

6

Remove the retaining screw that secures the floppy/printer adapter board and the VDU adapter board to the system chassis (see Figure 8-13).

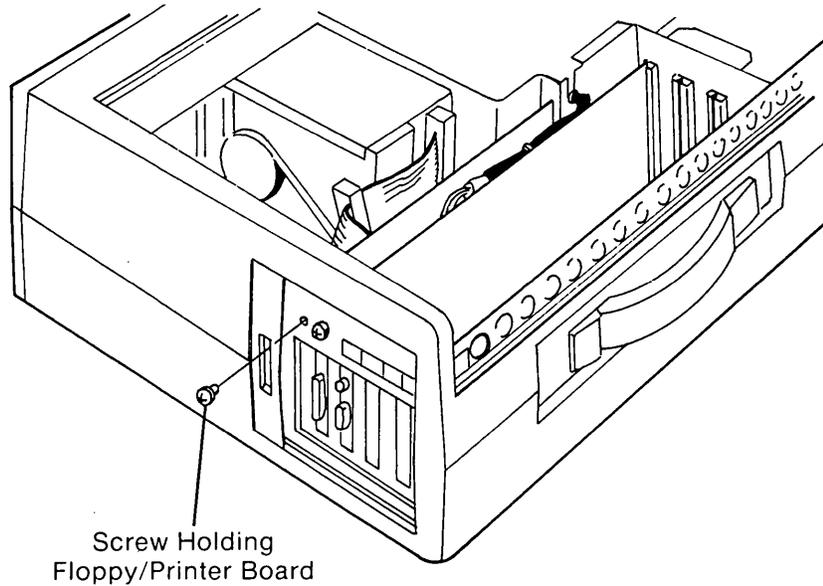


Figure 8-13. Removing the Screw Which Holds the Floppy/Printer Adapter Board.

7

Gently remove the adapter boards by pulling them away from the processor board (see Figure 8-14).

Similarly, remove any other adapter boards which may occupy any additional expansion slots in the processor board.

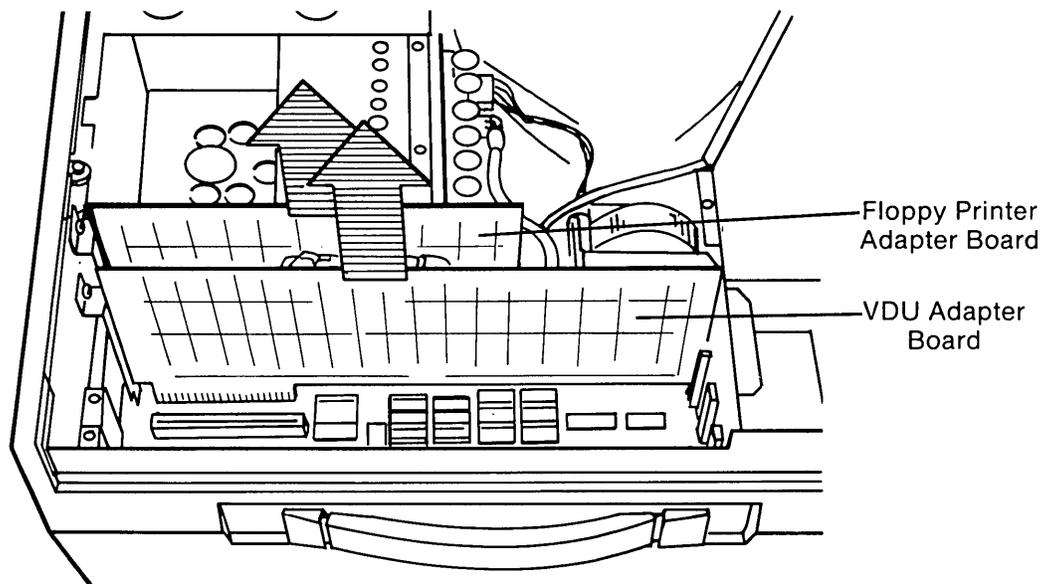


Figure 8-14. Removing the Floppy/Printer Adapter Board and the VDU Adapter Board.

STEP:

8

ACTION:

Loosen (DO NOT REMOVE) the five (5) screws that secure the floppy disk drive access plate. Remove the disk drive's top rear mounting screw (see Figure 8-15a). Slide the metal access cover toward the rear of the computer and lift it off (see Figure 8-15b).

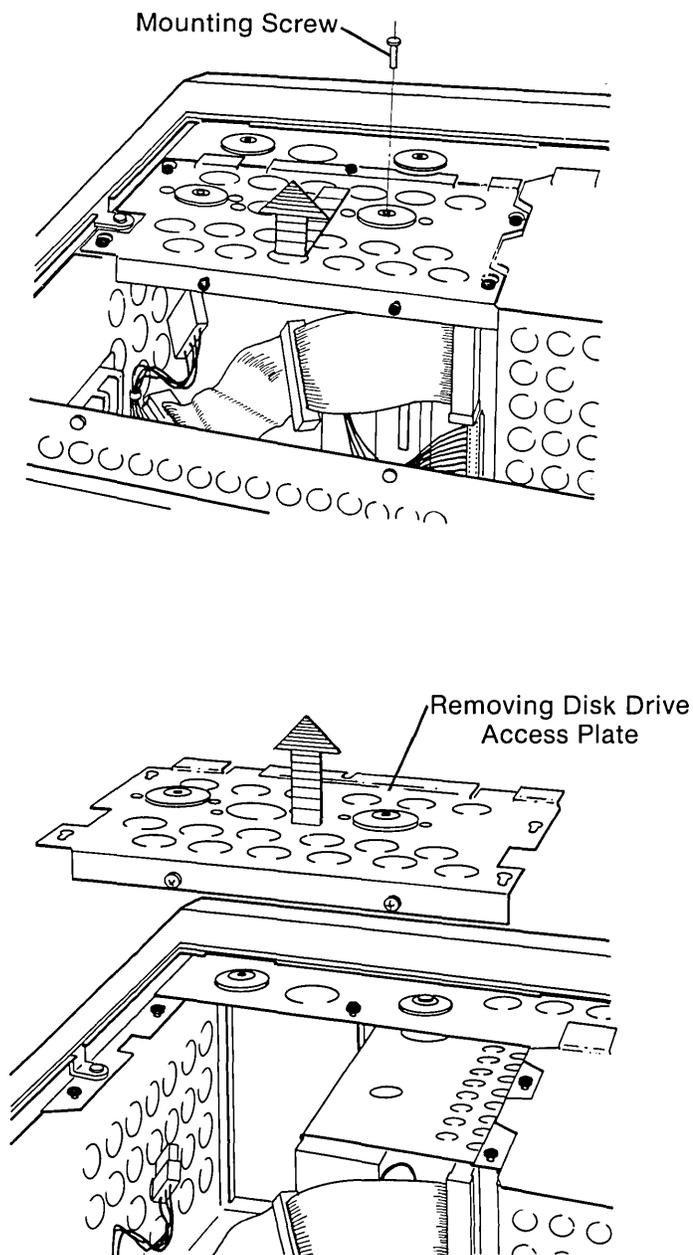


Figure 8-15. Loosening the Screws Which Hold the Floppy Disk Drive.

STEP:

ACTION:

9

Disconnect the signal cable and the power cable from the floppy disk drive (see Figure 8-16a+b).

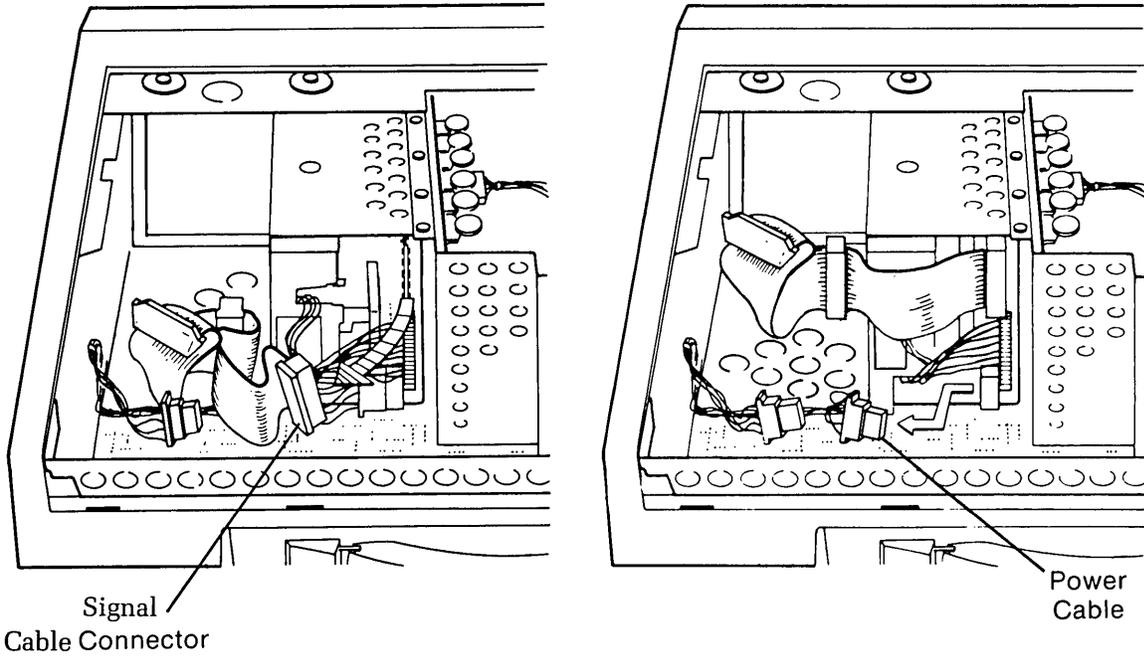


Figure 8-16. Disconnecting the Signal Cable and the Power Cable From the Floppy Disk Drive.

- | STEP: | ACTION: |
|-------|--|
| 10 | Turn the computer over so that the base of the system is facing upward. Remove the bottom plastic access cover to expose the base of the system chassis using the same procedure outlined in STEP 2. |
| 11 | Remove the bottom mounting screws and the remaining top mounting screw from the defective disk drive (see Figure 8-17 a+b). |

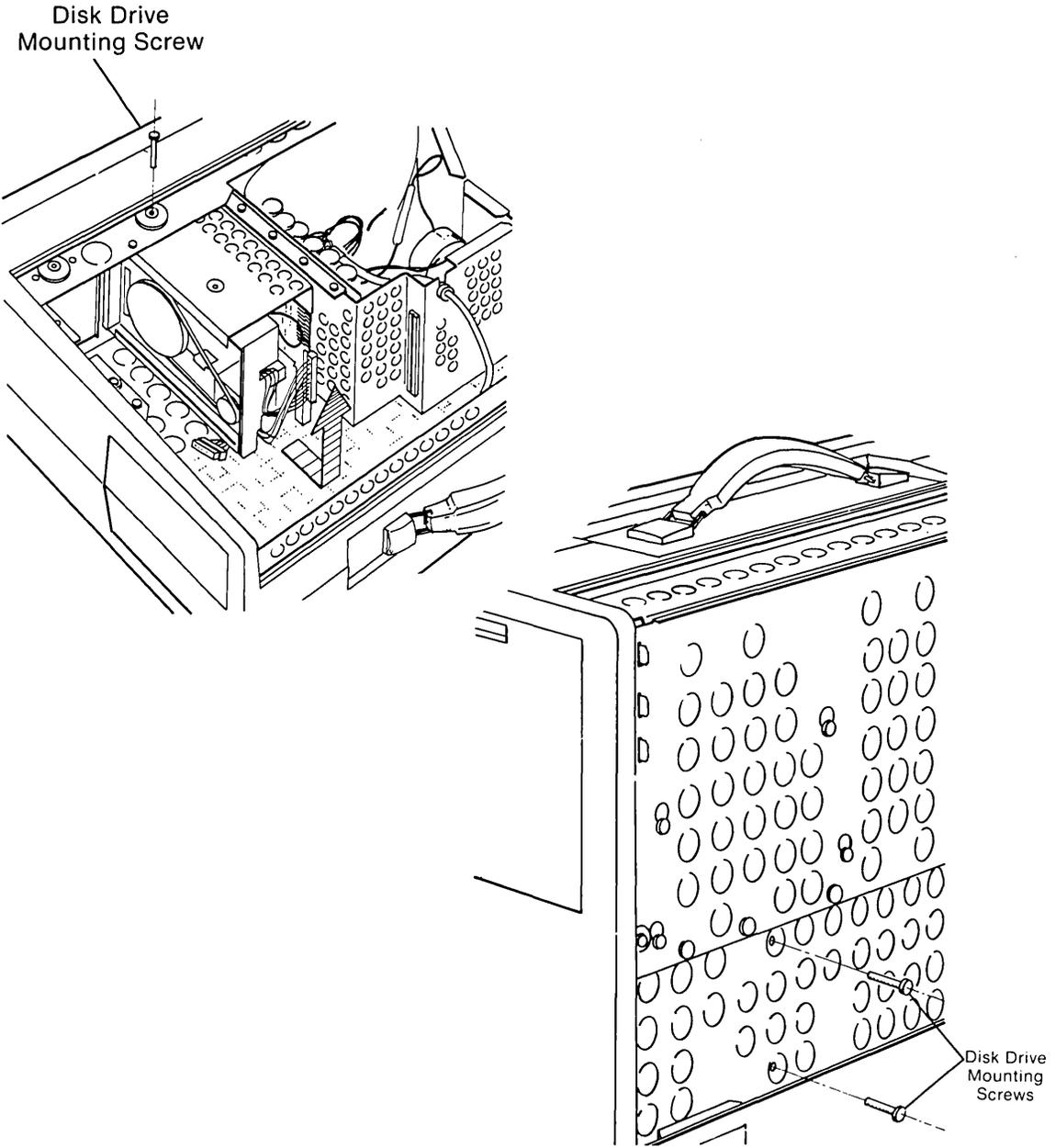


Figure 8-17. Removing Bottom and Top Mounting Screws.

STEP:

ACTION:

12

Carefully slide the disk drive out toward the rear of the computer, away from the chassis, and place it away from your working area.

Place the system on its base. Locate and remove the remaining top disk drive mounting screw (see Figure 8-18a). Carefully slide the disk drive toward the rear of the computer and away from the system chassis (see Figure 8-18b).

*** * * CAUTION * * ***

Be extremely careful not to break the disk drive to system chassis ground strap when removing the disk drive.

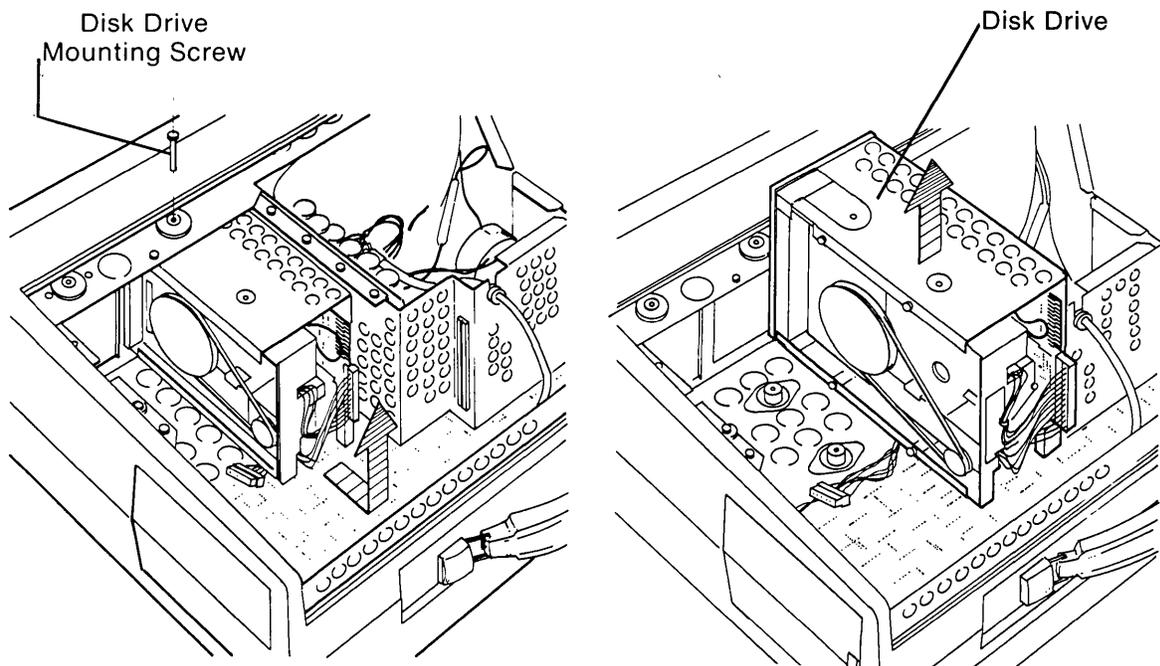


Figure 8-18. Removing the Disk Drive.

To replace the disk drive, reverse Steps 1 through 12.

FLOPPY DISK DRIVE SPEED ADJUSTMENT PROCEDURE

INTRODUCTION

This procedure is designed to provide the service technician with an orderly, easy-to-follow method of performing any required speed adjustments to the 5 1/4" floppy disk drive(s) contained in the COMPAQ Portable Computer. To complete the adjustment procedures, the following equipment will be needed:

- All tools normally required to service the COMPAQ Portable Computer.
- COMPAQ Advanced Diagnostics Diskette.
- Floppy Disk Drive Signal Extension Cable (P/N 100546-001)
- Floppy Drive Power Extension Cable (P/N 100545-001).

The floppy disk drive speed adjustment procedure is arranged in a step-by-step outline. Be sure to read the entire procedure carefully and completely before proceeding with any work. Make certain that each step is completed before continuing to the next step.

For additional information on floppy disk drive speed adjustment procedures, contact the COMPAQ Technical Support Department.

HOW TO BEGIN

Remove the floppy disk drive you wish to test from the system chassis. Refer to the Removal and Replacement Procedure for the floppy disk drive assembly located in this chapter for more information on how to remove the floppy disk drive.

Once the disk drive is removed, place it next to the COMPAQ Portable Computer with the disk drive analog board (the board mounted on the drive) facing upward. Re-install all boards and connectors removed from the COMPAQ Portable Computer to this point.

Using the disk drive power and signal extension cables, connect the disk drive to be tested to the floppy/printer adapter board and to the disk drive's original power connector.

Apply power to the COMPAQ Portable Computer, insert the Advanced Diagnostics Diskette into the disk drive to be tested and load the Advanced Diagnostics Program. Refer to Chapter 3, SYSTEM CHECKOUT, for more information on loading the Advanced Diagnostics Program.

If the system booted properly, and contains an AUTOEXEC.BAT file to load the diagnostics, the following menu should appear:

```
The COMPAQ PERSONAL COMPUTER

ADVANCED DIAGNOSTICS MENU

Version 1.00 (c) COPYRIGHT 1982, COMPAQ COMPUTER CORP.
ALL RIGHTS RESERVED

YOUR CHOICES ARE:

0 - RUN THE DIAGNOSTIC TESTS
1 - FORMAT A DISKETTE
2 - COPY A DISKETTE
9 - GO TO THE SYSTEM DISKETTE

Input your choice (0,1,2, or 9)
and press ENTER
?_
```

This menu indicates that the diagnostics are loaded and ready to be executed.

DID YOU GET THE CORRECT MENU AFTER LOADING YOUR DIAGNOSTICS DISKETTE?

NO

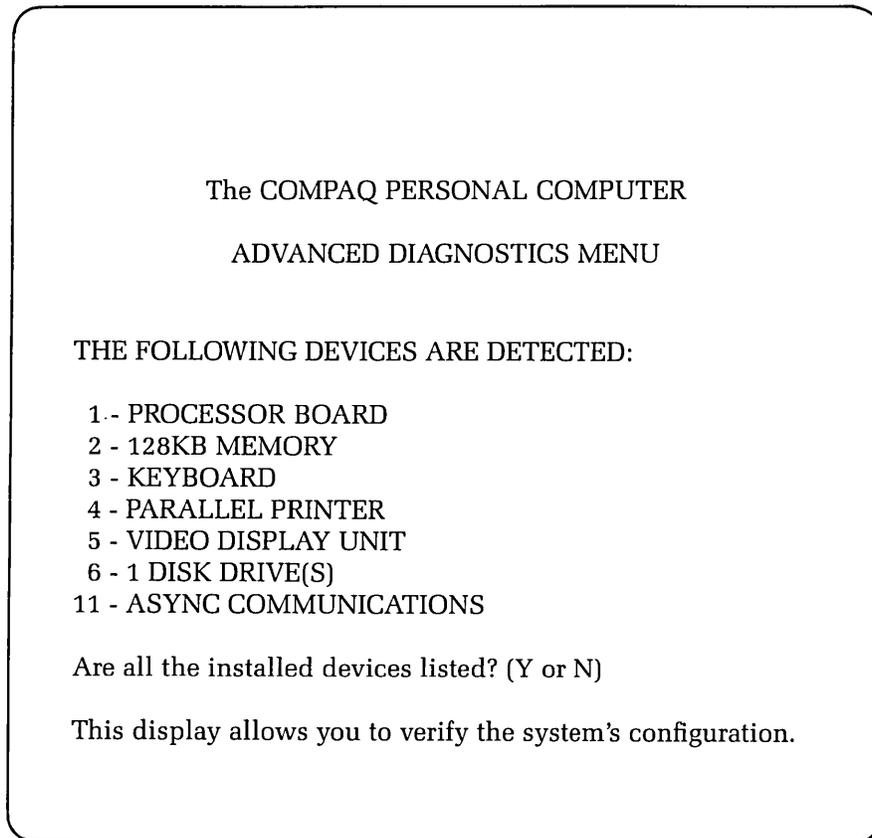
If the diagnostics did not load automatically, type in DIAG in response to the A>, and then press [ENTER]. This causes the diagnostics to load, if the file DIAG.COM is on your diskette.

If the diagnostics program still does not load, repeat this procedure with a known-good Advanced Diagnostics diskette. If the problem is not resolved, refer to the beginning of the disk drive subsystem PIP to further isolate the cause of the problem.

YES

This menu indicates that you have successfully loaded the diagnostics and are ready to begin.

Press [0] and then [ENTER] to select RUN THE DIAGNOSTIC TESTS. A display similar to the following should appear on the screen:

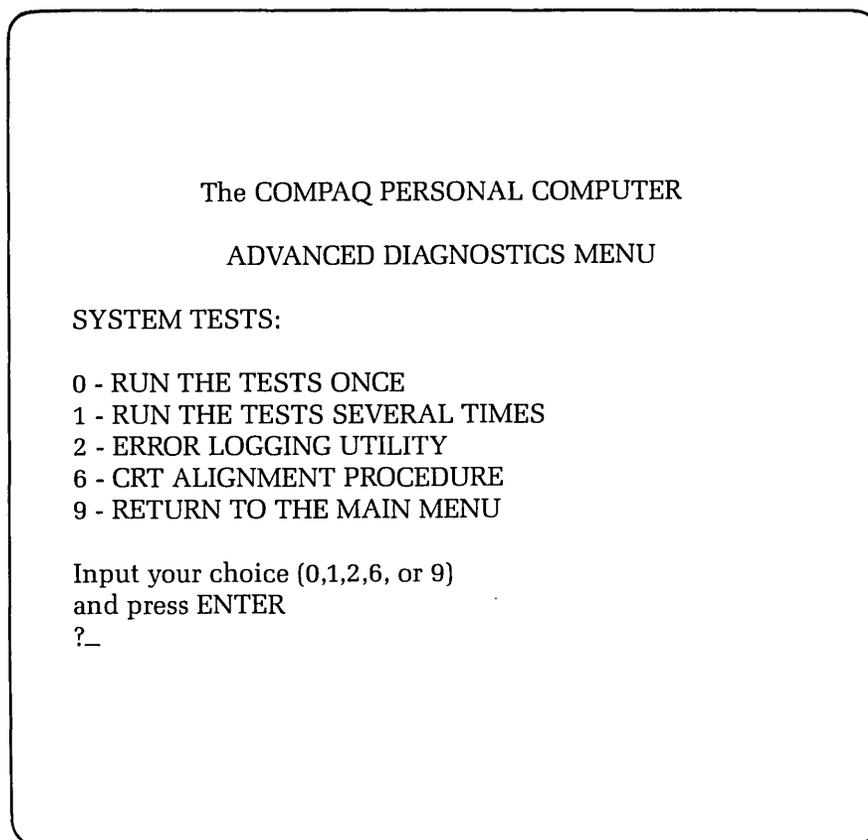


DOES THE DISPLAY ACCURATELY DESCRIBE THE SYSTEM CONFIGURATION?

NO This indicates a possible problem with the setting of the switches (SW1 and SW2) on the processor board. Refer to the configuration portion of Chapter 5, CPU/MEMORY SUBSYSTEM, to confirm the positions of SW1 and SW2.

YES Press [Y] and then [ENTER].

The following menu should appear on the screen:



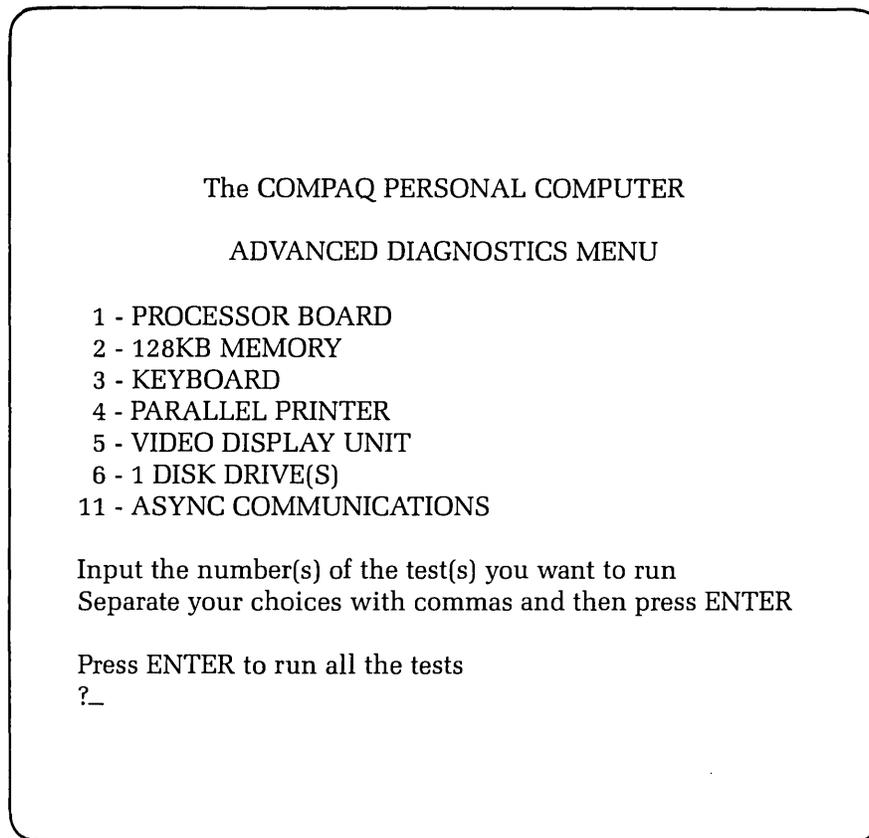
At this point you can select the mode in which you want to run the tests.

DO YOU WANT TO RUN THE SELECTED TESTS MORE THAN ONE TIME?

NO Select RUN THE TESTS ONCE by pressing [0] and then [ENTER].

YES To complete the floppy disk drive speed adjustment procedure, you would not normally choose to run the test more than one time (it is a "cycling" test). You should always select RUN THE TESTS ONCE by pressing [0] and then [ENTER].

A menu similar to the following should now appear on the display screen:



Begin the disk drive diagnostics by pressing [6] and then [ENTER].

The following menu should appear on the display screen:

```

                                The COMPAQ PERSONAL COMPUTER
                                ADVANCED DIAGNOSTICS MENU
                                DISKETTE DIAGNOSTIC MENU
                                OPTION                DRIVE
                                1 - SEQUENTIAL SEEK TEST  A OR B
                                2 - RANDOM SEEK TEST      A OR B
                                3 - VERIFY DISKETTE TEST  A OR B
                                4 - DISK SPEED TEST       A OR B
                                9 - RETURN TO PREVIOUS MENU
                                To return press 9 followed by ENTER
                                To run any test (1,2,3 OR 4):
                                Enter option number, Drive (A,B) followed by ENTER
                                Example: 3,A<ENTER>
                                ?_

```

This menu lists the series of tests that you can use to check the disk drive subsystem. For the floppy disk drive speed adjustment procedure, select DISK SPEED TEST by pressing [4] and then [ENTER].

***** CAUTION *****
DATA WILL BE DESTROYED

Insert scratch diskette into drive A>: press ENTER when ready.

The disk speed test program makes use of an auto-feature of the floppy disk drive. The index detector circuitry contained inside the drive chassis will automatically generate a signal pulse each time the index hole of a soft-sectored diskette passes by the index detector. As the diskette continues to rotate, the disk drive speed will stabilize (usually within 5-6 seconds) the speed test program can calculate the time span between each index pulse generated by the disk drive.

By using the disk speed test program with the following procedure, you will be able to quickly adjust the speed of the floppy disk drive to within proper specifications.

Step 1 - After selecting the disk speed test from the Diskette Diagnostic Menu (using the proper command format), the display should show the current speed of rotation of the disk drive under test. The value of rotational speed will be displayed in two formats. Although they are exactly the same, this procedure will usually refer to the value in parentheses (the value expressed in milliseconds).

Step 2 - Wait approximately 5-6 seconds, or until the displayed value stabilizes. Remember, this test is a continuously "cycling" test; and the values will continue to scroll the display upward.

Step 3 - Check the value for disk rotational speed. The optimum value for use in the COMPAQ Portable Computer is 200.0 msec. The displayed value should be within $\pm 2\%$ of the optimum value (196.0 - 204.0 msec).

Step 4 - If the displayed value is out of the specified parameters, locate the speed adjustment potentiometer on the disk drive analog board. Using a small flat-blade screwdriver **carefully** turn the adjustment screw clockwise if the displayed value is larger than the specified parameters. Turn the adjustment screw counter-clockwise if the displayed value is less than the specified parameters.

Step 5 - By carefully turning the speed adjustment screw, you should be able to bring the speed of the disk drive to within 1% of the optimum value (198.0 - 202.0 msec).

NOTE: Although the disk drive(s) contained in the COMPAQ Portable Computer should continue to function properly if the speed adjustment is within $\pm 3\%$ of the optimum value (200.0 msec), if a disk speed adjustment is attempted, the service technician should **always** adjust the speed of the disk drive to within 1% of the optimum value.

Step 6 - Once the speed of the disk drive has been properly adjusted, exit the speed test program by pressing any key.

Step 7 - Remove power from the system and replace the disk drive into the system chassis. Remember to remove the disk drive power and signal extension cables.

This completes the floppy disk drive speed adjustment procedure. For additional technical assistance, contact the COMPAQ Technical Support Department.

PARALLEL PRINTER PORT SUBSYSTEM

Configuration/Interface Information

The printer port, as discussed in this chapter, will deal primarily with the floppy/printer adapter board assembly, (see Figure 9-1) and its use as an interface between the COMPAQ Portable Computer and all types of I/O peripheral devices which require parallel communication.

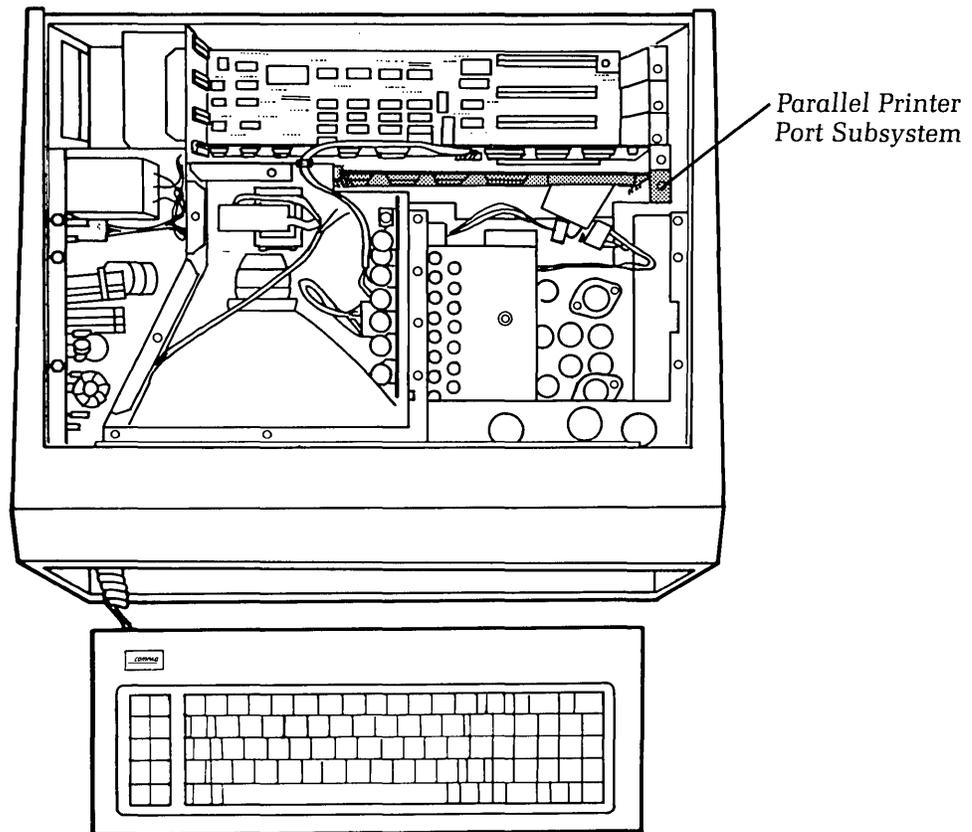


Figure 9-1. Floppy/Printer Adapter Board Assembly.

The standard COMPAQ Computer has the capability to continuously support a single parallel port interface. This feature allows the user to utilize the speed and efficiency of a variety of parallel printers; but may also be used to operate with any general I/O peripheral device which is signal-compatible with the port interface (e.g., speech synthesizers, etc.)

Use the diagram and chart below which describes the parallel port interface pin-out in order to determine whether or not a peripheral device is signal-compatible with the COMPAQ Computer.

9-2 Maintenance and Service Guide

COMPAQ PARALLEL
I/F

STANDARD
DB-25P CONNECTOR

PIN NO.	SIGNAL NAME (POLARITY)
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 FEED (-)
15	ERROR (-)
16	INITIALIZE PRINTER (-)
17	SELECT INPUT (-)
18-25	GROUND

For more information on system/subsystem configuration, contact the COMPAQ Technical Support Department.

Problem Isolation Procedure (PIP)

This procedure is designed to help you in determining if the printer port subsystem is functioning properly. This PIP for parallel I/O malfunctions provides a systematic method of identifying and correcting most printer port problems.

As with any troubleshooting procedure, you may encounter some problem that this procedure does not cover. If you complete this PIP without resolving the problem, contact the COMPAQ Technical Support Department for further technical assistance.

If you have not already done so, complete the following actions:

Step 1. With the exception of the parallel printer, remove any non-COMPAQ peripherals or adapters from the system.

Step 2. Power-on the system.

Step 3. Boot the system and load the Advanced Diagnostics Diskette. Refer to Chapter 3, SYSTEM CHECKOUT, for more information on loading the Advanced Diagnostics Program.

DID THE SYSTEM BOOT PROPERLY?

NO You may have a defective diagnostics diskette or a diskette that does not contain the correct operating system. Try to boot the system using a diskette that is known to be good.

If the system still does not boot, it is an indication of a probable failure in the disk drive system. Refer to the PIP in Chapter 8, DISK DRIVE SUBSYSTEM, to further isolate the cause of the problem.

YES If the system booted properly, and contains an AUTOEXEC. BAT file to load the diagnostics, the following menu appears:

9-4 Maintenance and Service Guide

YES When the system boots properly, and contains an AUTOEXEC.BAT file to load diagnostics, you will see a screen display.

The following menu will appear:

```

The COMPAQ PERSONAL COMPUTER
      ADVANCED DIAGNOSTICS MENU
Version 1.00 (c) COPYRIGHT 1982, COMPAQ COMPUTER CORP.
      ALL RIGHTS RESERVED

YOUR CHOICES ARE:

0 - RUN THE DIAGNOSTIC TESTS
1 - FORMAT A DISKETTE
2 - COPY A DISKETTE
9 - GO TO THE SYSTEM DISKETTE

Input your choice (0,1,2 or 9)
and press ENTER
?_

```

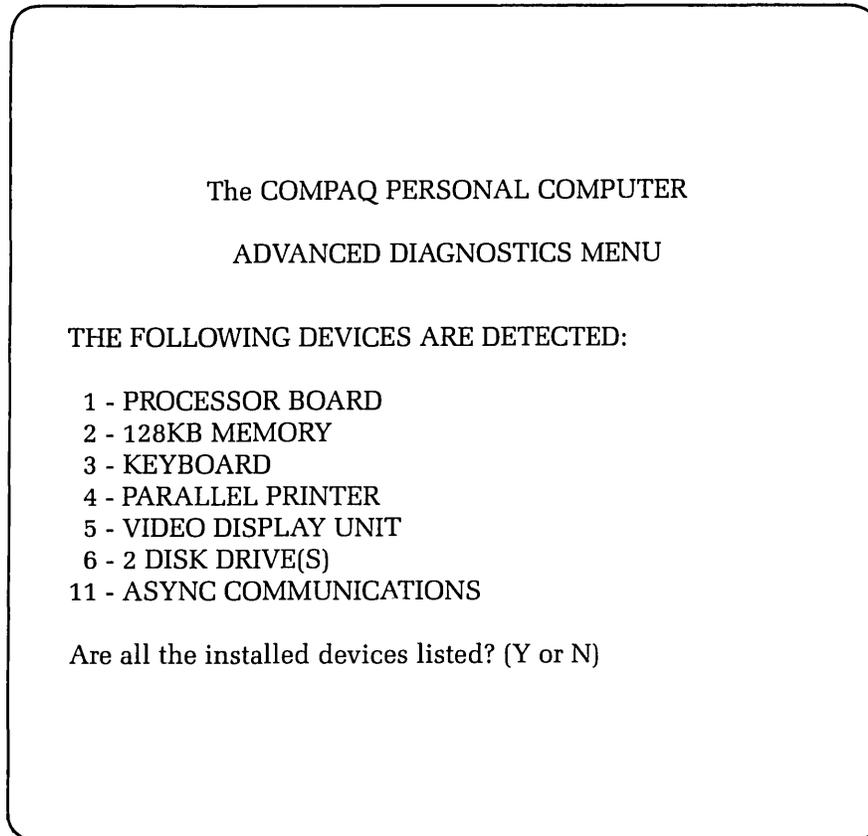
DID YOU GET THE CORRECT MENU AFTER LOADING YOUR DIAGNOSTICS DISKETTE?

NO If the diagnostics did not load automatically, type in DIAG, and then press ENTER. This causes the diagnostics to load, if the file DIAG.COM is on your diskette.

If the diagnostics program still does not load, repeat this procedure with a known-good Advanced Diagnostics Diskette. If the problem is not resolved, refer to the PIP in Chapter 8, DISK DRIVE SUBSYSTEM, to further isolate the cause of the problem.

YES This menu indicates that you have successfully loaded the diagnostics and are ready to begin.

In response to the display prompt, press [0] and then [ENTER] to select RUN THE DIAGNOSTIC TESTS. A display similar to the following should appear on the screen:



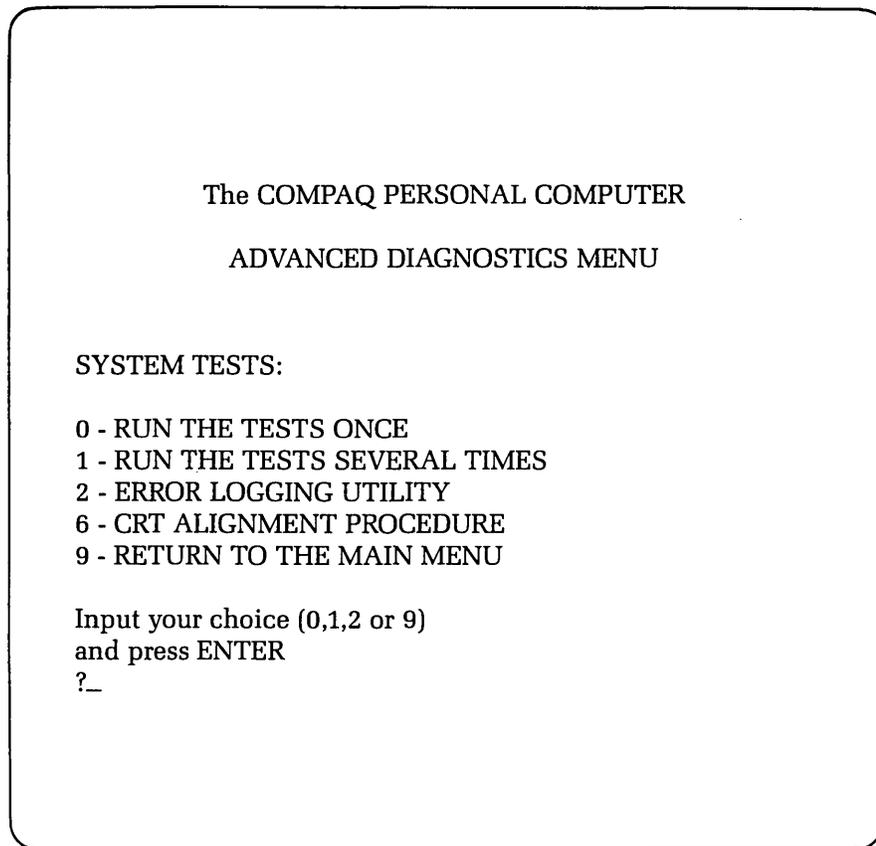
This display allows you to verify the system's configuration.

DOES THE DISPLAY ACCURATELY DESCRIBE THE SYSTEM CONFIGURATION?

NO This indicates a possible problem with the setting of the switches (SW1 and SW2) on the processor board. Refer to the configuration portion of Chapter 5, CPU/MEMORY to confirm the correct positions of SW1 and SW2.

YES Press [Y] and then [ENTER].

The following menu should appear on the screen:



At this point, you can select the mode in which you want to run the tests.

DO YOU WANT TO RUN THE SELECTED TESTS MORE THAN ONE TIME?

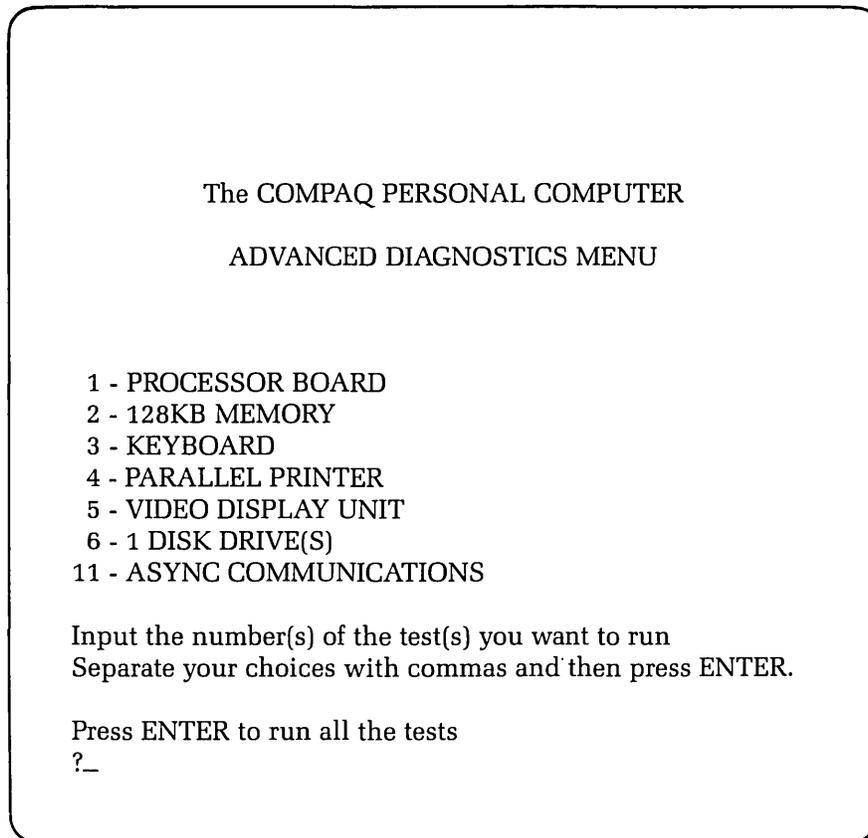
NO Select RUN THE TESTS ONCE by pressing [0] and then [ENTER].

YES Select RUN THE TESTS SEVERAL TIMES by pressing [1] and then [ENTER].

A prompt will appear requesting the number of times you wish to run the selected tests (between 1 and 65,535 times). Enter the desired number of test cycles, followed by [ENTER].

Finally, when running the tests several times, you may choose to halt program execution each time an error is detected. When this prompt appears on the screen, simply press [Y] or [N], followed by [ENTER].

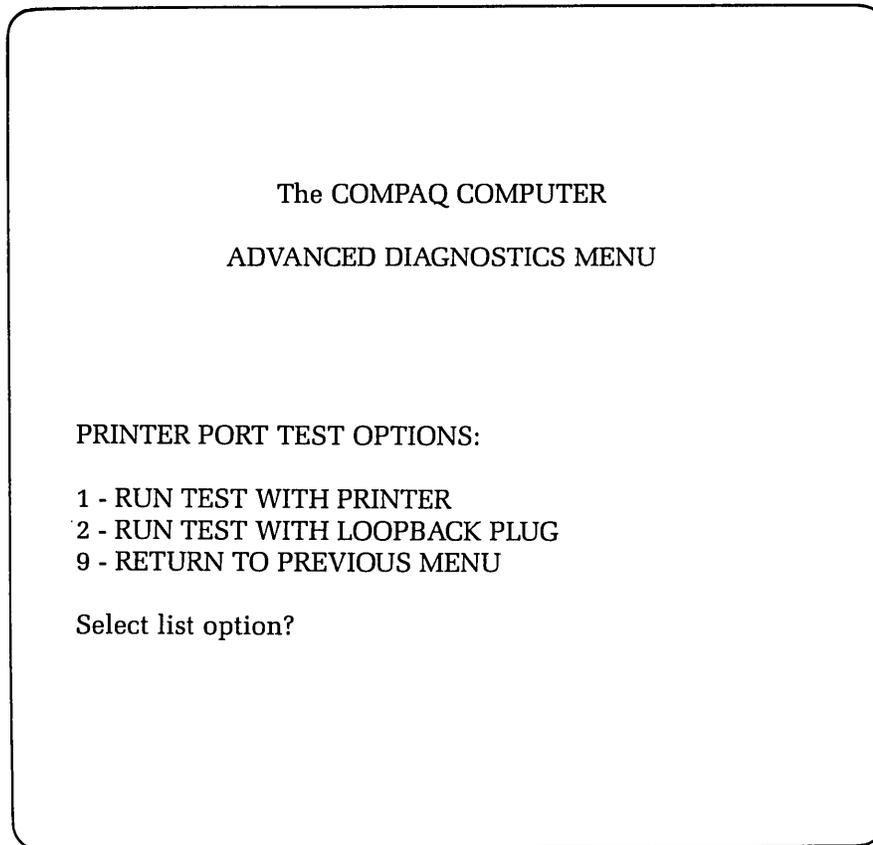
Selecting either mode will cause a display similar to the following to appear:



Begin the parallel port diagnostics by pressing [4] and then [ENTER].

If you chose to run the diagnostic test more than one time, the test will begin automatically. The test will assume that a printer is already connected to the interface port.

If you chose to run the diagnostic test only once, the following menu should appear on the screen:



NOTE: If your system is not equipped with a printer, or if your system is using the parallel port for a function other than a printer, it is recommended that this test be run with a loopback plug installed. At this point, make sure that a loop back plug is installed if you try using a printer.

ARE YOU GOING TO RUN THE TEST WITH A PRINTER CONNECTED?

YES Select RUN TEST WITH PRINTER by pressing [1] and then [ENTER].

NO Select RUN TEST WITH LOOPBACK PLUG by pressing [2] and then [ENTER].

If you select RUN TEST WITH PRINTER, the printer diagnostic test will begin automatically. The program is designed to exercise all printer functions. A pattern similar to the following should be printed at the printer.

```

CHECKING - PARALLEL PRINTER
00:03:03
ERROR - PRINTER                                404

Test Complete, Press ENTER to continue

```

WAS THE CORRECT TEST PATTERN PRINTED?

- YES** This concludes the printer diagnostic test. The printer port is functioning properly. Press [ENTER] to return to the printer diagnostic menu.
- NO** Refer to the Operations Manual of the particular printer in use, and run the printer's **internal** self-test.

DID THE PRINTER SUCCESSFULLY COMPLETE ITS INTERNAL SELF-TEST?

- NO** It is probable that there is a problem with the printer. Repair or replace the printer, and run the printer port subsystem PIP again. If the printer still fails its self-test, and the printer port test, contact the printer manufacturer for further technical assistance.
- YES** Make sure that the system-to-printer interface cable is seated properly, and run the printer port diagnostic test again.

DID THIS CORRECT THE PROBLEM?

- YES** This completes the printer port subsystem PIP.
- NO** Replace the floppy/printer adapter board, as described in the Removal and Replacement Procedure for the floppy/printer adapter board assembly, located at the end of this chapter.

DID THIS CORRECT THE PROBLEM?

- YES** This completes the printer port subsystem PIP.
- NO** Replace the system-to-printer interface cable.

DID THIS CORRECT THE PROBLEM?

- YES** This completes the printer port subsystem PIP.
- NO** Contact the COMPAQ Technical Support Department for further technical assistance.

9-10 Maintenance and Service Guide

If you are running the parallel port diagnostic test with a loopback plug installed, the system will exercise all appropriate signal tests through the printer port via the loopback plug. A failure will always occur if this test is run without a loopback plug installed.

If an error is detected during the test, a highlighted error message will appear on the screen indicating the type of error with the corresponding error code.

DID ANY ERROR MESSAGES APPEAR AFTER RUNNING THE TEST?

NO

The printer port subsystem is functioning properly.

YES

Replace the floppy/printer adapter board as described in the Removal and Replacement Procedure for the floppy/printer adapter board assembly, located at the end of this chapter. After replacing the floppy/printer adapter board, execute the parallel port diagnostic test again.

If none of the steps you have taken to this point have resolved the problem, contact the COMPAQ Technical Support Department for further technical assistance.

Removal and Replacement Procedures For The Printer Port Subsystem

Floppy/Printer Adapter Board Assembly

***** WARNING *****

Before opening the unit's case to perform any removal, replacement, or maintenance procedures, disconnect the line cord from the ac outlet and set the ON/OFF switch to the OFF position. Otherwise, dangerous voltages may be present throughout the system.

STEP:

ACTION:

1

Place the computer on a level surface, such as a table or workbench with the handle assembly facing you (see Figure 9-2).

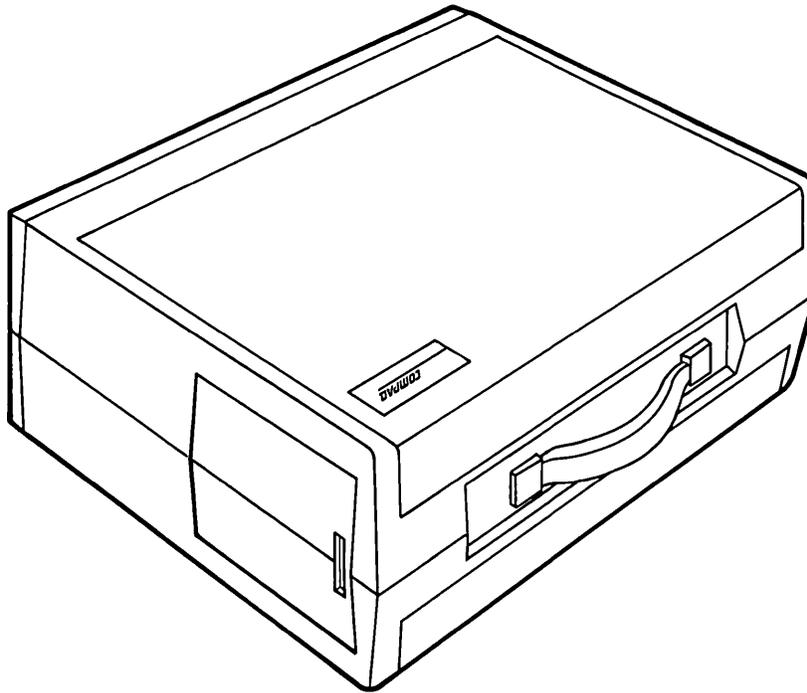


Figure 9-2. Computer On Work Surface.

STEP:

ACTION:

2

Open the access cover by pressing down on the plastic cover of the unit with one hand next to the COMPAQ logo (see Figure 9-3a). As pressure is applied, the plastic cover will bulge at the connecting seam which runs directly above the handle. Partially insert a plastic card under the cover at the bulge, and release the hand pressure applied. At the opposite end of the plastic cover (see Figure 9-3b), apply pressure with your hand in the same manner as previously done. When the plastic cover bulges, reach under the cover and pull upward and outward, then slide cover out (see Figure 9-3c).

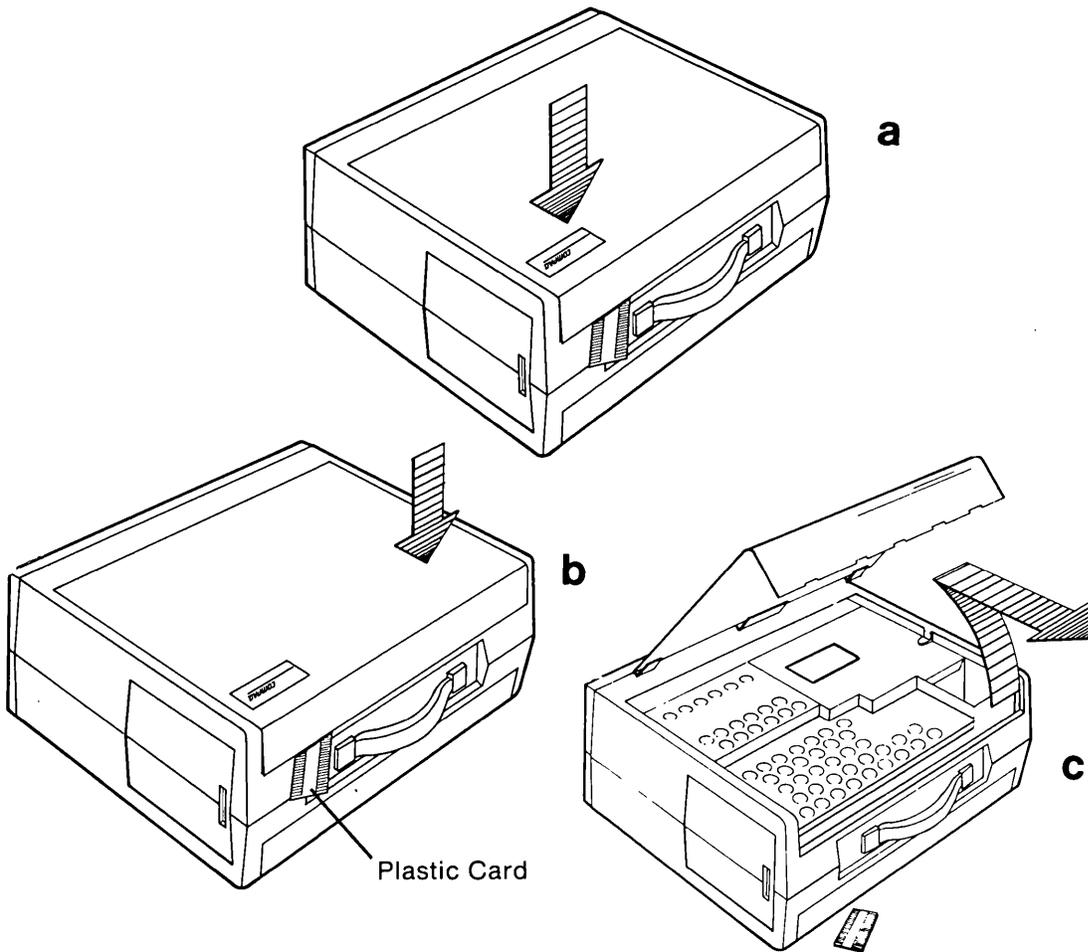


Figure 9-3. Removing Top Cover.

STEP:

3

ACTION:

Loosen (DO NOT REMOVE) the six (6) screws and the one nut that secure the card cage access plate (see Figure 9-4).

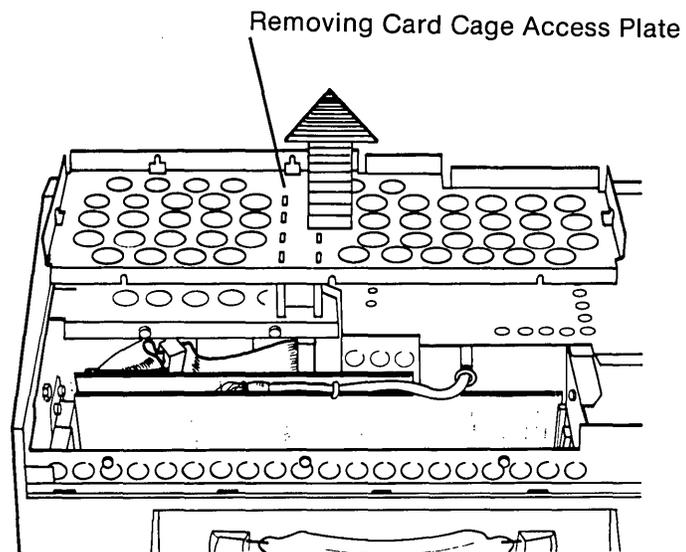
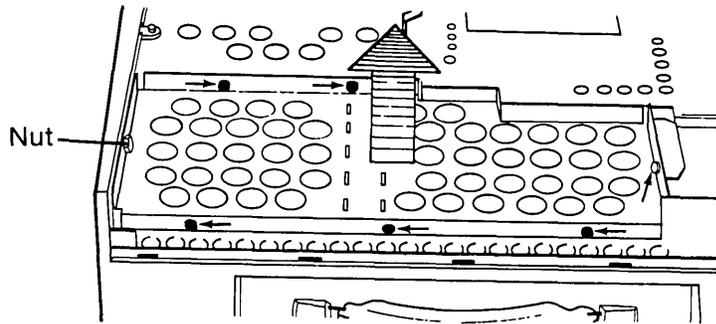


Figure 9-4. Removing Card Cage Access Plate.

STEP:

ACTION:

4

Gently remove the card cage access plate as shown in Figure 9-5.

5

Carefully disconnect all cables from the floppy/printer adapter board (see Figure 9-5).

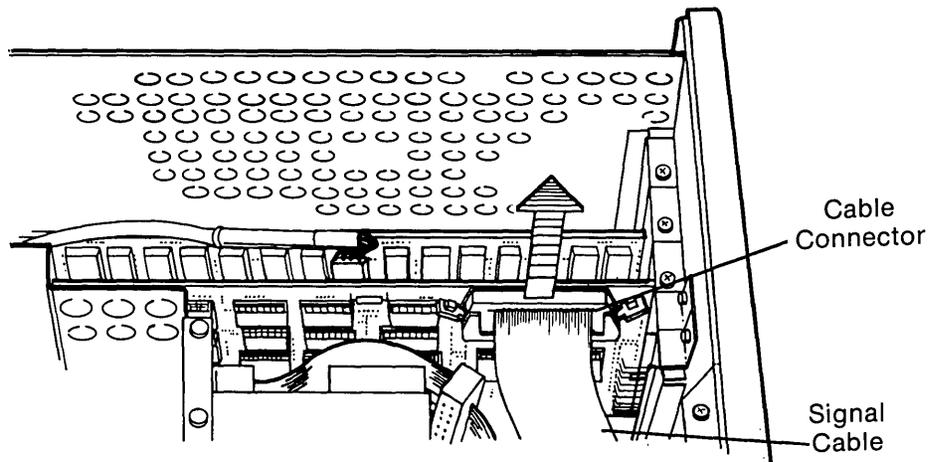


Figure 9-5. Disconnecting All Cables From the Floppy/Printer Board.

6

Remove the retaining screw that secures the floppy/printer adapter board assembly to the system chassis. (see Figure 9-6).

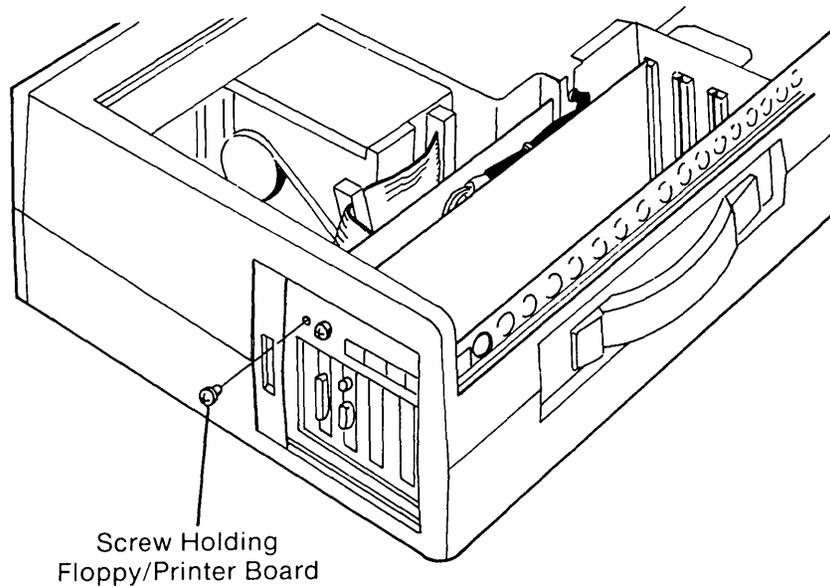


Figure 9-6. Removing the Floppy/Printer Adapter Board.

STEP:

ACTION:

7

Gently remove the floppy/printer adapter board by pulling it away from the processor board (see Figure 9-7).

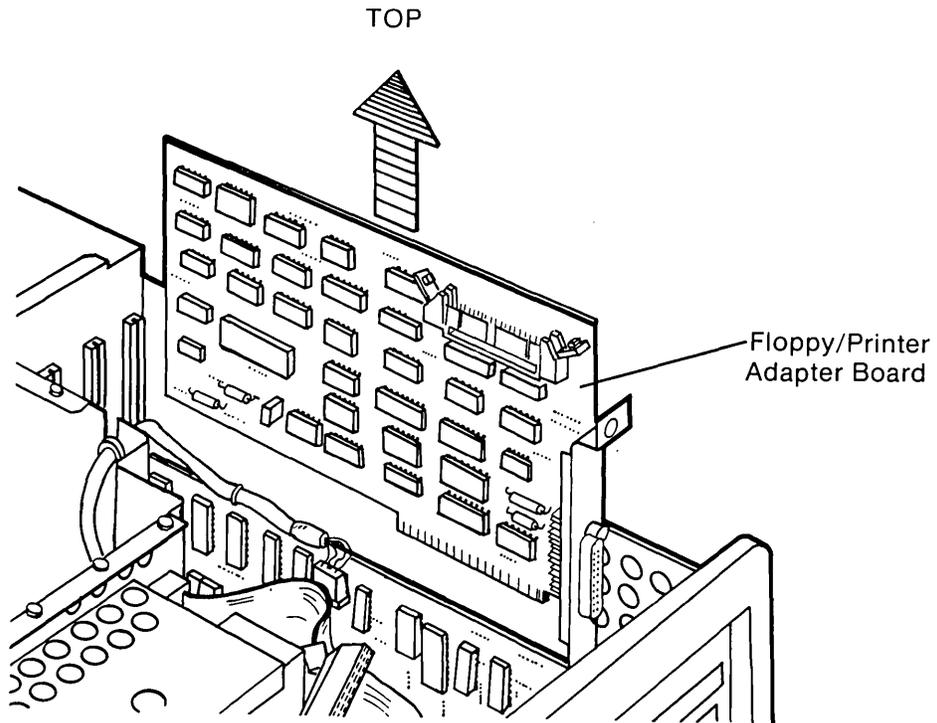


Figure 9-7. Removing the Floppy/Printer Adapter Board.

To replace the floppy/printer board, reverse Steps 1 through 7.

(

(

(

FIXED DISK DRIVE SUBSYSTEM

Configuration/Interface Information

The fixed disk drive subsystem, as discussed in this chapter, will include the fixed disk drive assembly and the fixed disk adapter board assembly. The fixed disk system can only be used under MSTM-DOS 2.0 or an equivalent operating system. Refer to Chapter 5 of this guide, CPU/Memory Subsystem, for specific instructions on how to configure the processor board to support MSTM-DOS 2.0.

It is the function of the disk drive subsystem to store (write) data, recall (read) data and erase data when necessary. The fixed disk adapter board acts as an interface between the disk drive and the processor board assembly.

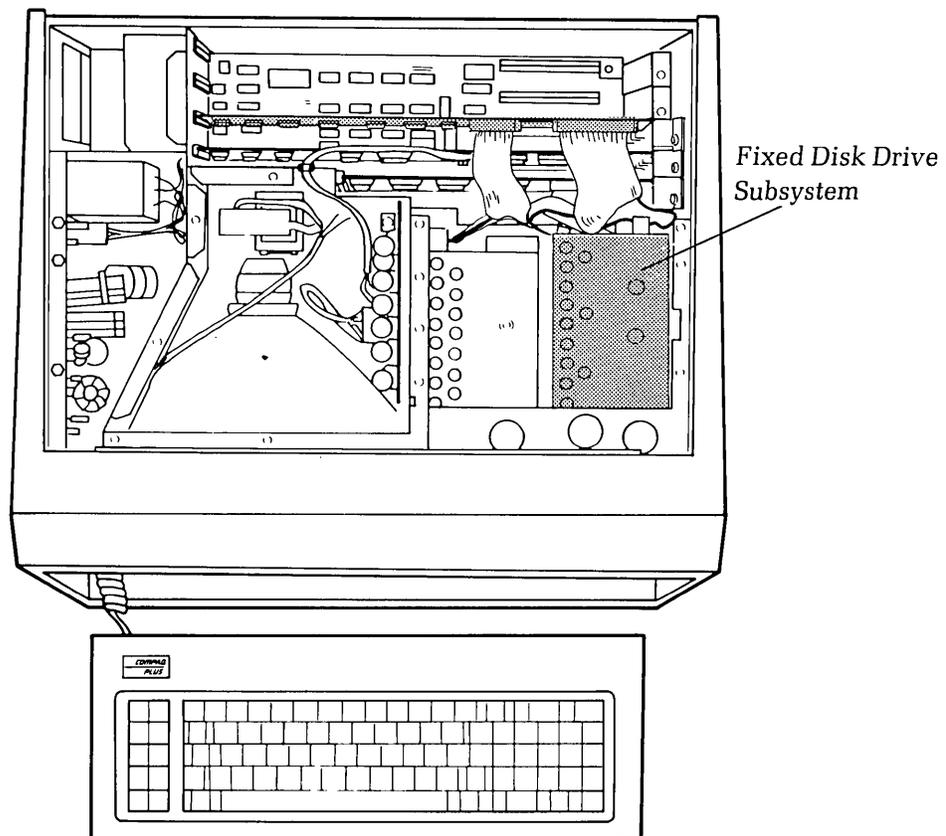


Figure 10-1. Fixed Disk Drive Subsystem.

The fixed disk drive is mounted with a special case designed to protect the drive from mechanical shocks which could otherwise cause irreparable damage.

*****CAUTION*****

Do not under any circumstances attempt to service the fixed disk drive assembly within the protective case. To do so will void all COMPAQ Computer warranties covering the drive.

The fixed disk adapter board assembly occupies one of the COMPAQ PLUS Portable Computer expansion slots. The main function of this board is as follows:

- Receives data that is to be stored on the fixed disk.
- Arranges the data into appropriate sector formats.
- Encodes the data into usable information to be transmitted to the fixed disk drive.
- Receives data from the fixed disk drive and translates the information so that it can be used by the system.
- Mathematically verifies the data read from a diskette.

This adapter board will support a maximum of two (2) fixed disk drives.

For more information on system/subsystem configuration, contact the COMPAQ Technical Support Department.

Problem Isolation Procedure (PIP)

This procedure is designed to help you in determining if the fixed disk drive subsystem is functioning properly. This PIP should provide a systematic method of identifying and correcting most fixed disk drive subsystem problems.

As with any troubleshooting procedure, you may encounter a problem that this procedure does not cover. If you complete this PIP without solving the problem, contact the COMPAQ Technical Support Department for further technical assistance.

PRELIMINARY TESTING

If you have not already done so, complete the following actions:

- STEP 1. Remove any non-COMPAQ peripheral devices or adapters from the system.
- STEP 2. Power-on the system with no diskette in the floppy disk drive.
- STEP 3. The system should boot from the fixed disk.

DID THE SYSTEM BOOT PROPERLY FROM THE FIXED DISK?

- YES Go to the section titled FIXED DISK DRIVE TESTING to continue this PIP.
- NO Proceed to the next step.

DID A 1701 ERROR OCCUR DURING THE POWER-UP ATTEMPT TO BOOT?

- NO Refer to Chapter 2, SYSTEM PROBLEM ISOLATION GUIDE, to determine which PIP will assist you in further isolating the cause of the problem.
- YES Attempt to boot the system from an Authorized Diagnostics Diskette.

DID THE SYSTEM BOOT PROPERLY FROM THE FLOPPY DRIVE?

- NO This indicates a possible problem with the Floppy Disk Drive Subsystem or Power Supply Subsystem. Refer to Chapter 2, SYSTEM PROBLEM ISOLATION GUIDE, to determine which PIP will assist you in further isolating the cause of the problem.
- YES Go to the section entitled FIXED DISK DRIVE TESTING to continue this PIP.

DISK DRIVE TESTING

Once the system has been booted, insert the advanced diagnostics diskette, Version 2.0.

NOTE: To test the fixed disk subsystem, you must have loaded the COMPAQ Advanced Diagnostics, Version 2.0. Version 1.0 does not contain the fixed disk drive tests.

Type in DIAG in response to the A>, and then press [ENTER]. This causes the diagnostics to load, if the file DIAG.COM is on your diskette. The following menu should appear:

```
The COMPAQ PERSONAL COMPUTER
ADVANCED DIAGNOSTICS MENU
Version X.XX (C) COPYRIGHT YYYY, COMPAQ COMPUTER CORP.
ALL RIGHTS RESERVED

YOUR CHOICES ARE:

0 - RUN THE DIAGNOSTIC TESTS
1 - FORMAT A DISKETTE
2 - COPY A DISKETTE
9 - GO TO THE SYSTEM DISKETTE

Input your choice (0, 1, 2, or 9)
and press ENTER
?_
```

This menu indicates that the diagnostics are loaded and ready to be executed.

DID YOU GET THE CORRECT MENU AFTER LOADING YOUR DIAGNOSTICS DISKETTE?

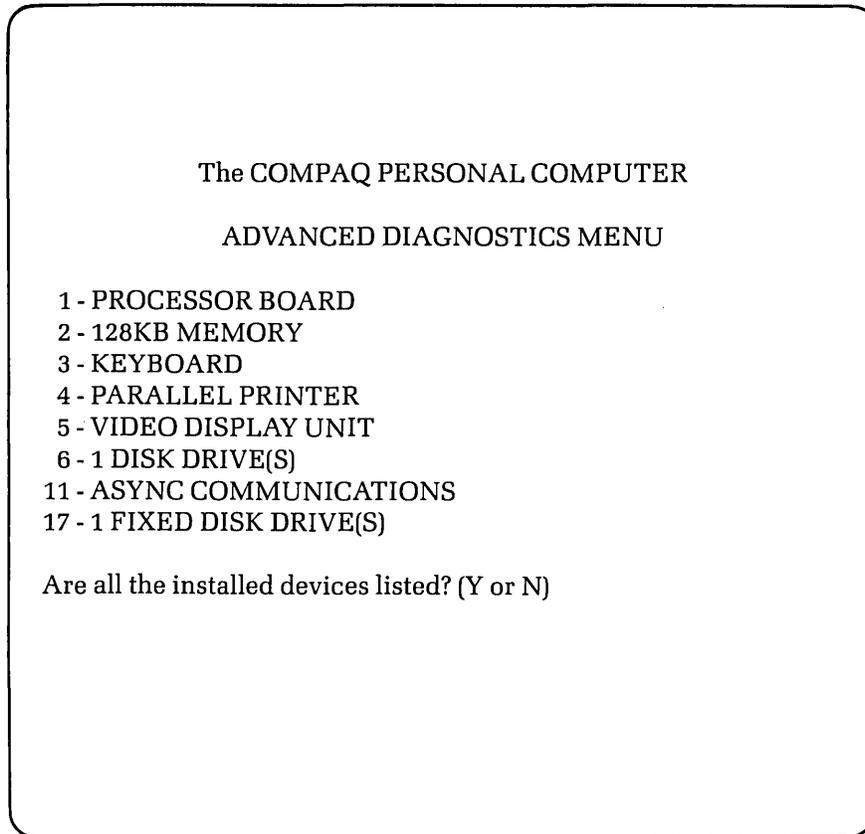
NO

If the diagnostics did not load automatically, type in DIAG, and then press [ENTER]. This causes the diagnostics to load, if the file DIAG.COM is on your diskette.

If the diagnostics program does not load, repeat this procedure with a known-good Advanced Diagnostics diskette. If the problem is not solved, contact the COMPAQ Technical Support Department for further technical assistance.

YES This menu indicates that you have successfully loaded the diagnostics and are ready to proceed.

Press [0] and then [ENTER] to select RUN THE DIAGNOSTIC TESTS. A display similar to the following should appear on the screen:



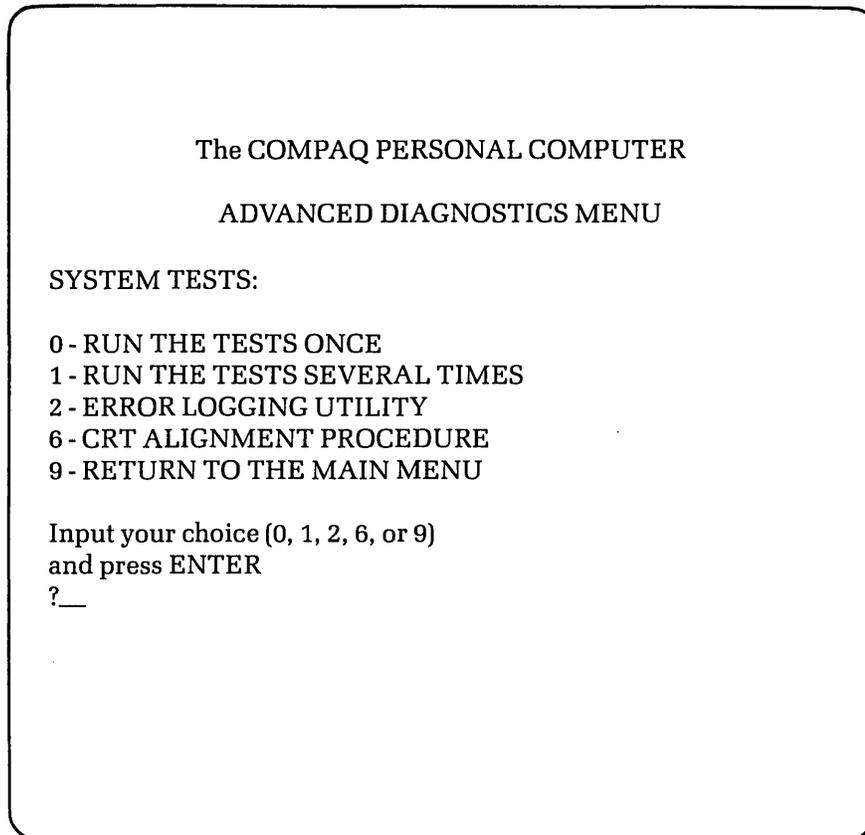
This display allows you to verify the system's configuration.

DOES THE DISPLAY ACCURATELY DESCRIBE THE SYSTEM CONFIGURATION?

NO This indicates a possible problem with the setting of the switches (SW1 and SW2) on the processor board. Refer to the configuration portion of Chapter 5, CPU/MEMORY SUBSYSTEM, to confirm the positions of SW1 and SW2.

YES Press [Y] and then [ENTER].

The following menu should appear on the screen:



At this point you can select the mode in which you want to run the tests. You also have the option to log errors to a printer as they are detected.

DO YOU INTEND TO LOG DETECTED ERRORS?

NO Decide if you want to run the selected tests once or repeat the tests several times.

YES Select the ERROR LOGGING UTILITY by pressing [2] and then [ENTER].

The following menu should appear on the screen:

```
The COMPAQ PERSONAL COMPUTER
ADVANCED DIAGNOSTICS MENU

ERROR LOGGING UTILITIES

0 - BEGIN LOGGING ERRORS
1 - QUIT LOGGING ERRORS
2 - SET THE TIME
3 - DISPLAY THE TIME
9 - EXIT FROM THE LOGGING UTILITY

Input your choice (0, 1, 2, 3, or 9)
and press ENTER
?_
```

Error-logging is a convenient way to create a printed version (hardcopy) of all system errors. This utility will automatically log errors to an attached printer only. Use the [0] and [1] keys, accompanied by [ENTER], to start and stop the error-logging function.

The error-logging utility will also record the time at which the error occurred. Use the [2] and [3] keys, accompanied by [ENTER] to make sure the system clock is set to the current time.

Once the logging function is initiated, return to the previous menu by selecting EXIT FROM THE LOGGING UTILITY by pressing [9] and then [ENTER].

DO YOU WANT TO RUN THE SELECTED TESTS MORE THAN ONE TIME?

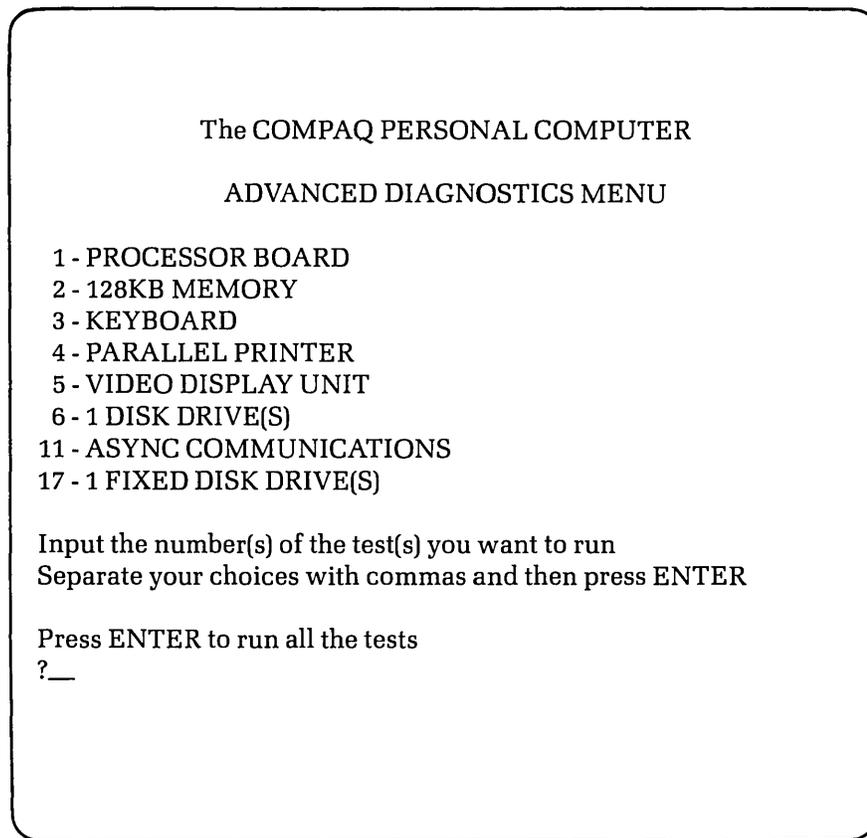
NO Select RUN THE TESTS ONCE by pressing [0] and then [ENTER].

YES Select RUN THE TESTS SEVERAL TIMES by pressing [1] and then [ENTER].

A prompt will appear requesting the number of times you wish to run the selected tests (between 1 and 65,535 times). Enter the desired number of test cycles, followed by [ENTER].

Finally, when running the tests several times, you may choose to halt program execution each time an error is detected. When this prompt appears on the screen simply press [Y] or [N], followed by [ENTER].

Whether you select [Y] or [N], a menu similar to the following will appear:



To begin the fixed disk drive diagnostics, press [17] and then [ENTER].

Follow the instructions on the screen to execute the desired functional test.

If you chose to run the tests only once, the following menu should appear on the screen:

```
The COMPAQ PERSONAL COMPUTER
ADVANCED SERVICE DIAGNOSTICS

FIXED DISK DIAGNOSTIC MENU

OPTION
0 - FIXED DISK TEST
2 - FORMAT FIXED DISK
9 - RETURN TO PREVIOUS MENU

To return press 9 followed by ENTER
To run any option (0 OR 2):
Enter option number followed by ENTER
?_
```

At this point, you should select option 0, the FIXED DISK TEST. This will result in the following message being displayed:

```
***CAUTION***
DATA CYLINDER 305 WILL BE
DESTROYED BY THE WRITE TEST
```

Do you want to include the write test?

If the fixed disk has been formatted and is being used from MS-DOS 2.0, PC DOS 2.0, or MSTM-DOS 2.0, the write test should be selected. The operating system does not allow data to be written to cylinder 305. However, with other operating systems this may not be true. Discretion should be used in this case.

WAS THE DISK FORMATTED WITH MS-DOS 2.0, PC DOS 2.0, OR MS-DOS 2.0?

NO Do not exercise the write test. Enter an [N] in response to the “Do you want to include the write test?” prompt.

YES Enter a [Y] in response to the “Do you want to include the write test?” prompt.

Running the fixed disk test will test up to 4 disk performance functions:

1. The ability of the drive to seek any track is tested with the SEEK TEST.
2. The ability of the drive to write data is tested if the WRITE TEST is selected.
3. The integrity of the data on track zero, where the operating system is stored, is verified with the TRACK ZERO TEST.
4. The integrity of the media is verified with the SURFACE SCAN TEST.

The fixed disk drive test will begin with the following screen being displayed:

```
The COMPAQ PERSONAL COMPUTER
ADVANCED DIAGNOSTICS MENU

FIXED DISK TEST STATUS
SEEK TEST IN PROGRESS
COMPLETE CYLINDER nnn
WRITE TEST IN PROGRESS
COMPLETE *
TRACK ZERO TEST IN PROGRESS
COMPLETE
SURFACE SCAN IN PROGRESS
COMPLETE

*Will only be displayed if selected.
```

The CYLINDER message indicates which cylinder is presently being tested.

DID ANY ERROR MESSAGES APPEAR DURING ANY DISK DRIVE TEST?

NO This concludes the fixed disk drive subsystem PIP. The subsystem is functioning properly.

YES All disk drive interface error codes will result in a 170X error message. Use the following chart to determine the probable error and recommended action.

ERROR CODE	ERROR DESCRIPTION	RECOMMENDED ACTION
1701	Defective controller, diskette signal cable, and/or fixed disk drive assembly.	1. Verify signal cable connections. 2. Replace the defective assembly(s).
1702	Defective controller.	Replace the defective controller board.
1703	Disk error - the drive has failed or has developed a format error	Continue the PIP

Refer to the appropriate Removal and Replacement Procedures located at the end of this chapter for more information on how to replace any defective assemblies.

To determine if the 1703 error was caused by a defective drive or by a format problem, it will be necessary to reformat the fixed disk.

*****CAUTION*****

The diagnostic format routine will cause the permanent loss of all data currently on the disk. If it is at all possible, back up as much of the disk as you can.

Return to the fixed disk test menu.

The COMPAQ PERSONAL COMPUTER

ADVANCED DIAGNOSTICS MENU

FIXED DISK DIAGNOSTIC MENU

OPTION

0 - FIXED DISK TEST

2 - FORMAT FIXED DISK

9 - RETURN TO PREVIOUS MENU

To return press 9 followed by ENTER

To run any option (0 OR 2):

Enter option number followed by ENTER

?_

At this point, you should select option 2, the FORMAT FIXED DISK. This will result in the following message being displayed:

```
          FORMAT WILL DESTROY ALL DATA ON THIS DRIVE

Do you wish to abort format?

FIXED DISK FORMAT IN PROGRESS
                   COMPLETE
```

The format routine should take approximately x minutes to complete.

DID THE FORMAT ROUTINE COMPLETE WITHOUT ANY ERRORS?

YES Rerun the FIXED DISK TEST. If it passes this time, the fixed disk drive is functioning properly. Before using DOS, the disk must be reinitialized using the FDISK utility. Refer to the MSTM-DOS 2.0 REFERENCE GUIDE for complete instructions on how to use FDISK.

NO Replace the fixed disk drive and start this PIP again. Refer to the Removal and Replacement Procedure for the fixed disk drive assembly located at the end of this chapter, for more information on how to replace the fixed disk drive.

Rerun the FIXED DISK TEST. If it passes this time, the fixed disk drive is functioning properly. Before using DOS 2.0, the disk must be reinitialized using the FDISK utility. Refer to the MSTM-DOS 2.0 REFERENCE GUIDE for complete instructions on how to use FDISK.

If none of the steps you have taken to this point have corrected the problem, contact the COMPAQ Technical Support Department for further technical assistance.

Removal and Replacement Procedures

Fixed Disk Adapter Board Assembly

WARNING

Before opening the unit's case to perform any removal, replacement, or maintenance procedures, disconnect the line cord from the ac outlet and set the ON/OFF switch to the OFF position. Otherwise, dangerous voltages may be present throughout the system.

STEP:

ACTION:

- 1 Place the computer on a level surface, such as a table or workbench with the handle assembly facing you (see Figure 10-2).

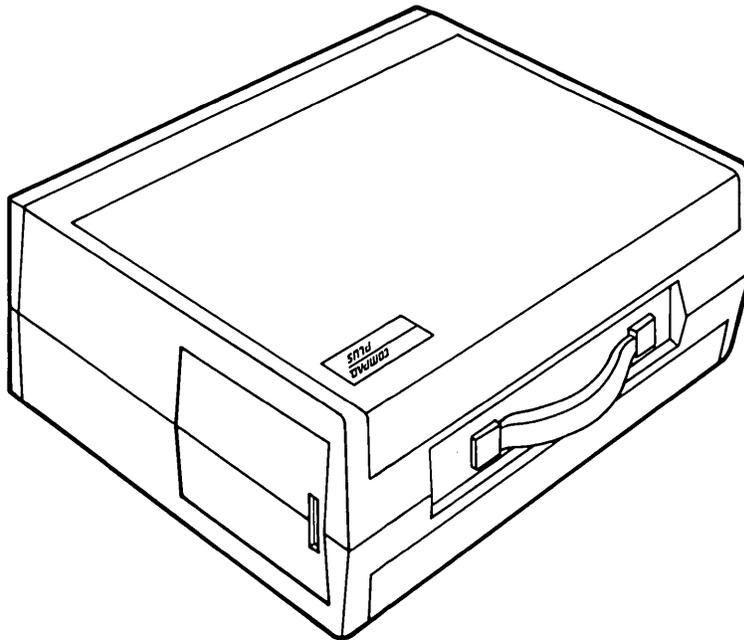


Figure 10-2. Computer On Work Surface.

2

Open the access cover by pressing down on the unit's plastic cover with your hand placed next to the COMPAQ name plate (see Figure 10-3). As pressure is applied, the plastic cover bulges at the connecting seam which runs directly above the handle. Partially insert a plastic card under the cover at the bulge and release the pressure. When the plastic cover bulges, reach under the cover and pull upward and outward, then slide the cover out.

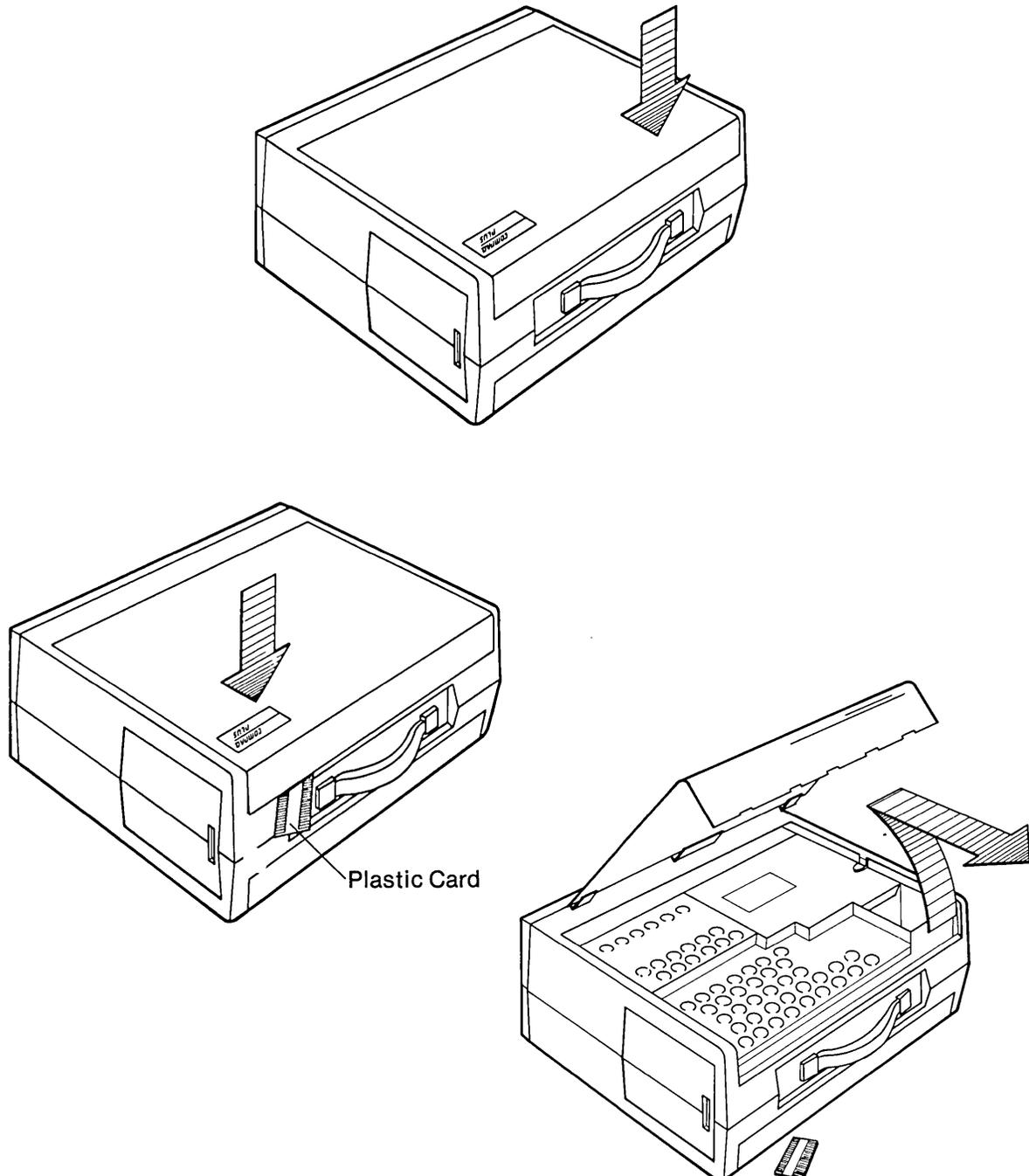
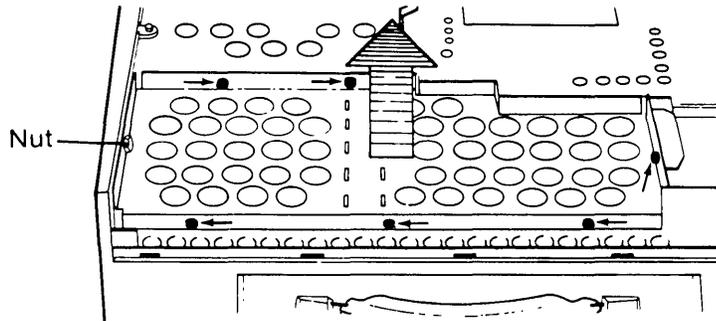


Figure 10-3. Removing Top Cover.

- 3 Loosen (DO NOT REMOVE) the six (6) Phillips screws and the one (1) ¼" nut that secure the card cage access plate (see Figure 10-4a). Remove the card cage access plate by lifting it up and away from chassis (see Figure 10-4b).



Removing Card Cage Access Plate

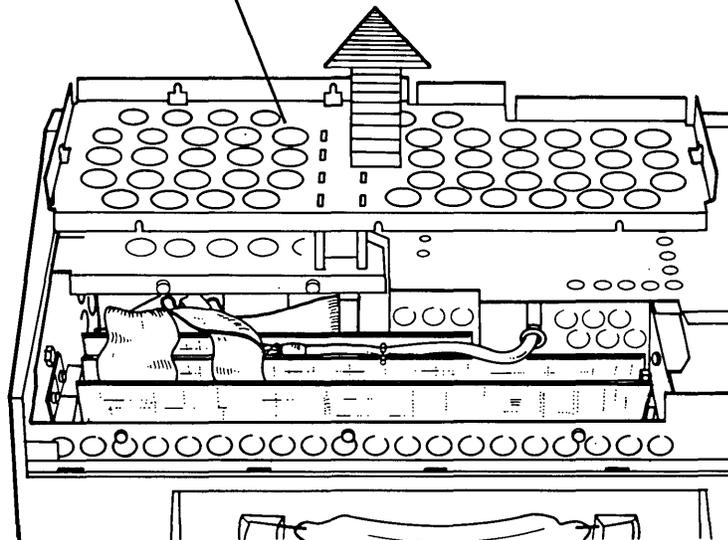


Figure 10-4. Card Cage Access Plate.

4

Carefully disconnect the two (2) flat-ribbon signal cables from the fixed disk adapter board (see Figure 10-5).

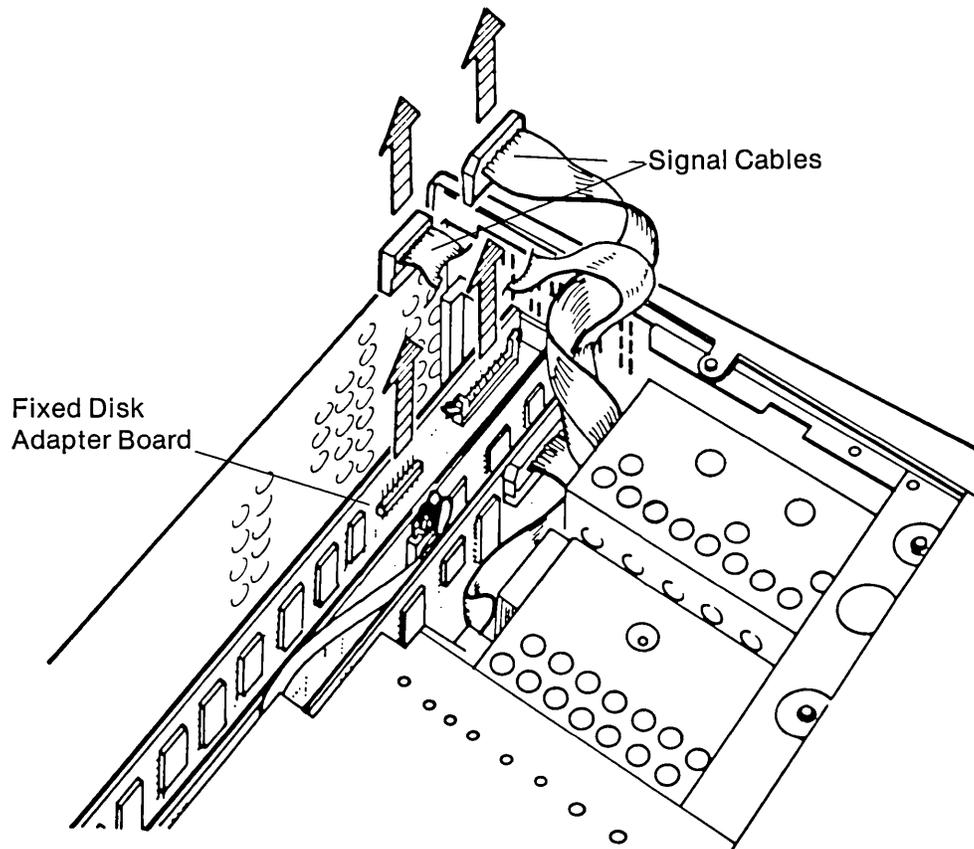


Figure 10-5. Disconnecting the Signal Cables From the Fixed Disk Adapter Board.

- 5 Remove the retaining screw that secures the fixed disk adapter board assembly to the system chassis (see Figure 10-6).

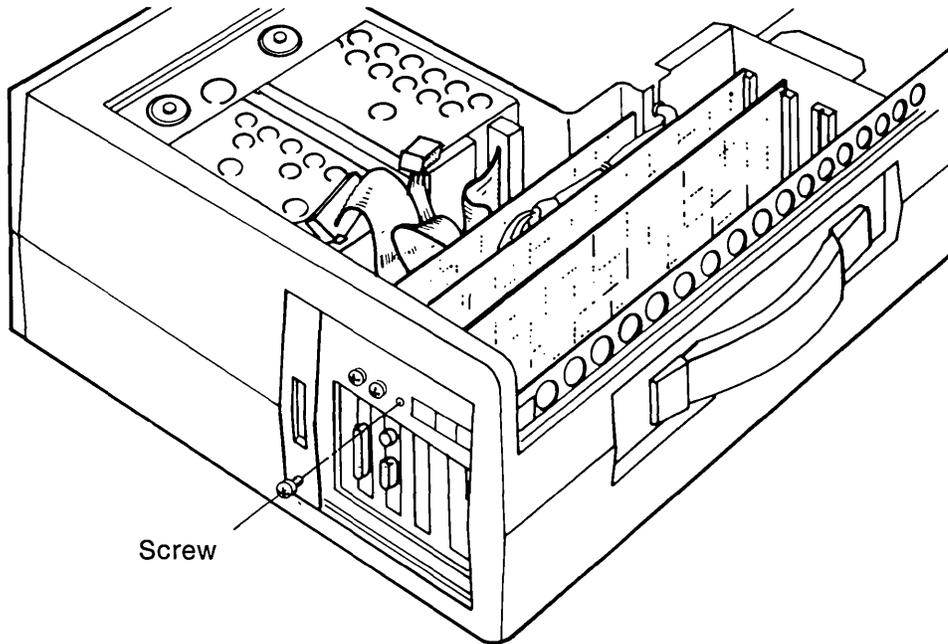


Figure 10-6. Removing the Screw Which Holds the Fixed Disk Adapter Board.

- 6 Gently remove the fixed disk adapter board assembly by pulling it away from the processor board (see Figure 10-7).

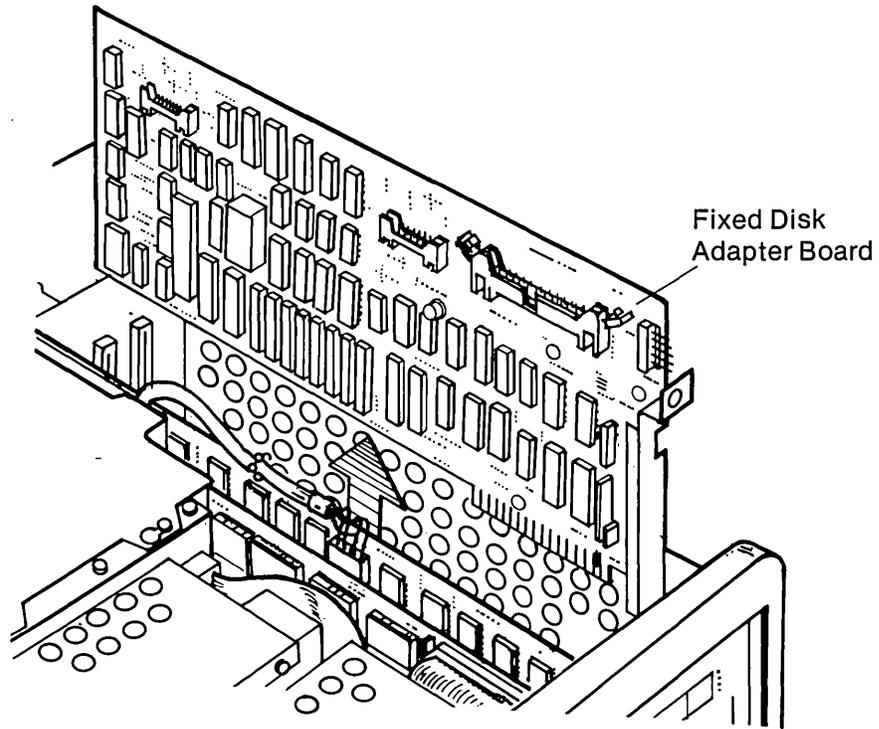


Figure 10-7. Removing the Fixed Disk Adapter Board.

To replace the fixed disk adapter board, reverse Steps 1 through 6.

Removal and Replacement Procedures

Fixed Disk Drive Assembly

WARNING

Before opening the unit's case to perform any removal, replacement, or maintenance procedures, disconnect the line cord from the ac outlet and set the ON/OFF switch to the OFF position. Otherwise, dangerous voltages may be present throughout the system.

CAUTION

Do not under any circumstances attempt to service the fixed disk drive assembly within the protective case. To do so will void all COMPAQ Computer warranties covering the drive.

- 1 Place the computer on a level surface, such as a table or workbench with the handle assembly facing you (see Figure 10-8).

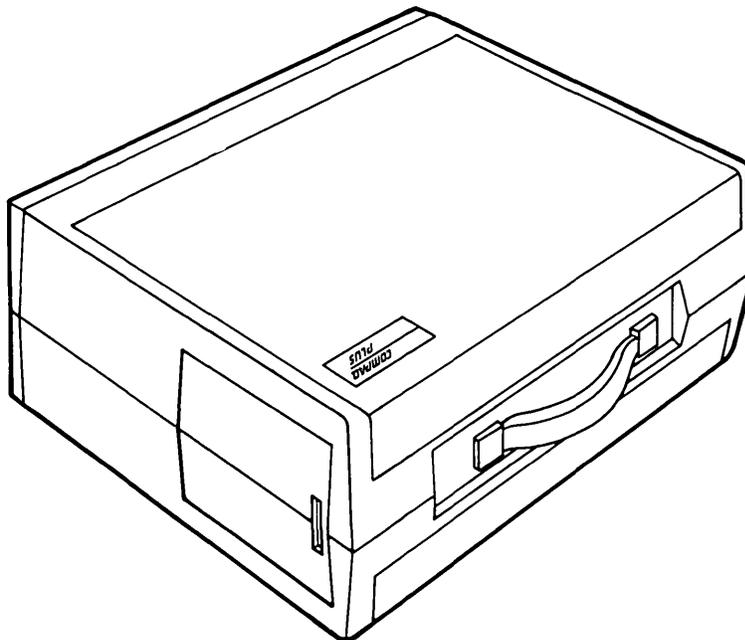


Figure 10-8. Computer On Work Surface.

2

Open the access cover by pressing down on the plastic cover of the unit with one hand placed next to the COMPAQ name plate (see Figure 10-9). As pressure is applied, the plastic cover bulges at the connecting seam which runs directly above the handle. Partially insert a plastic card under the cover at the bulge and release the pressure. When the plastic cover bulges reach under the cover and pull upward and outward, then slide the cover out.

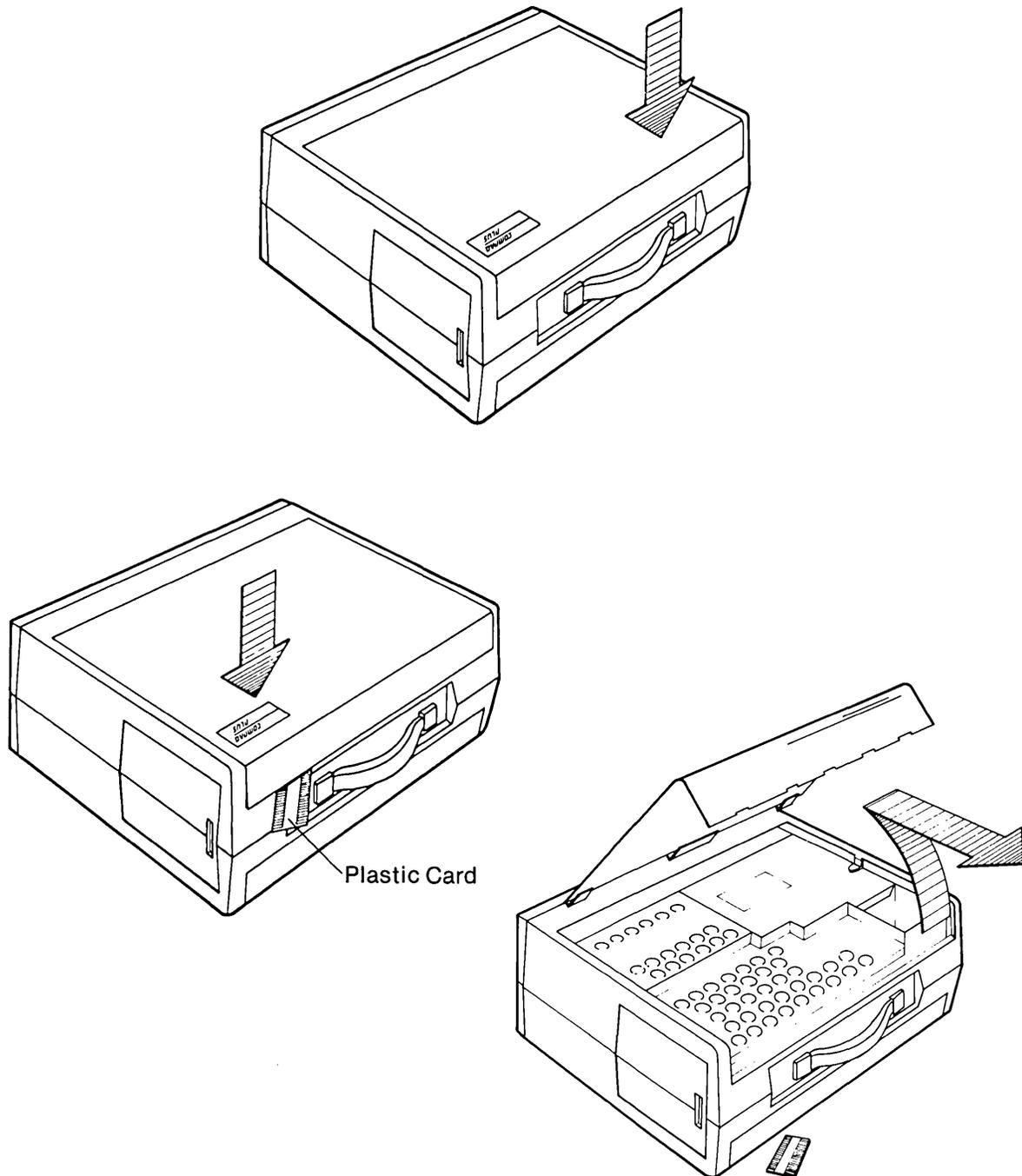
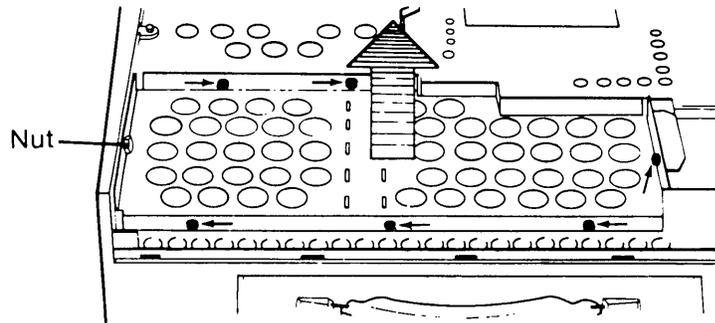


Figure 10-9. Removing Top Cover.

- 3 Loosen (DO NOT REMOVE) the six (6) Phillips screws and the one (1) $\frac{1}{4}$ " nut that secures the card cage access plate (see Figure 10-10a). Remove the card cage access plate by lifting it up and away from the chassis (see Figure 10-10b).



Removing Card Cage Access Plate

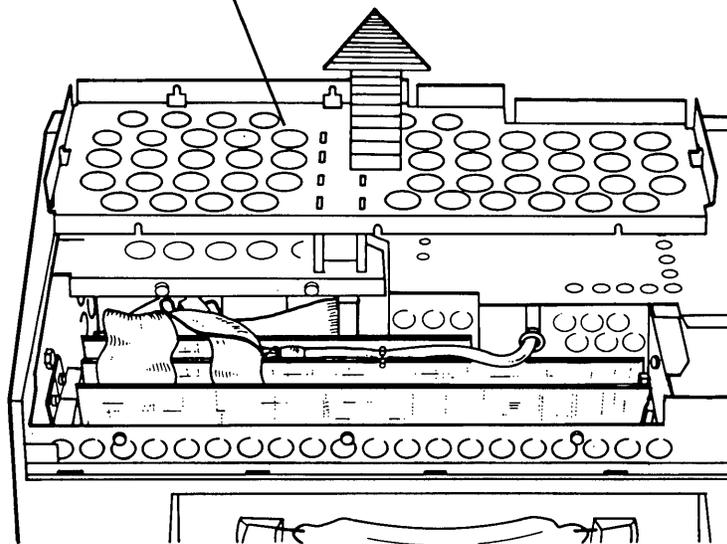


Figure 10-10. Card Cage Access Plate.

- 4 Disconnect the two (2) fixed disk drive controller cables from the fixed disk adapter board by pressing on the finger tabs located on either side of the connectors (see Figure 10-11).

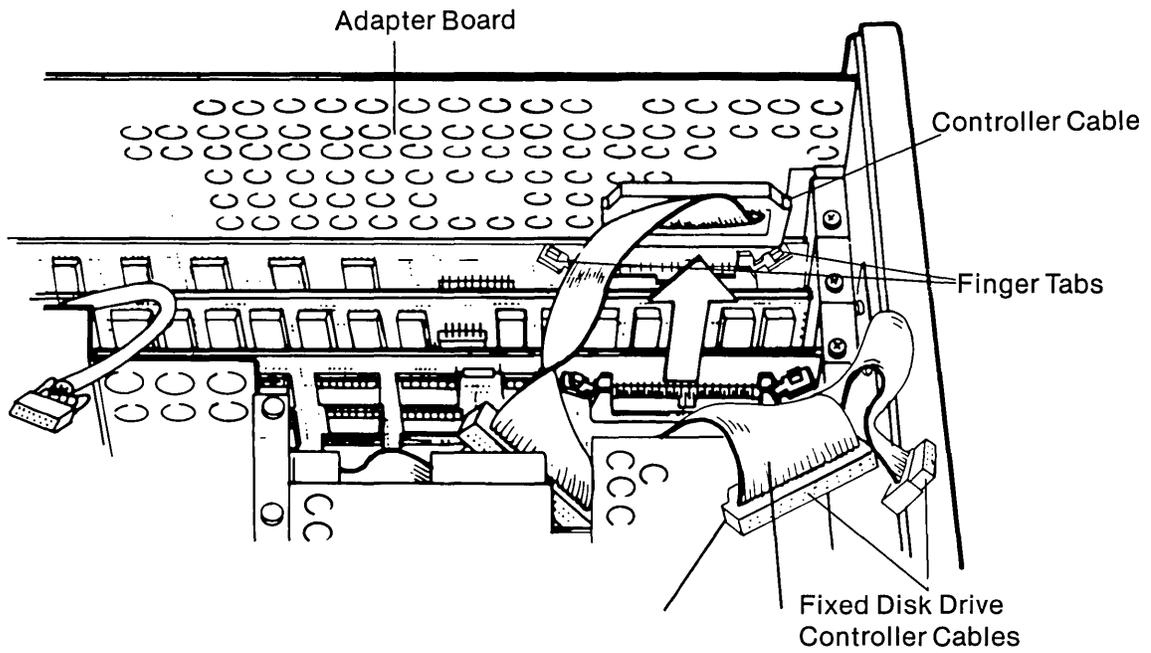


Figure 10-11. Disconnecting the Signal Cables From the Fixed Disk Adapter Board.

5

Disconnect the VDU cable from the VDU adapter board (see Figure 10-12).

If the tie wrap securing the VDU cable is not “beaded”, it should be carefully cut.

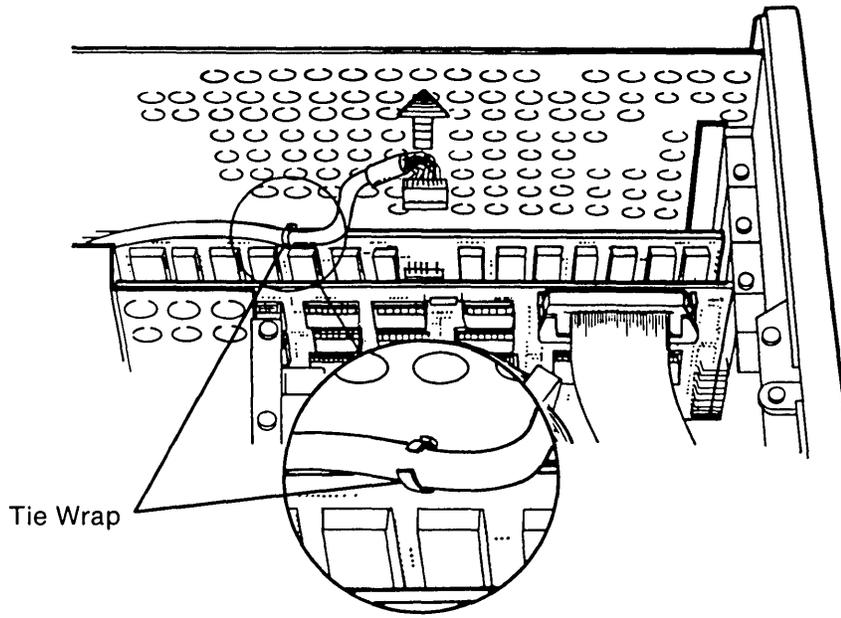


Figure 10-12. Disconnecting the VDU Cable From the VDU Adapter Board.

- 6 Disconnect the floppy disk drive controller cable from the floppy/printer adapter board by pressing on the finger tabs located on either side of the connectors (see Figure 10-13).

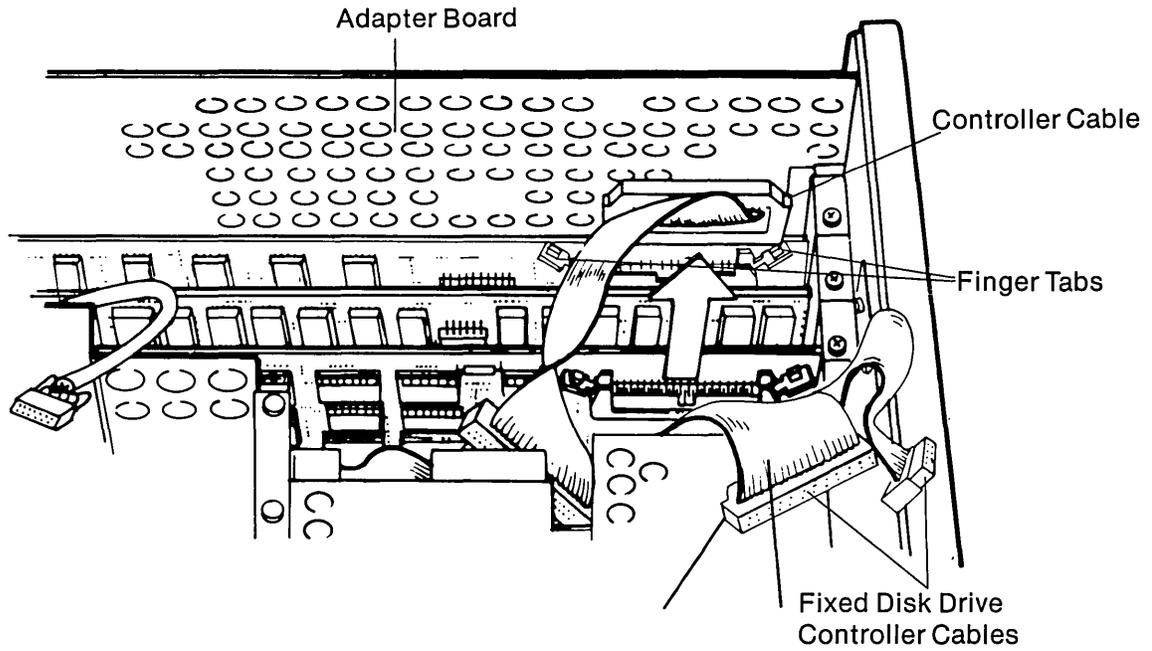


Figure 10-13. Disconnecting the Signal Cable From the Floppy/Printer Adapter Board.

- 7 Remove the retaining screws that secure the fixed disk, floppy/printer and the VDU adapter boards to the system chassis (see Figure 10-14).

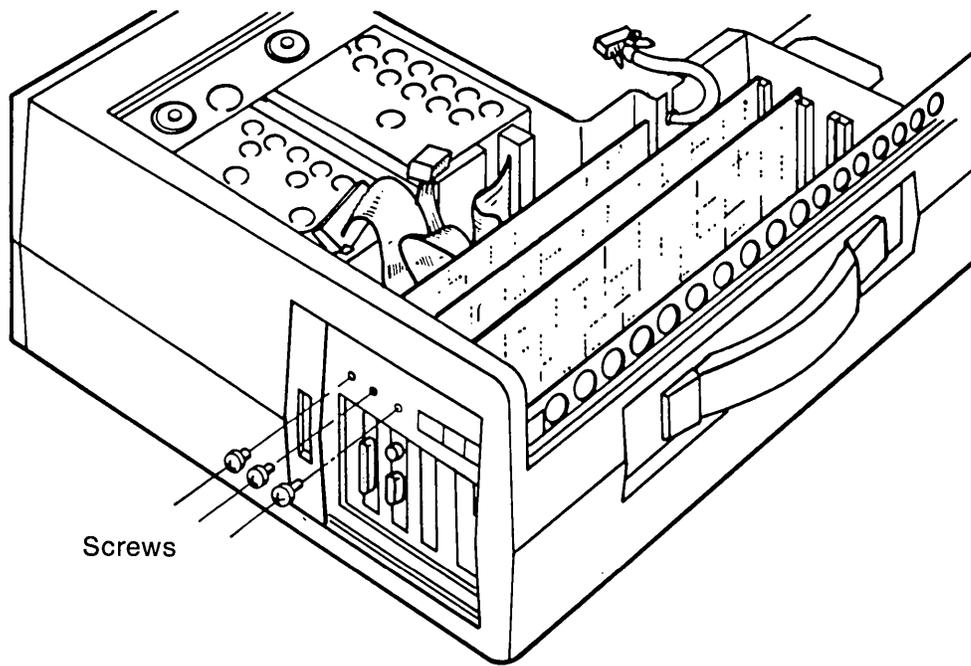


Figure 10-14. Removing the Screws Which Hold the Fixed Disk Adapter Board.

- 8 Gently remove the adapter boards by pulling them away from the processor board (see Figure 10-15).

Similarly, remove any other adapter boards which may occupy any additional expansion slots in the processor board.

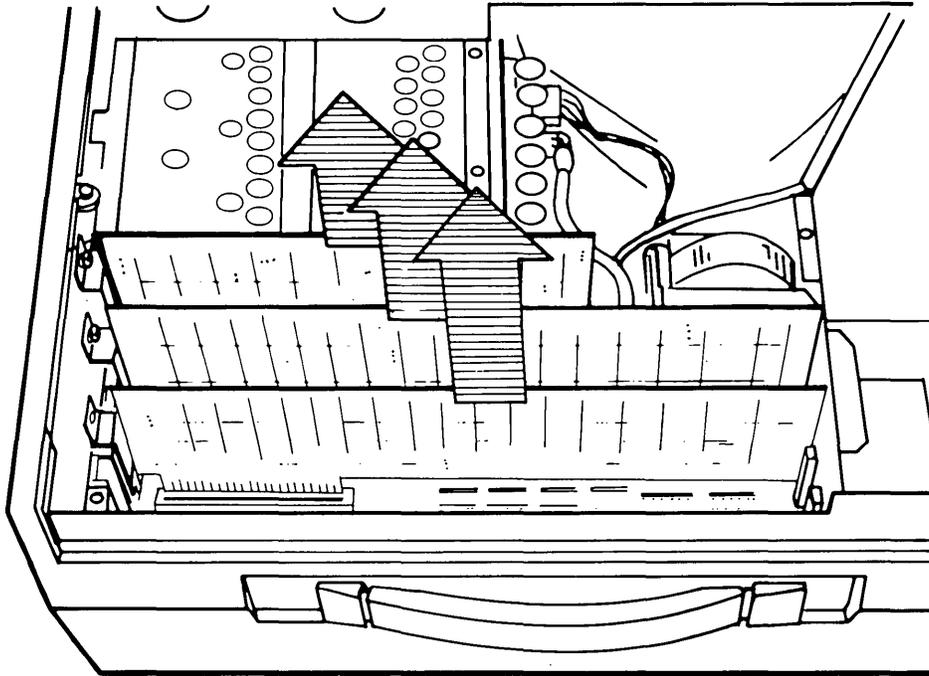


Figure 10-15. Removing the Fixed Disk, Floppy/Printer and the VDU Adapter Boards.

9

Loosen (DO NOT REMOVE) the five (5) screws that secure the disk drive access plate. Remove both the fixed disk drive's top rear mounting screw and the floppy disk drive's top rear mounting screw (see Figure 10-16a). Slide the metal access plate toward the rear of the computer and lift it off (see Figure 10-16b).

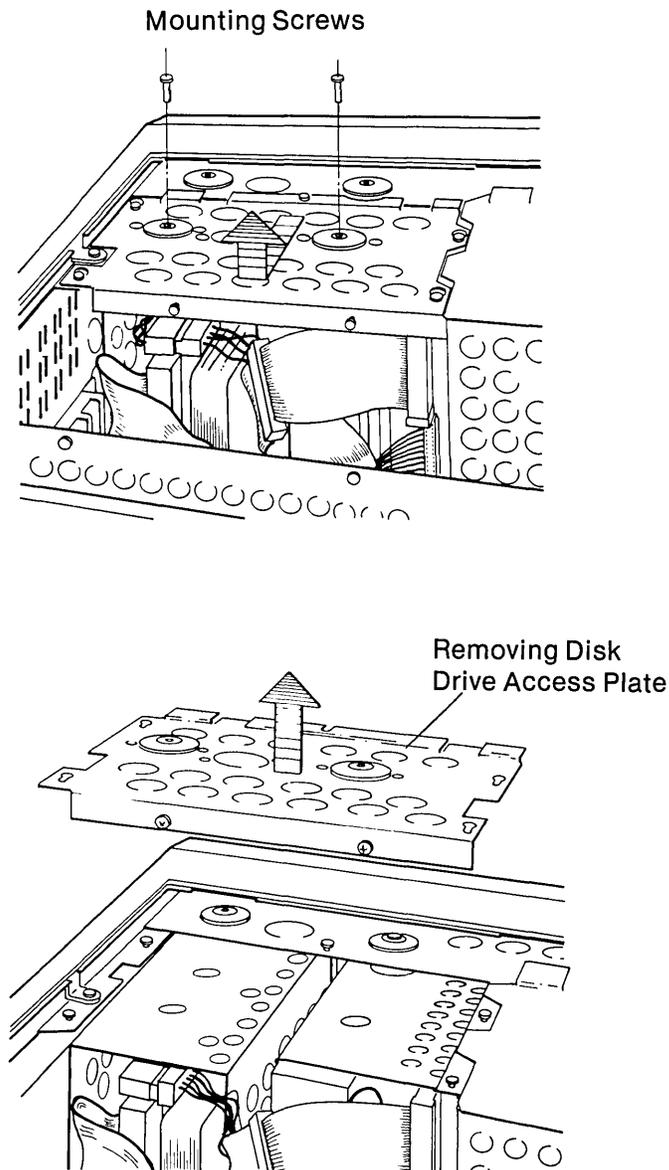


Figure 10-16. Removing the Screws Which Holds the Fixed Disk Drive.

10

Disconnect the two (2) signal cables and the power cable from the fixed disk drive (see Figure 10-17 a & b).

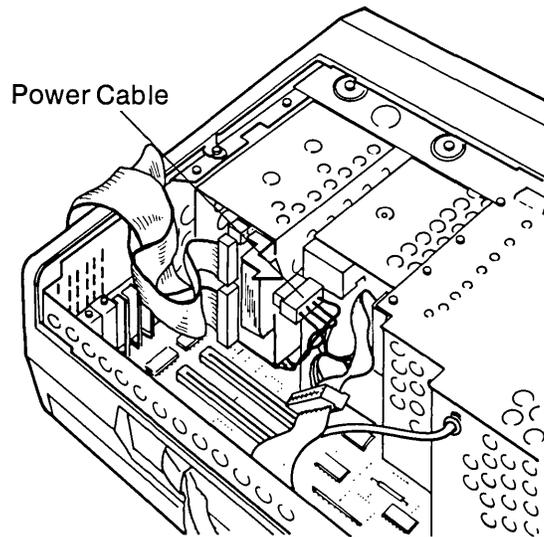
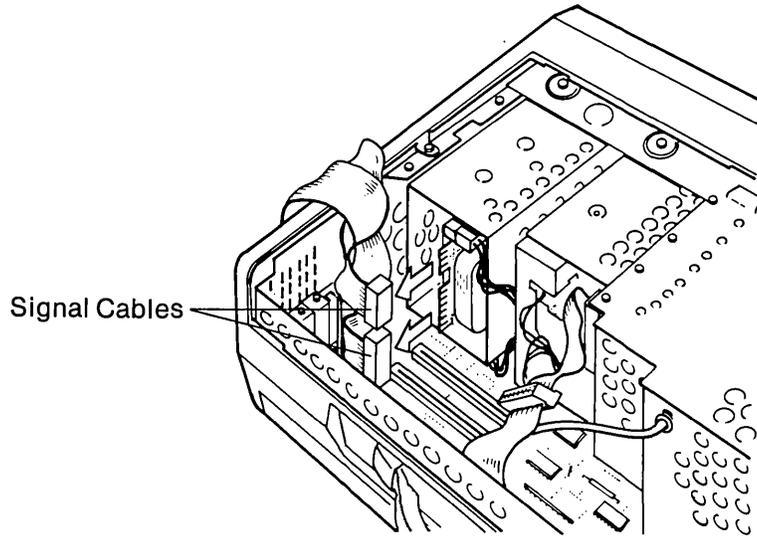


Figure 10-17. Disconnecting the Signal Cable and the Power Cable from the Fixed Disk Drive.

- 11 Turn the computer over so that the base of the system is facing upward. Remove the bottom plastic access cover to expose the base of the system chassis using the same procedure outlined in STEP 2.
- 12 Place the computer so that the screen is facing down towards the workbench. Remove the bottom mounting screws and the remaining top mounting screw from the defective fixed disk drive (see Figure 10-18).

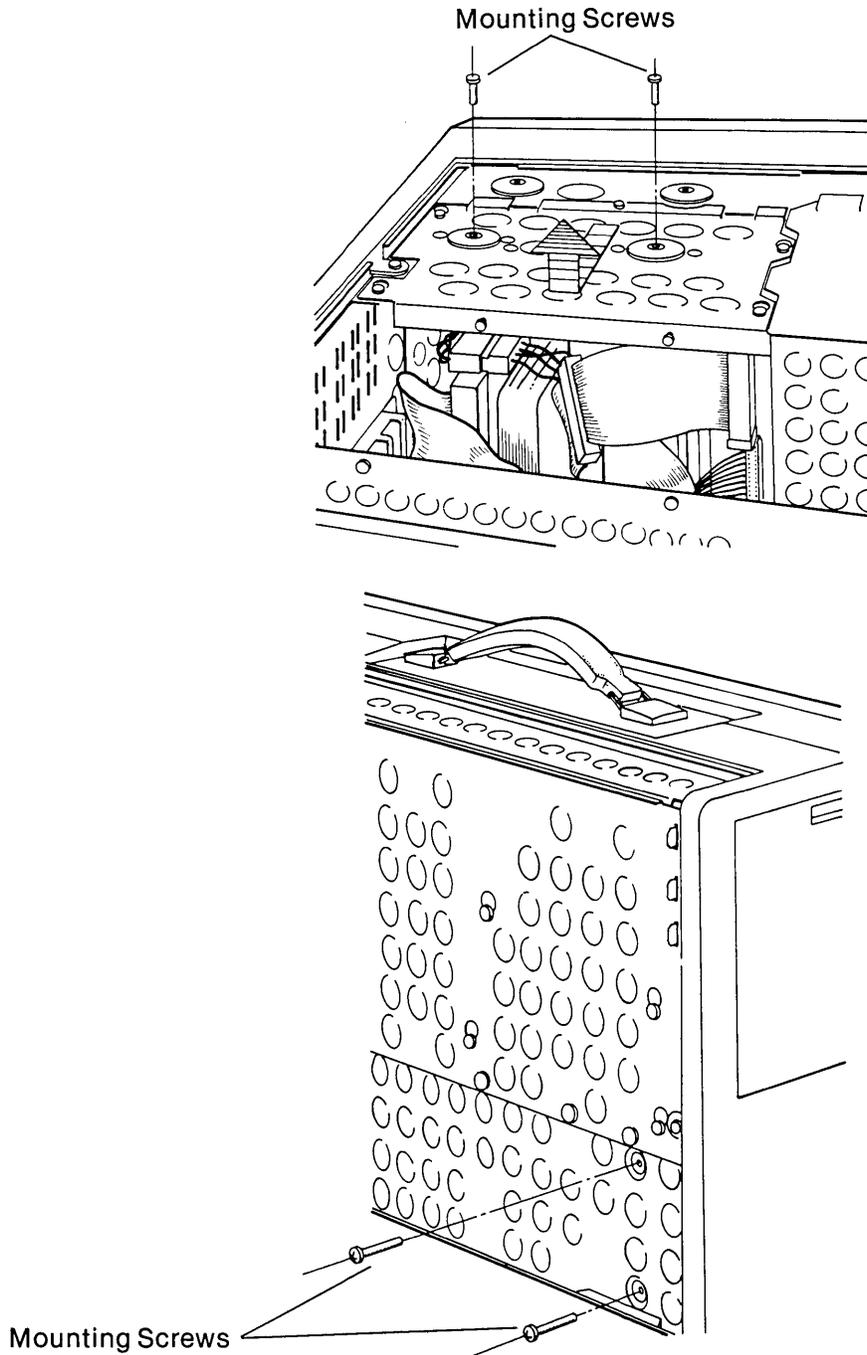


Figure 10-18. Removing Bottom and Top Mounting Screws from Fixed Disk Drive.

13

Carefully slide the fixed disk drive up and out of the computer chassis and place it away from your working area (see Figure 10-19).

*****CAUTION*****

Be extremely careful not to break the fixed disk drive to the system chassis ground strap when removing the drive.

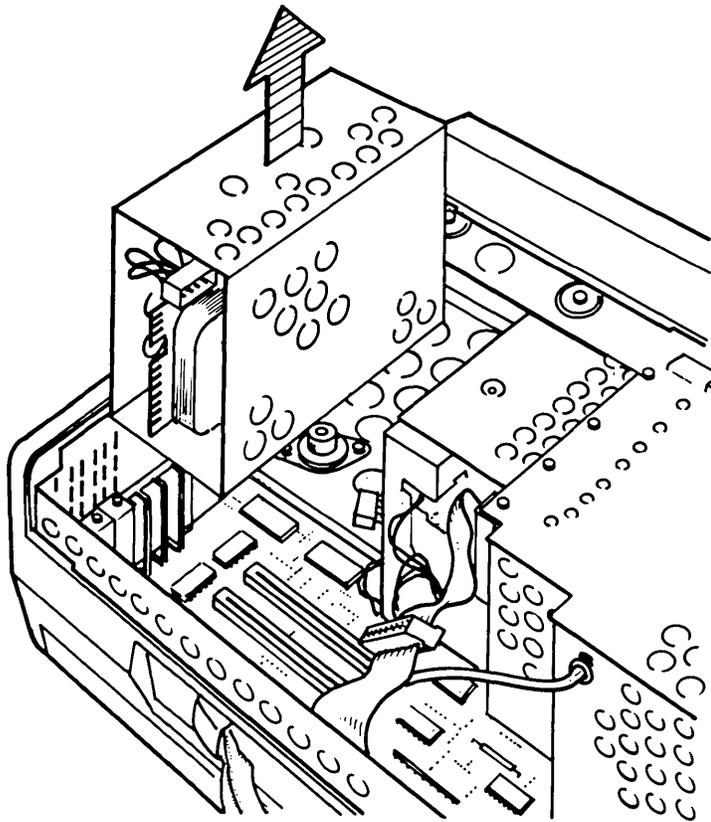


Figure 10-19. Removing the Fixed Disk Drive.

To replace the fixed disk drive, reverse Steps 1 through 13.

OPTION GUIDE

ASYNCHRONOUS COMMUNICATIONS CARD

Introduction

Although the COMPAQ Portable Computer or COMPAQ PLUS Portable Computer is designed for easy access to upgradable areas, it is strongly recommended that only Authorized COMPAQ Computer Service Representatives perform any upgrades. An Authorized COMPAQ Computer Representative has received factory training in performing upgrades, and will ensure the accurate installation of the option.

This guide describes how to install the asynchronous communications card in your COMPAQ Portable or COMPAQ PLUS Portable Computers. The asynchronous communications card allows your COMPAQ Computer to communicate with a variety of devices, such as printers, terminals, and other computers that are RS-232-compatible. It can be programmed through the COMPAQ Computer for data transmission rates from 50 to 9600.

Your COMPAQ Portable or COMPAQ PLUS Portable Computers can have two asynchronous communications cards. If two cards are used, be sure to note the jumper changes described in this guide.

Using the MODE Command, the COMPAQ asynchronous communications card can be used for a serial printer output. This is described in the **DISK OPERATING SYSTEM REFERENCE GUIDE**.

The asynchronous communications card can be used with other communications software packages available from your Authorized Dealer.

Tool Requirements

1. Plastic card.
2. Flat-bladed screwdriver.
3. Small (#1) Phillips screwdriver or $\frac{3}{16}$ " nut driver.
4. Open end wrench, $\frac{1}{4}$ ".

Initial Steps

WARNING

Before removing the COMPAQ Computer's case, set the ON/OFF switch to the OFF position and disconnect the power cord from the computer (see Figure 11-1).

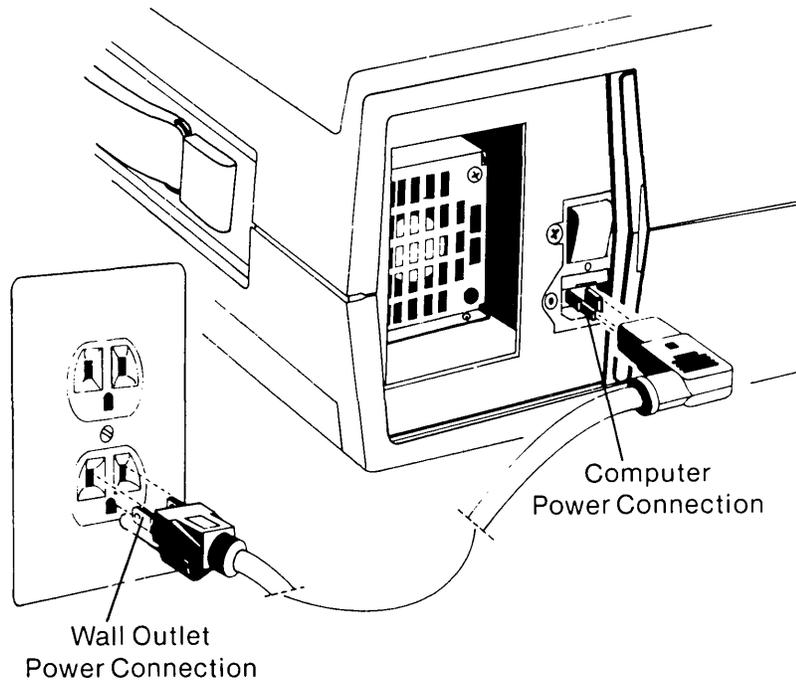


Figure 11-1. Disconnecting the Power Cord From the Computer.

Failure to disconnect the computer from all ac voltage sources can cause dangerous voltages to be present in the power supply and CRT. Even when the ON/OFF switch is set to OFF, any electrically conductive material in this area can cause a severe electrical shock.

1. Turn off the power to any external options (monitors, printers, and so on).
2. Set the computer's ON/OFF switch to the OFF position.
3. Unplug the computer and any options from their power sources (previously shown in Figure 11-1).
4. Disconnect any external option cables attached to the computer.

NOTE: The components which you removed during the installation procedure are very fragile; therefore, you must be extremely careful when replacing these components. Also remember, printed circuit boards (PCBs) must be protected from electrostatic discharge. Failure to protect these boards can result in degradation or failure.

Installation Steps

1. Open the access cover by pressing down on the unit's plastic cover with your hand placed next to the COMPAQ name plate (see Figure 11-2). As pressure is applied, the plastic cover bulges at the connecting seam which runs directly above the handle. Partially insert a plastic card under the cover at the bulge and release the pressure. When the plastic cover bulges, reach under the cover and pull upward and outward, then slide the cover out.

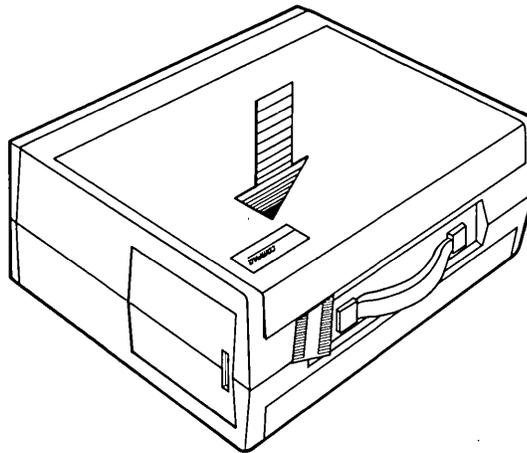
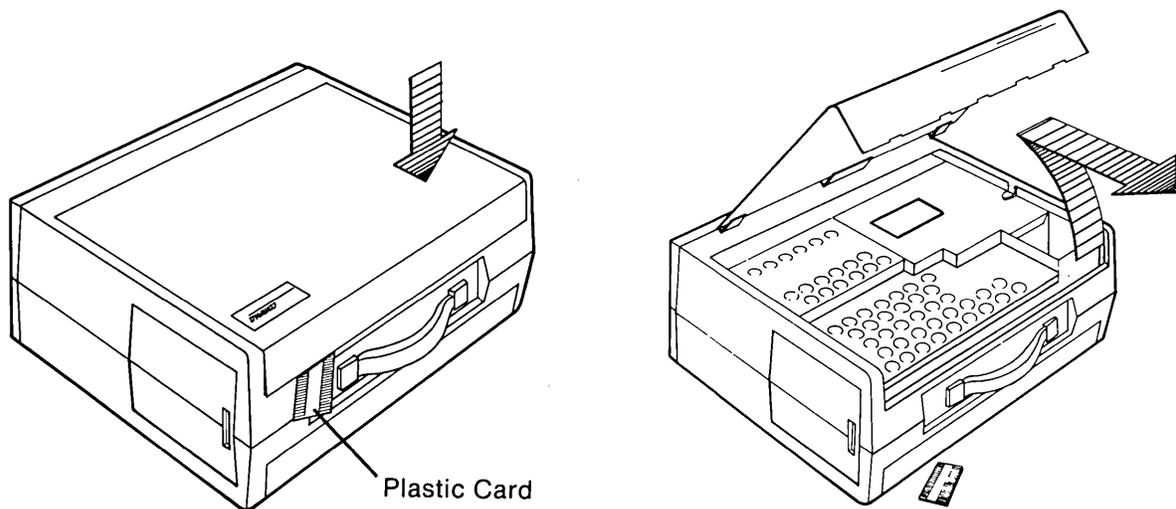


Figure 11-2. Removing Top Cover.



(Part 2 of 3)

(Part 3 of 3)

*****WARNING*****

Do not remove the panel which covers both the power supply and the CRT (see Figure 11-3). There are no user-serviceable parts in this area or options to be added. The CRT is fragile and should be handled only by an Authorized COMPAQ Computer Service Representative.

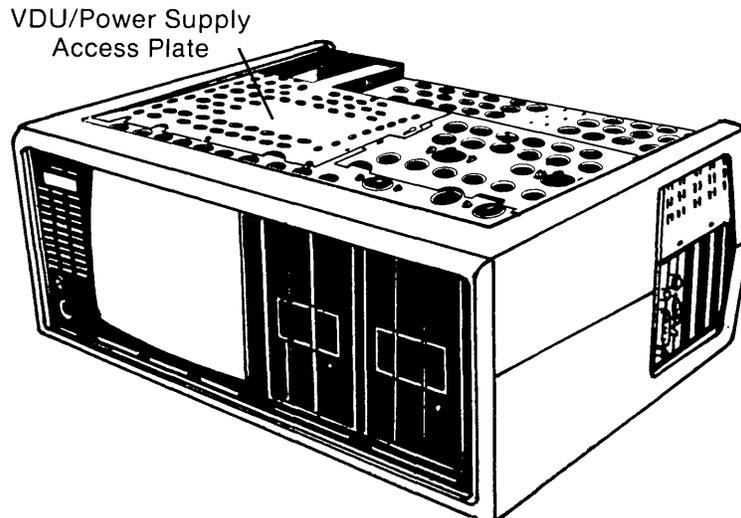


Figure 11-3. Do Not Remove the Panel Cover Which Covers the Power Supply and CRT.

2. Loosen (DO NOT REMOVE) the three screws on the back of the PCB compartment cover (see Figure 11-4).
3. Loosen (DO NOT REMOVE) the three screws and one nut on the top edge. Lift the cover off (refer to Figure 11-4).

NOTE: Since the cover is slotted, it is not necessary to remove the screws.

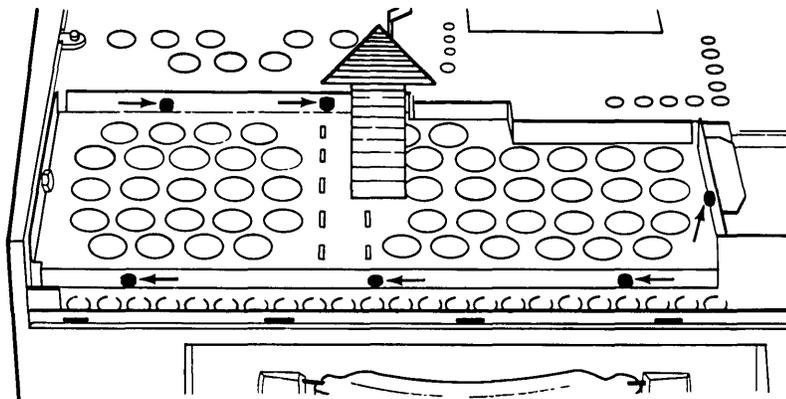


Figure 11-4. Removing the Cover of the PCB Compartment.

4. You can place the option board in any of the three vacant card slots. Remove one of the metal option slot covers in the position where the asynchronous communications card will be installed. Remove the screw at the top of the cover and lift it out, as shown in Figure 11-5.

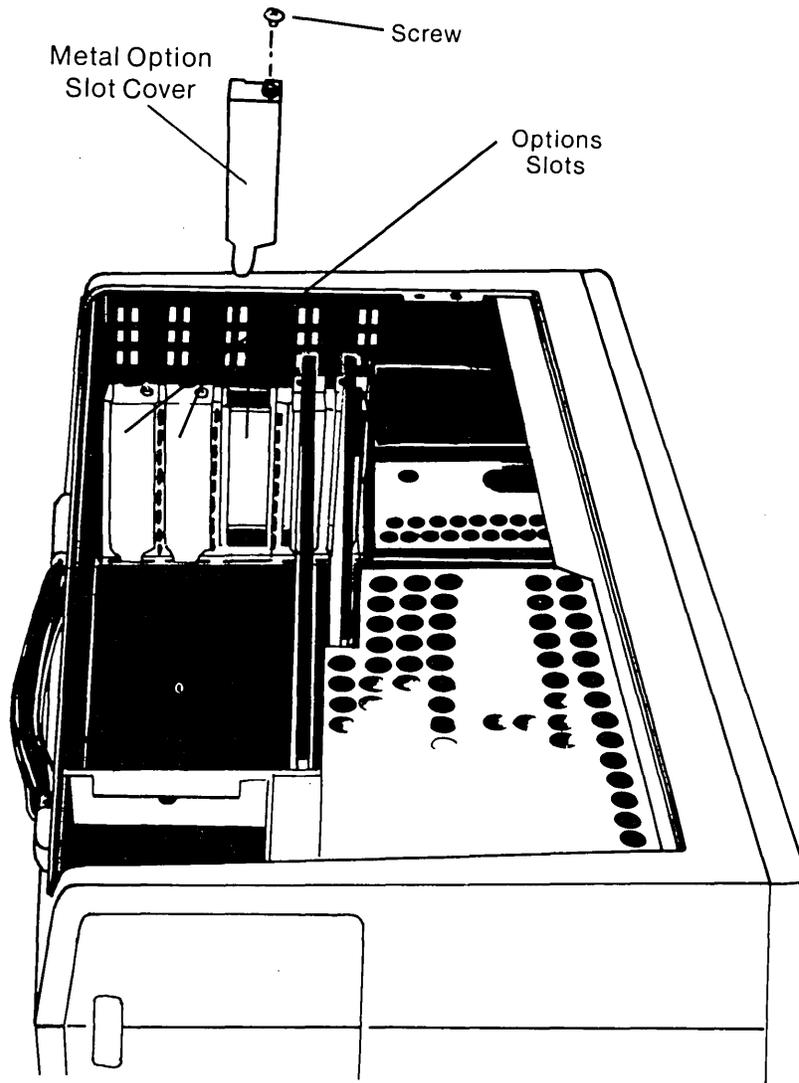


Figure 11-5. Metal Option Slot Cover.

5. Set aside the screw because you will need it later. Store the metal option slot cover in case you remove the option at a later date. The board may be placed in any vacant card slot.

Your COMPAQ Portable Computer or COMPAQ PLUS Portable Computer can use one or two asynchronous communications cards. If one communications card is installed, the jumper connector must be in the COM1 position (jumper plug between J702 pins 2 and 3).

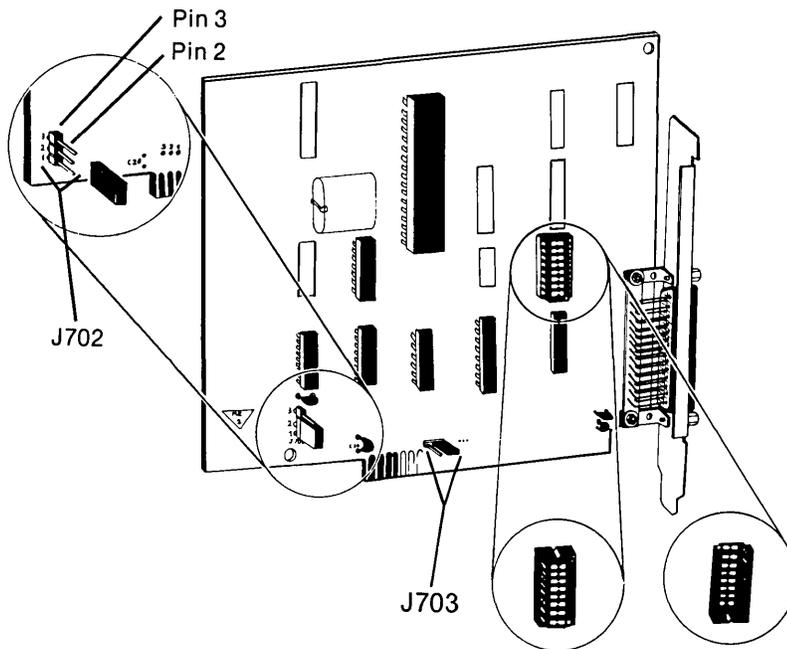


Figure 11-6. Asynchronous Communications Card Jumper Connectors.

If a second communications card is installed, move its jumper connector to the COM2 position (J702 Pin 1 and 2). Leave the first board's connector in the COM1 position.

NOTE: Interrupt levels are jumper-selectable. If the interrupts need to be changed, set the jumper connector shown in Figure 10-9. Normally, INT 4 (jumper between J703, between pins 1 and 2) is used with COM1, and INT 3 (jumper between J703, pins 2 and 3) is used with COM2.

6. Your card has both RS-232 and current-loop interfaces. For RS-232 operation, place the shunt module in location U11 with the dot up (see Figure 10-8). For (20-ma) current-loop operation, switch the module in the socket so that the locator dot is down (toward bottom edge connector).
7. Install the asynchronous communications card. Slide it into place with the connector panel in the position where the blank option panel was removed, then line the card up with the socket and press down until it clicks into place. Reinstall the bracket screw that you previously set aside.
8. Reinstall any option, VDU, and floppy/printer boards removed earlier. Carefully set the boards in their sockets until they click firmly into place. Reattach the connectors to the floppy/printer, VDU, and option boards and reinstall all bracket screws.
9. Replace the metal cover over the PCB compartment and tighten all six screws and one nut.
10. Replace the plastic access cover.

Interface Information

The following illustration shows the access to the communications card. The 25-pin EIA connector pin assignments are provided on page 11-7.

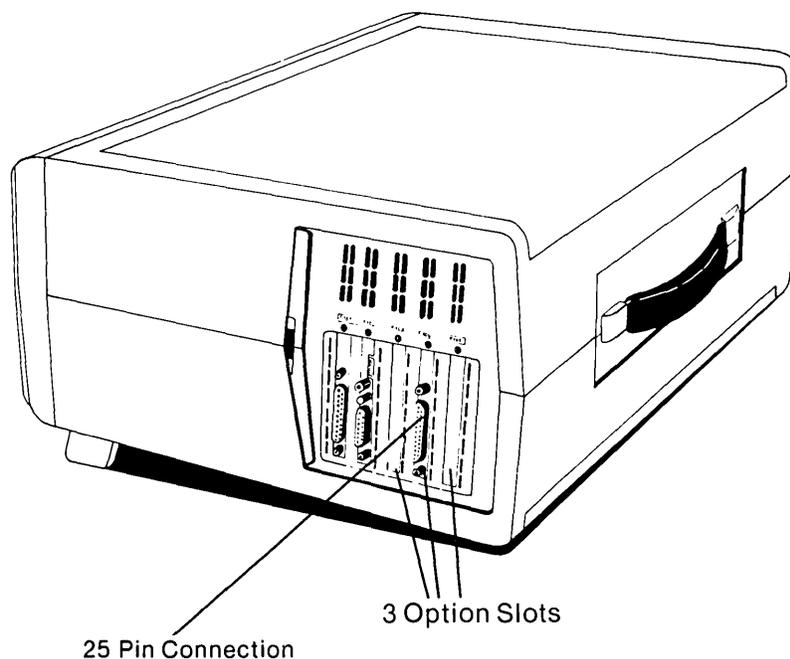


Figure 11-7. 25-pin Communications Adapter Installed in One of the Three Option Slots.

Signal Name and Description:	Pin:
Protective Ground	1
Transmit Data (EIA)	2
Receive Data (EIA)	3
Request to send (EIA)	4
Clear to send (EIA)	5
Data set ready (EIA)	6
Signal ground	7
Carrier detect (EIA)	8
+ Transmit current loop data (20 ma)	9
No Connection	10
- Transmit current loop return (20 ma)	11
(See Note)	12
No Connection	13
No Connection	14
No Connection	15
No Connection	16
No Connection	17
+ Receive current loop data (20 ma)	18
No Connection	19
Data Terminal Ready	20
No Connection	21
Ring Indicate	22
No Connection	23
No Connection	24
- Receive current loop return (20 ma)	25

NOTE: Pin 12 is reserved for future EIA level input. Do not apply voltage to 12 over normal EIA levels.

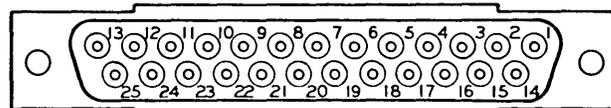


Figure 11-8. 25 pin Connection.

OPTION GUIDE

320-KBYTE DISK DRIVE

Introduction

Although the COMPAQ Portable Computer or COMPAQ PLUS Portable Computer is designed for easy access to upgradable areas, it is strongly recommended that only Authorized COMPAQ Computer Service Representatives perform any upgrades. An Authorized COMPAQ Computer Representative has received factory training in performing upgrades, and will ensure the accurate installation of the option.

This guide provides the step-by-step procedure to install the COMPAQ Portable or COMPAQ PLUS Portable Computers optional 320-Kbyte floppy disk drive.

No additional printed circuit board (PCB) or cable is required to add the optional 320-Kbyte floppy disk drive.

When you add the optional 320-Kbyte floppy disk drive, the switch settings on the processor board must be changed. This procedure is described in this booklet.

Tool Requirements

1. Plastic card.
2. Small, flat-bladed screwdriver.
3. Small (#1) Phillips screwdriver or $\frac{3}{16}$ " nut driver.
4. Medium (#2) Phillips screwdriver.
5. A $\frac{1}{4}$ " hex nutdriver.
6. Cable tie wraps.
7. Needle-nose pliers.
8. Side cutters.

Initial Steps

WARNING

Before you remove the case from the COMPAQ Computer, set the ON/OFF switch to the OFF position and disconnect the power cord from the computer (see Figure 11-9).

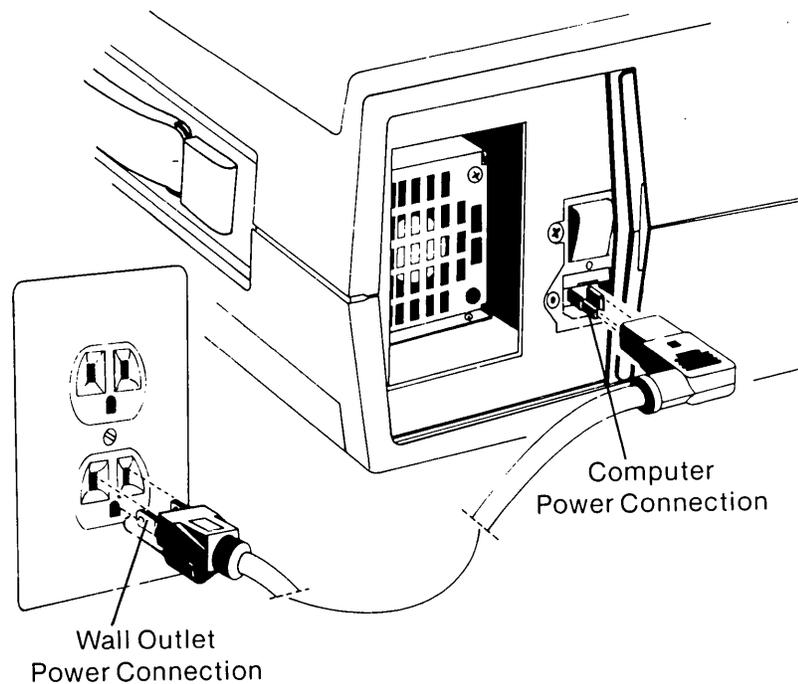


Figure 11-9. Disconnecting the Power Cord From the Computer.

Failure to disconnect the computer from all ac voltage sources can cause dangerous voltages to be present in the power supply and CRT. Even when the ON/OFF switch is set to the OFF position, any electrically conductive material in this area can cause a severe electrical shock.

1. Set the computer's ON/OFF switch to the OFF position.
2. Turn off the power to any external options (monitors, printers, and so on).
3. Unplug the computer and any options from their power sources (previously shown in Figure 11-9).
4. Disconnect any external options attached to the computer (see Figure 11-10).

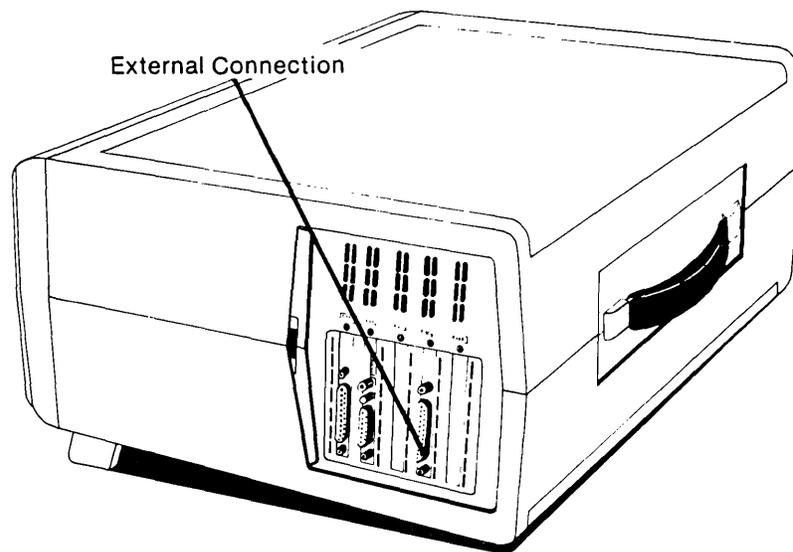


Figure 11-10. Connections for External Options.

NOTE: The components which you removed during the installation procedure are very fragile; therefore, you must be extremely careful when replacing these components. Also remember, printed circuit boards (PCBs) must be protected from electrostatic discharge. Failure to protect these boards can result in degradation or failure.

Installation Steps

1. Open the access cover by pressing down on the unit's plastic cover with your hand placed next to the COMPAQ name plate (see Figure 11-11). As pressure is applied, the plastic cover bulges at the connecting seam which runs directly above the handle. Partially insert a plastic card under the cover at the bulge and release the pressure. When the plastic cover bulges, reach under the cover and pull upward and outward, then slide the cover out.

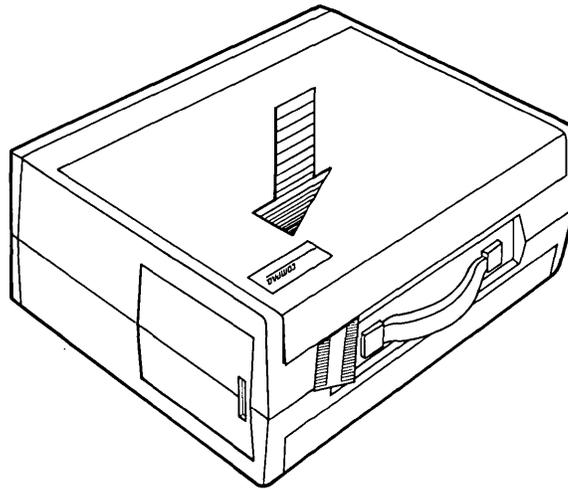
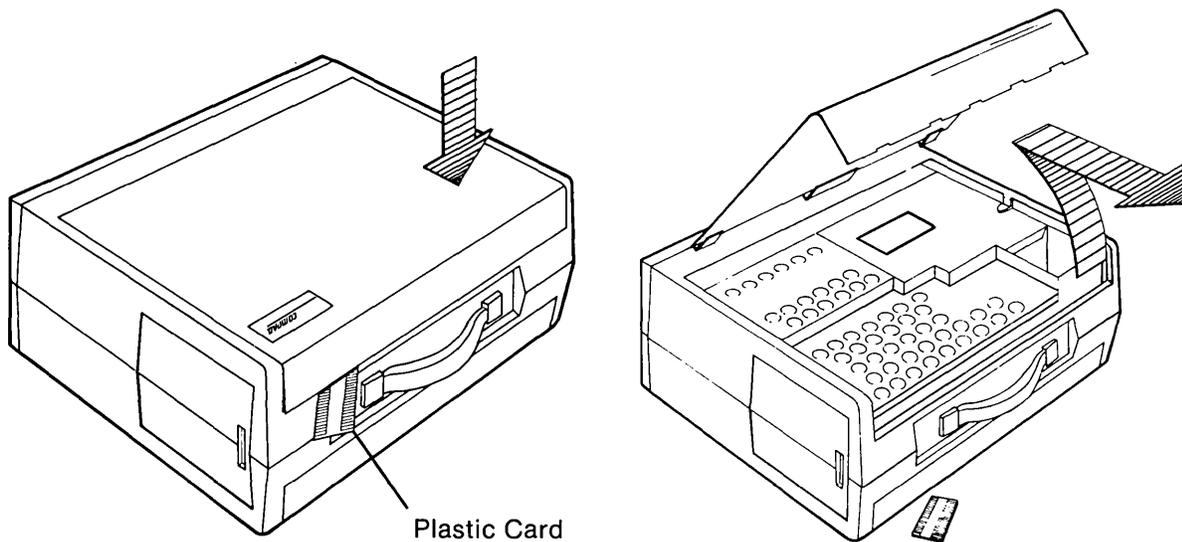


Figure 11-11. Removing Top Cover. (Part 1 of 3)



(Part 2 of 3)

(Part 3 of 3)

*****WARNING*****

Do not remove the panel which covers the power supply and the CRT (see Figure 11-12). There are no user-serviceable parts or options to be added in this area. The CRT is fragile and should be handled only by an Authorized COMPAQ Computer Service Representative.

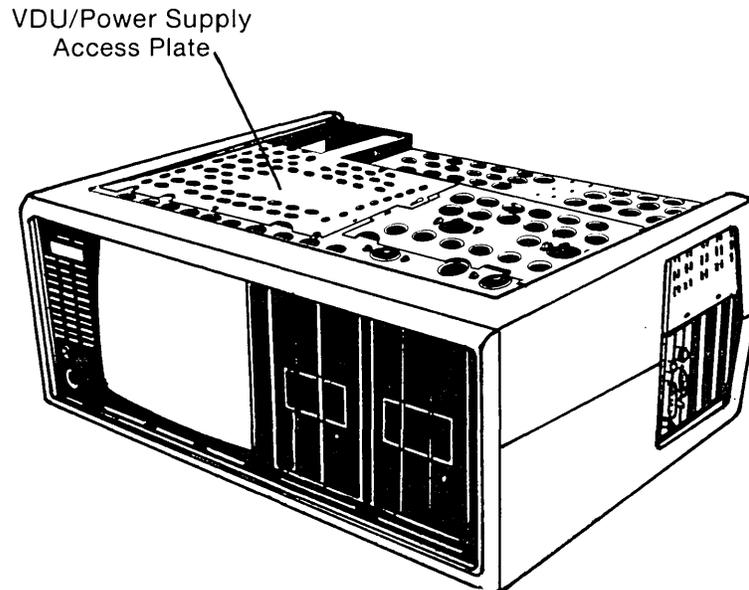


Figure 11-12. Do Not Remove the Panel Cover Which Covers the Power Supply and CRT.

2. Loosen (DO NOT REMOVE) the three screws on the back of the PCB compartment cover.

NOTE: Since the cover is slotted, it is not necessary to remove the screws.

3. Loosen (DO NOT REMOVE) the three screws and one nut on the top edge. Lift the cover off (see Figure 11-13).

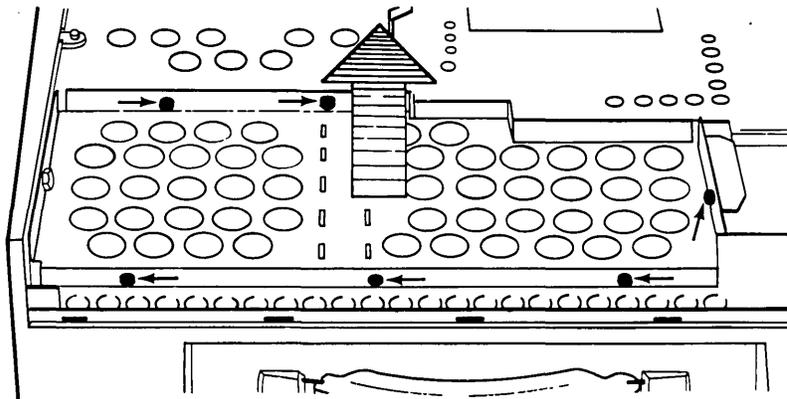


Figure 11-13. Removing the Cover of the PCB Compartment.

4. There are two standard boards: the VDU board and the floppy/printer board. There are three additional slots for optional PCBs. Be sure to disconnect any external connectors from the boards. Remove the PCBs from their slots by performing these steps.

To remove the VDU adapter board, cut the tie wrap at the board (see Figure 11-14) and disconnect the CRT/VDU cable by pulling on the connector.

NOTE: Do not pull on the cable because to do so may damage the cable.

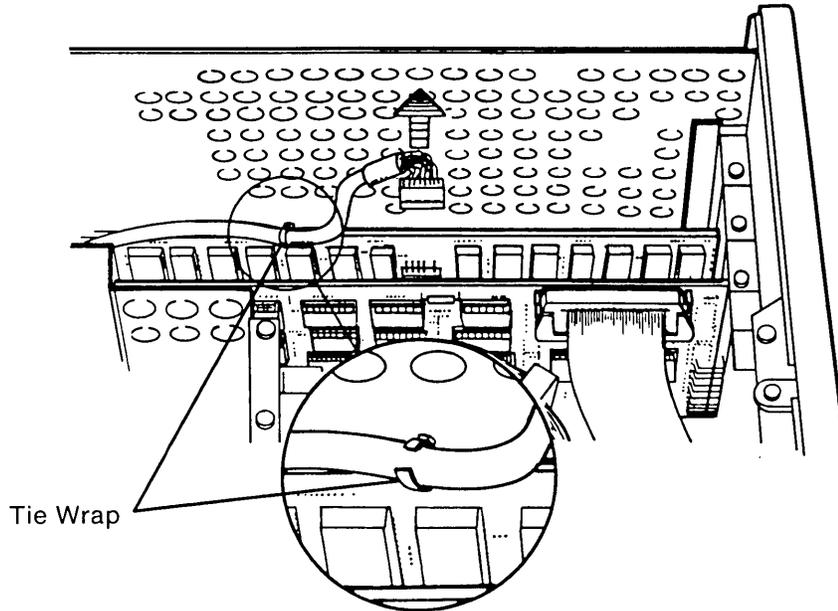


Figure 11-14. Cutting the Tie Wrap.

Now, remove the bracket screw, then carefully pull upward (see Figure 11-15).

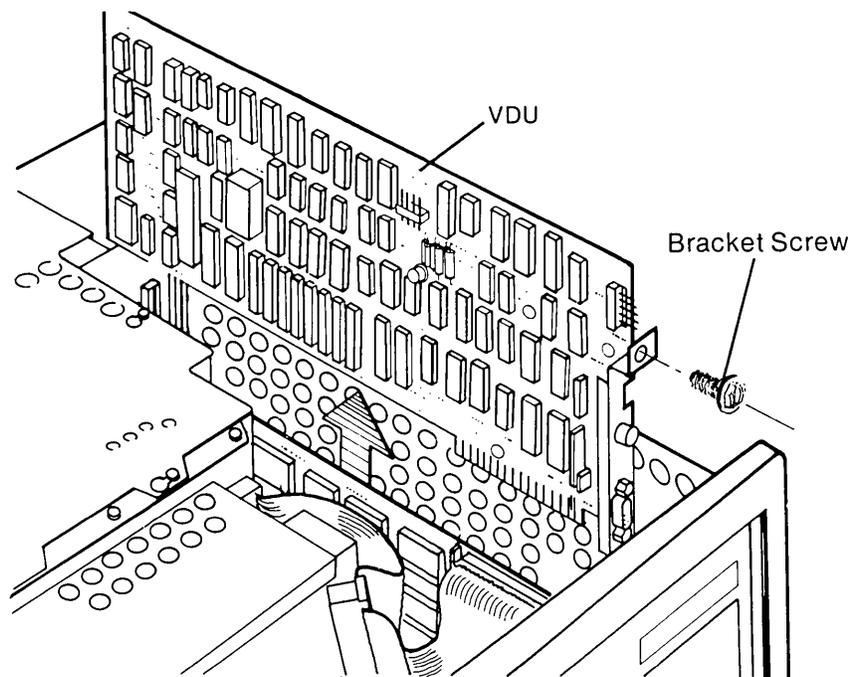


Figure 11-15. Removing the VDU Board.

5. Remove the floppy/printer board by disconnecting the ribbon cable attached at the top of the board. Push down on the two ejector levers on the edge of the board. These levers lift the ribbon cable up for easy access.

NOTE: Do not pull on the cable because to do so may damage the cable.

Now, remove the bracket screw, and carefully lift the floppy/printer board out of the unit (see Figure 11-16).

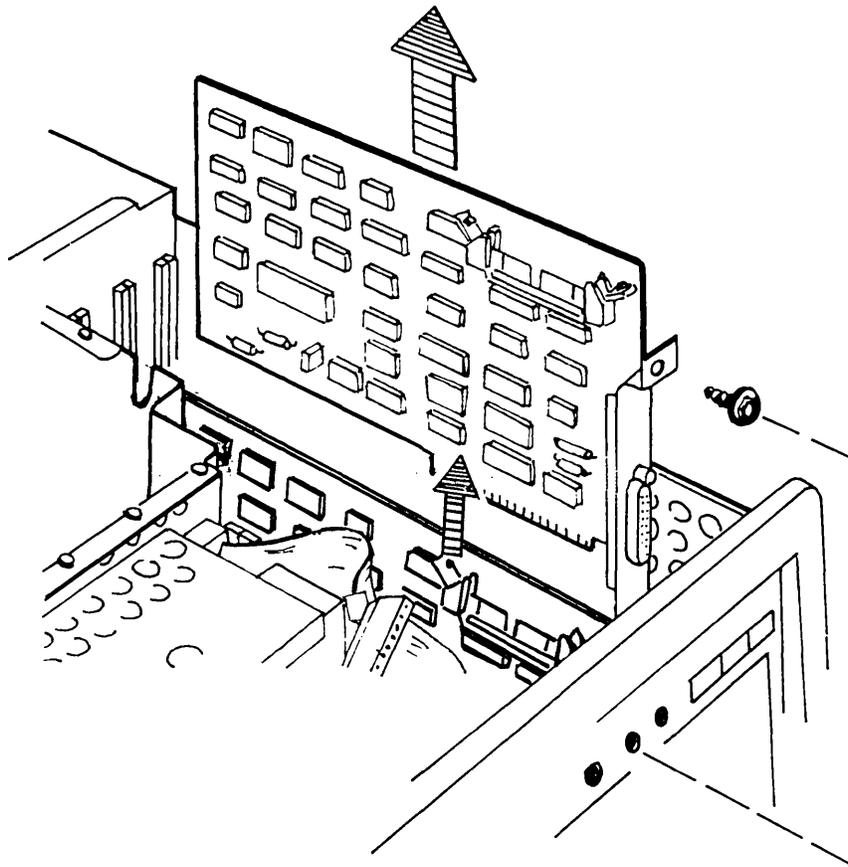


Figure 11-16. Removing the Floppy/Printer Board.

11-16 Maintenance and Service Guide

6. Loosen (DO NOT REMOVE) the five screws that hold the metal cover over the disk drive compartment. Remove the one shock-mount screw that holds the top plate over the disk drive in place. Be sure to save this screw to replace later (see Figure 11-17).

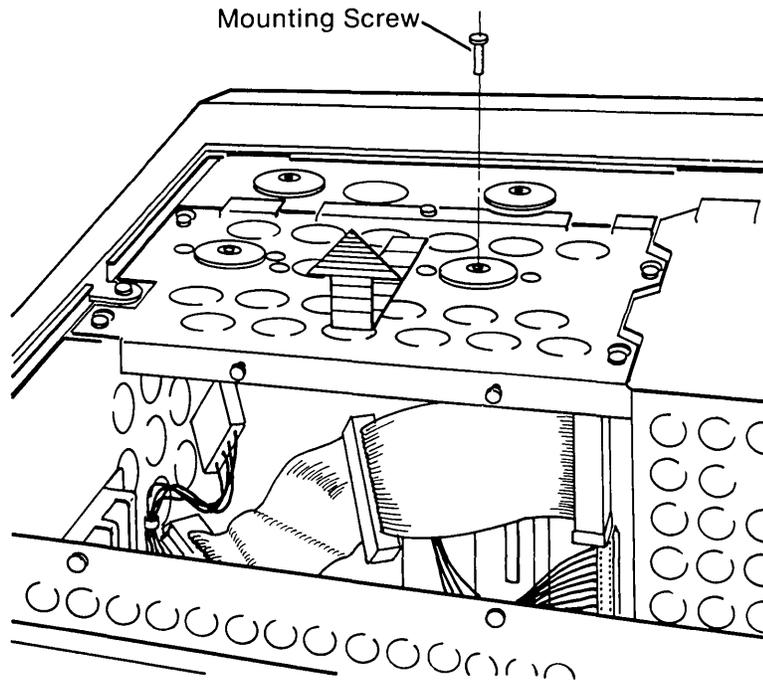
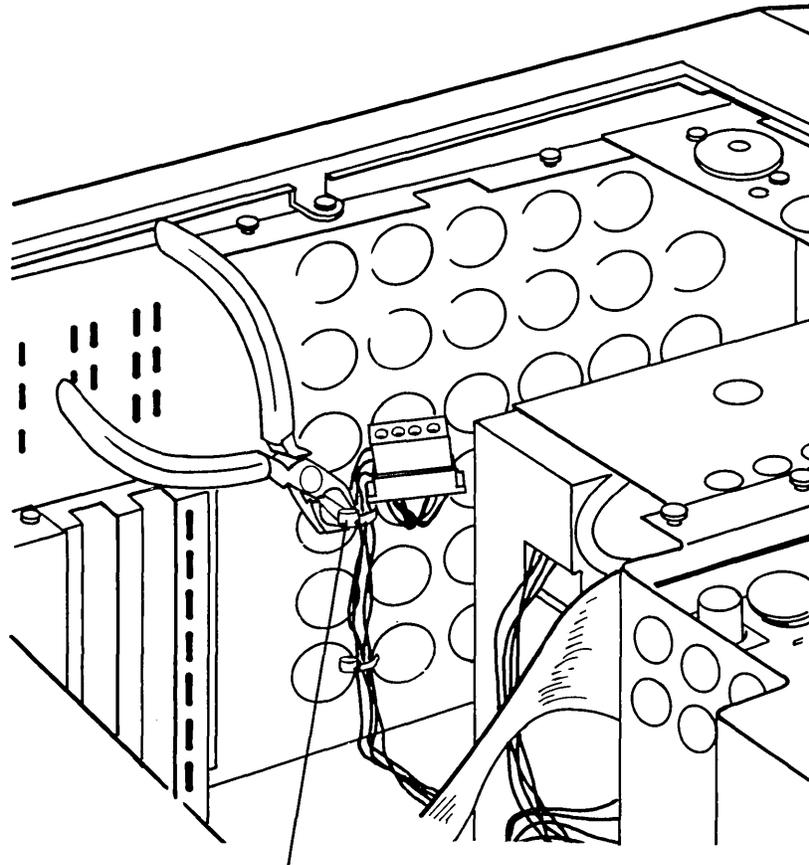


Figure 11-17. Opening the Disk Drive Compartment.

7. The power supply cable for the second disk drive is strapped to the case with tie wraps. Cut the tie wraps with side cutters. Do not accidentally cut any wires (see Figure 11-18).



Tie Wrap Holding
Power Supply Cable

Figure 11-18. Cutting Tie Wrap.

8. Remove the blank filler panel from the second disk drive position by loosening the 1/4" nut holding it in from the back side (see Figure 11-19).

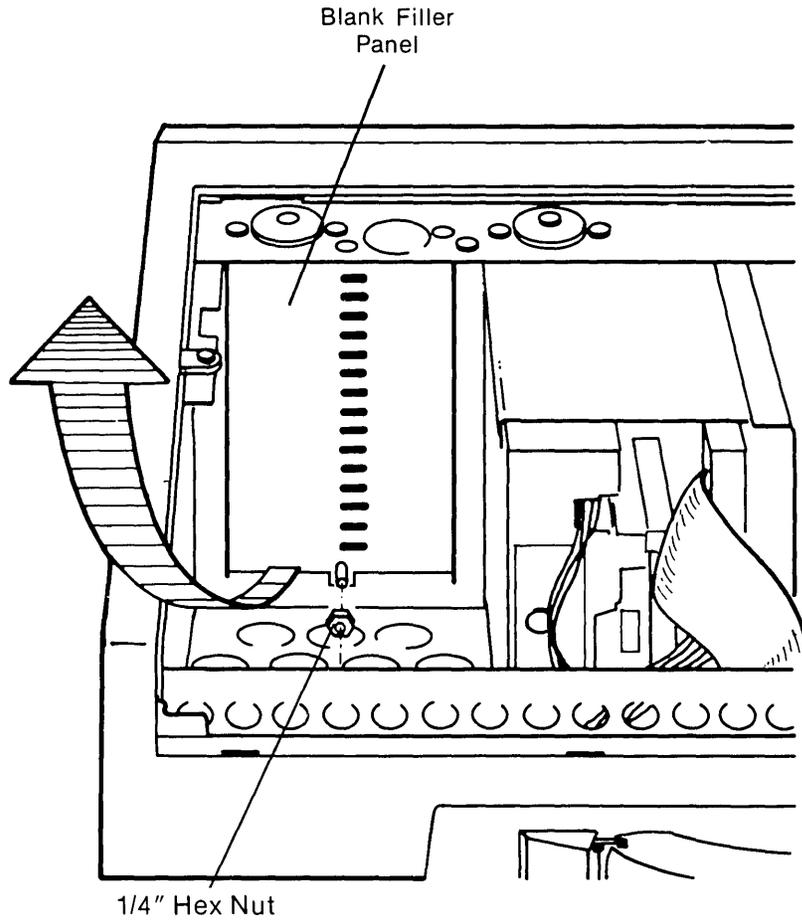


Figure 11-19. Removing the Blank Filler Panel.

9. Remove diskette drive enclosure from disk drive assembly (see Figure 11-20).
10. Unplug and remove the resistor pack located on the floppy disk drive PCB (see Figure 11-21).

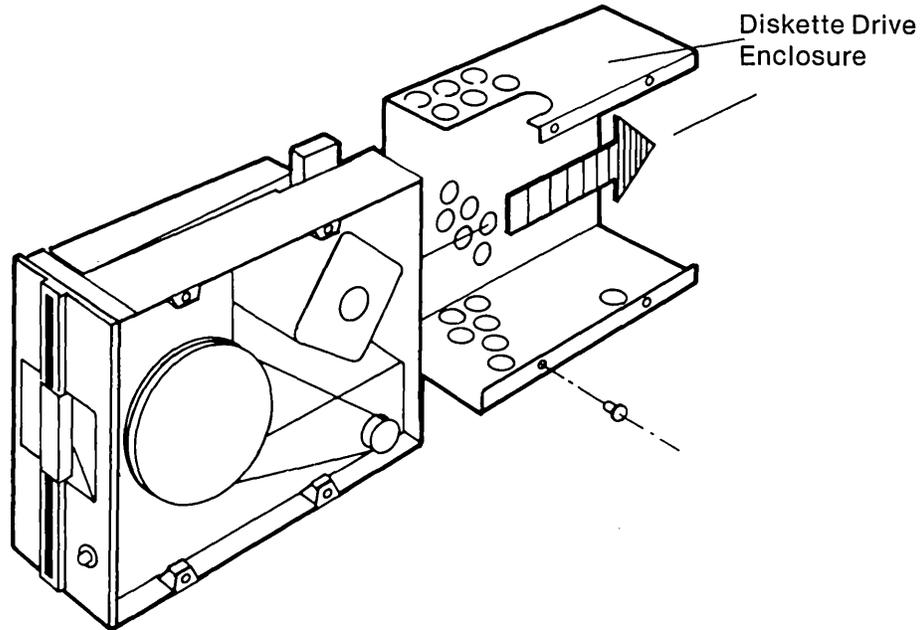


Figure 11-20. Removing Diskette Drive Enclosure.

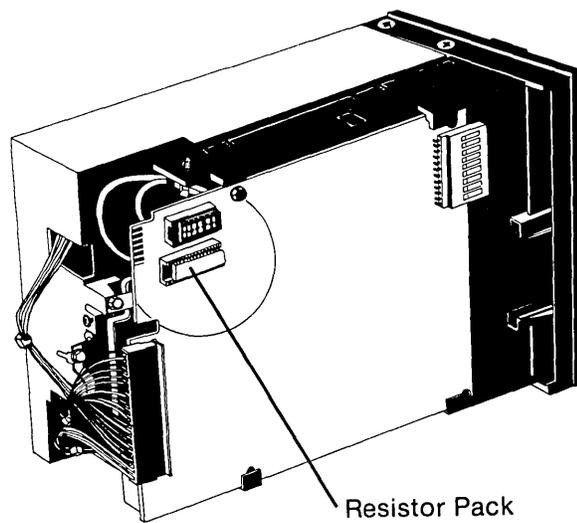


Figure 11-21. Resistor Pack.

11. Place the second disk drive in its compartment, inserting it from the rear of the front panel.
12. Attach the white power supply connector to the bottom of the second disk drive (see Figure 11-22).

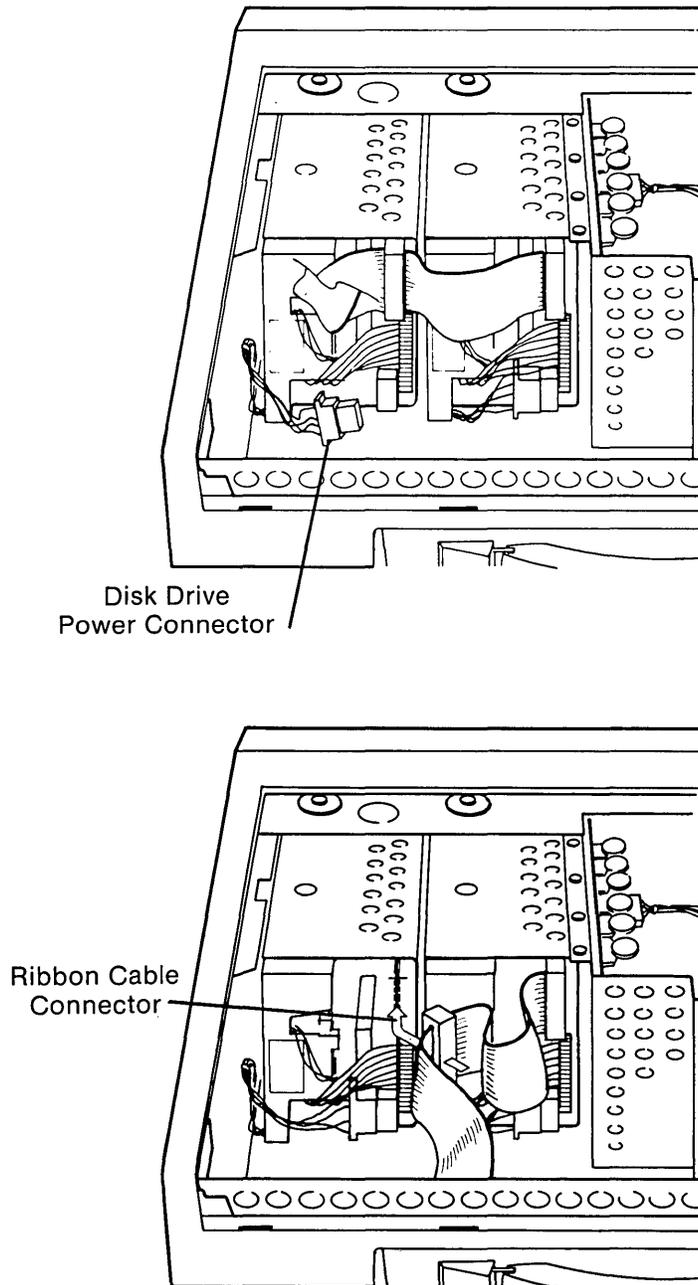


Figure 11-22. Connecting the Drive Power Cable and Ribbon Cable.

13. Set the second disk drive in position and connect the ribbon cable connector on the top of the drive (shown in Figure 11-22).
14. Replace the sheet metal cover over the disk drive compartment. Install the shock-mount screw you removed earlier, and the two supplied with the new disk drive. Tighten all the screws.
15. Turn the unit over and install two shock-mount screws supplied with the new disk drive.
16. Turn the unit back over. The switches on the processor board must be set to be compatible with the added disk drive, and for other options (refer to page 11-19).
17. Reinstall the floppy/printer board. Carefully seat the board in its socket.
18. Reconnect the ribbon cable connector from the disk drive cable to the floppy/printer board (refer to Figure 11-22).
19. Reinstall the VDU board, then any optional boards, by placing them in their sockets. Carefully push them into place until they are firmly seated. Be sure to put a tie wrap on the VDU cable.
20. Replace the metal cover over the PCB compartment and tighten all six screws and one ¼" nut.
21. With all the metal covers in place, now is a good time to test the system to determine if the upgrade was successful. The disk drive is set at the factory and requires no adjustment for proper operation. If the drive fails to perform properly, return it to the factory for warranty repair.
22. Replace the plastic access cover.

OPTION GUIDE

64-KBYTE MEMORY

Introduction

Although the COMPAQ Portable Computer or COMPAQ PLUS Portable Computer is designed for easy access to upgradable areas, it is strongly recommended that only Authorized COMPAQ Computer Service Representatives perform any upgrades. An Authorized COMPAQ Computer Representative has received factory training in performing upgrades, and will ensure the accurate installation of the option.

The COMPAQ Portable or COMPAQ PLUS Portable Computers come equipped with 128-Kbytes of random-access memory (RAM) on the processor board. Two memory kits of 64-Kbytes each can be added to the processor board to increase the COMPAQ Computer's RAM to 256-Kbytes. Each kit consists of nine integrated circuits (ICs).

When you add additional memory kits, you must change the switch settings on the processor board. This procedure is described in this booklet.

Tool Requirements

1. Plastic card.
2. Flat-bladed screwdriver.
3. Small (#1) Phillips screwdriver or $\frac{3}{16}$ " nut driver.
4. IC insertion tool (optional; available from your dealer).
5. IC puller (available from your dealer).
6. Open-end wrench, $\frac{1}{4}$ ".
7. Wire cutters.
8. Plastic cable ties.

Initial Steps

WARNING

Before you remove the case from the COMPAQ Computer, set the ON/OFF switch to the OFF position and disconnect the power cord from the computer (see Figure 11-23).

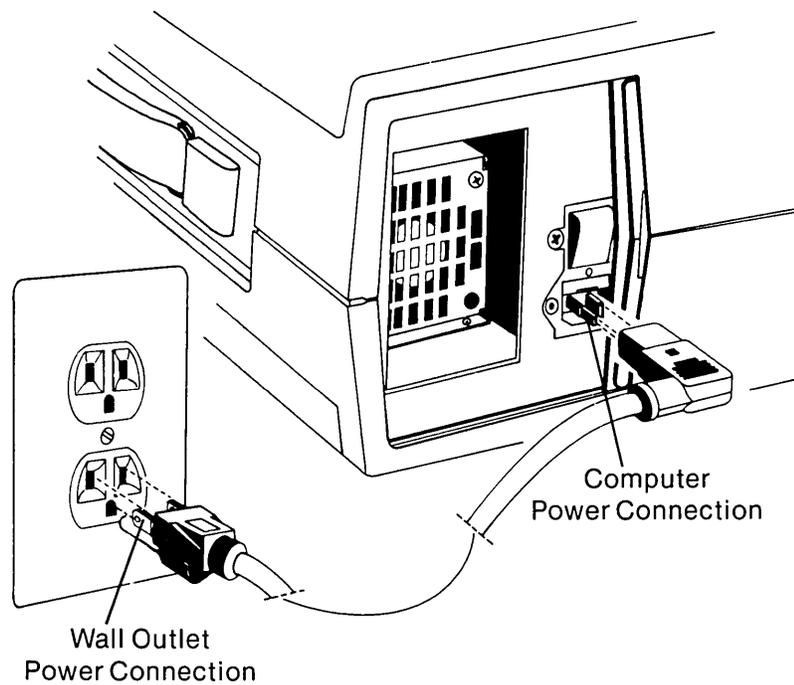


Figure 11-23. Disconnecting the Power Cord From the Computer.

Failure to disconnect the computer from all ac voltage sources can cause dangerous voltages to be present in the power supply and CRT. Even when the ON/OFF switch is set to OFF, any electrically conductive material in this area can cause a severe electrical shock.

1. Turn off the power to any external options (monitors, printers, and so on).
2. Set the computer's ON/OFF switch to the OFF position.
3. Unplug the computer from its power source (previously shown in Figure 11-23).
4. Disconnect any external options attached to the computer.

NOTE: The components which you remove during the installation procedure are very fragile; therefore you must be extremely careful when replacing these components. Also remember, printed circuit boards (PCBs) must be protected from electrostatic discharge. Failure to protect these boards can result in degradation or failure.

Installation Steps

1. Open the access cover by pressing down on the unit's plastic cover with your hand placed next to the COMPAQ name plate (see Figure 11-24). As pressure is applied, the plastic cover bulges at the connecting seam which runs directly above the handle. Partially insert a plastic card under the cover at the bulge and release the pressure. When the plastic cover bulges, reach under the cover and pull upward and outward, then slide the cover out.

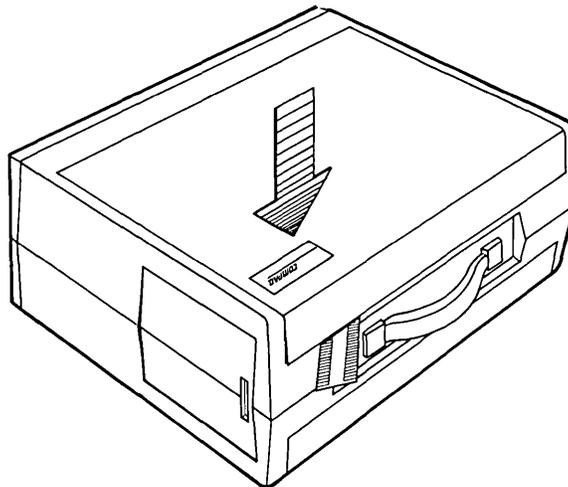
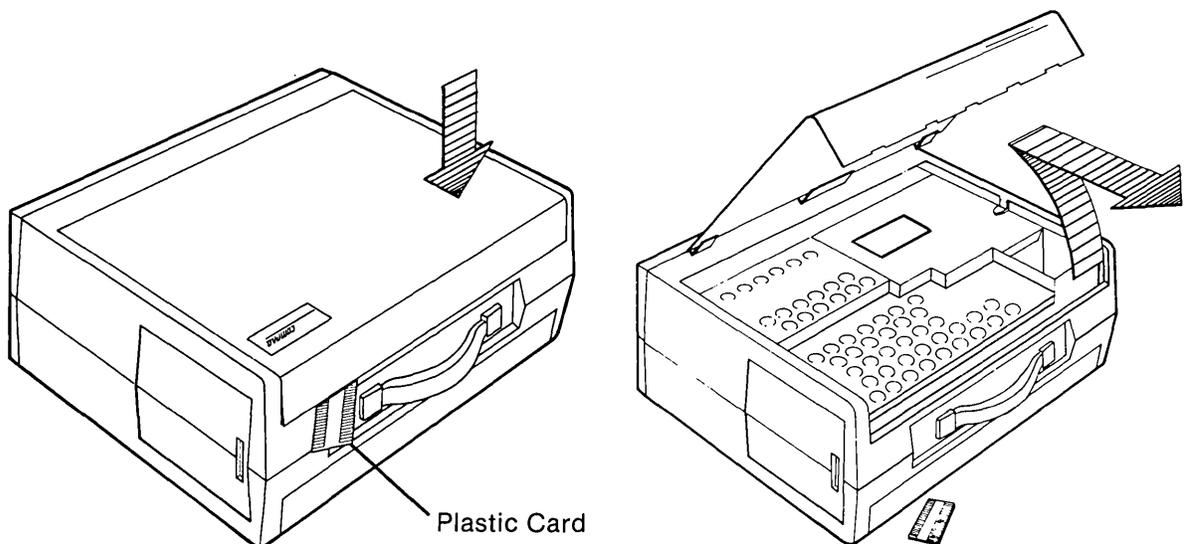


Figure 11-24. Removing Top Cover. (Part 1 of 3)



(Part 2 of 3)

(Part 3 of 3)

*****WARNING*****

Do not remove the panel which covers the power supply and the CRT (see Figure 11-25). There are no user-serviceable parts or options to be added in this area. The CRT is fragile and should be handled only by an Authorized COMPAQ Computer Service Representative.

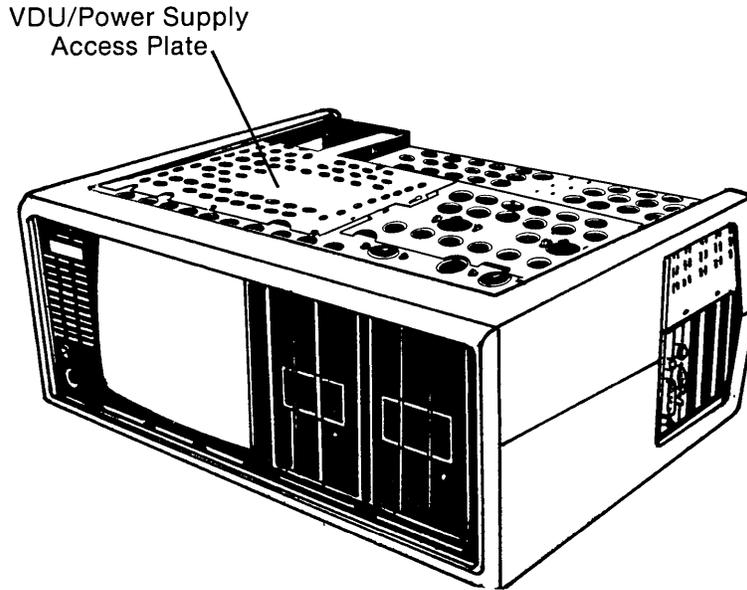


Figure 11-25. Do Not Remove the Panel Cover Which Covers the Power Supply and CRT.

2. Loosen (DO NOT REMOVE) the three screws on the back of the PCB compartment cover.

NOTE: Since the cover is slotted, it is not necessary to remove the screws.

3. Loosen (DO NOT REMOVE) the three screws and one nut on the top edge. Lift the cover off (see Figure 11-26).

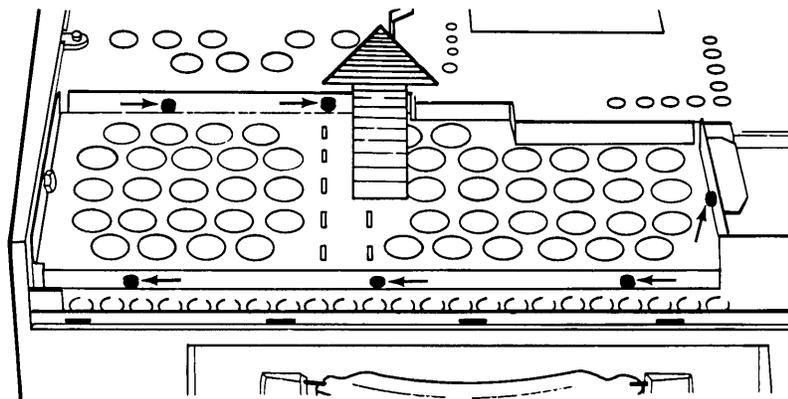


Figure 11-26. Removing the Cover of the PCB Compartment.

4. There are two standard boards: the VDU board and the floppy/printer board. There are three additional slots for optional PCBs. Be sure to disconnect any external connectors from the boards. Remove the PCBs from their slots by performing these steps.

To remove the VDU adapter board, cut the tie wrap at the board (see Figure 11-27) and disconnect the CRT/VDU cable by pulling on the connector.

NOTE: Do not pull on the cable because to do so may damage the cable.

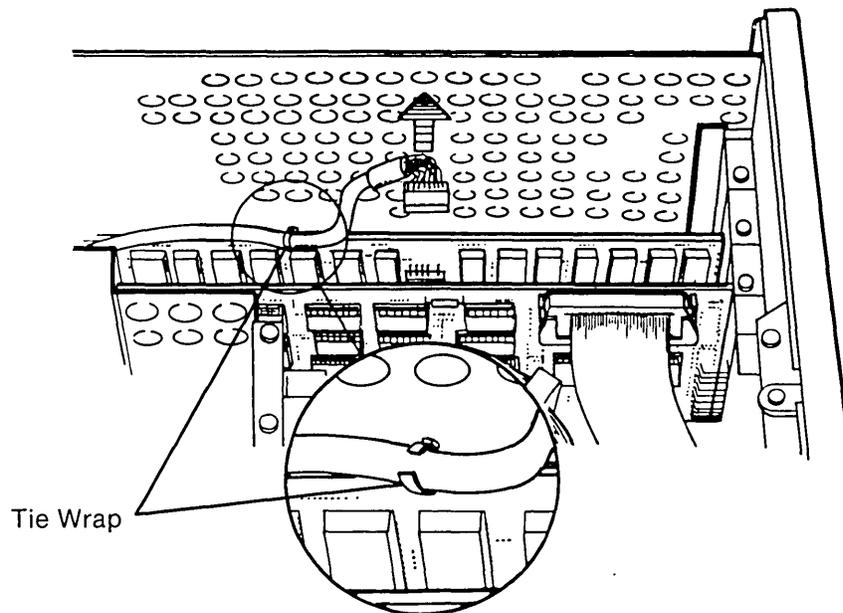


Figure 11-27. Cutting the Tie Wrap.

Now, remove the bracket screw, then carefully pull upward (see Figure 11-28).

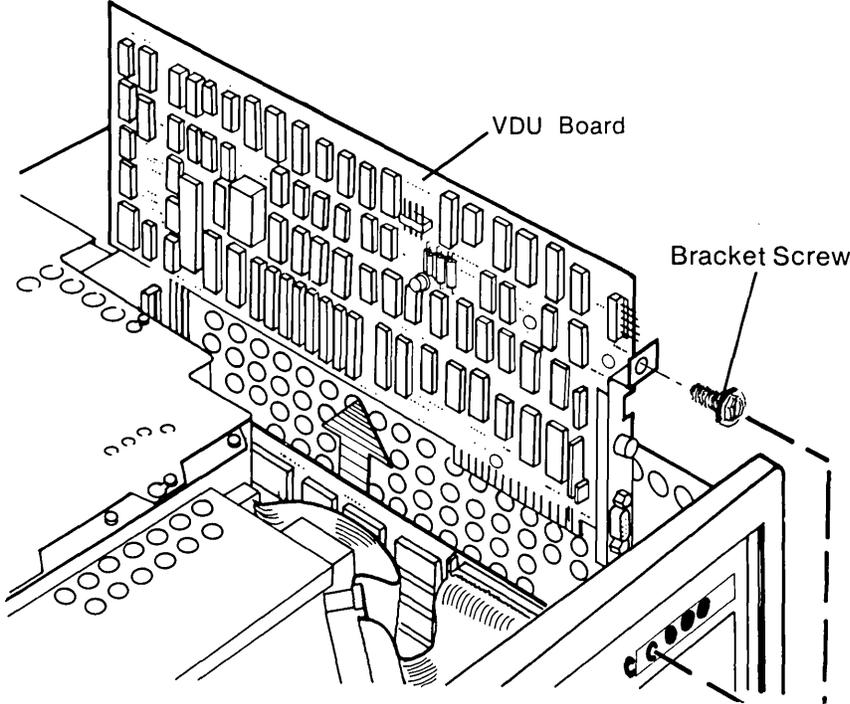


Figure 11-28. Removing the VDU Adapter Board.

5. Remove the floppy/printer board by disconnecting the ribbon cable attached at the top of the board. Push down on the two ejector levers on the edge of the board. These levers lift the ribbon cable up for easy access.

NOTE: Do not pull on the cable because to do so may damage the cable.

Now, remove the bracket screw, and carefully lift the floppy/printer board out of the unit (see Figure 11-29).

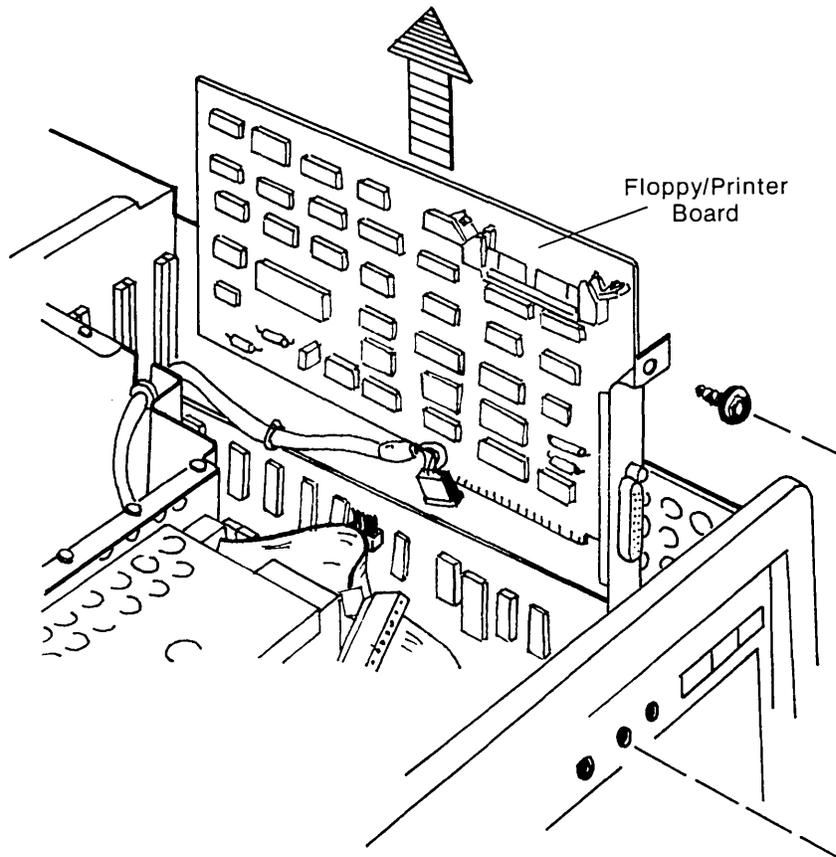


Figure 11-29. Removing the VDU Adapter Board.

Remove any optional boards by removing bracket screws and carefully pulling upward.

- Each memory kit contains nine (9) 64-bit RAM ICs, enough for an additional 65,535 bytes of memory with parity.

Figure 11-30 shows the COMPAQ Portable or COMPAQ PLUS Portable Computers processor board with the location of the Memory Expansion Sockets, as well as Configuration Switches "SW1" and "SW2". Note the location of "Bank 2" and "Bank 3". "Bank 2" must be completely filled prior to filling "Bank 3".

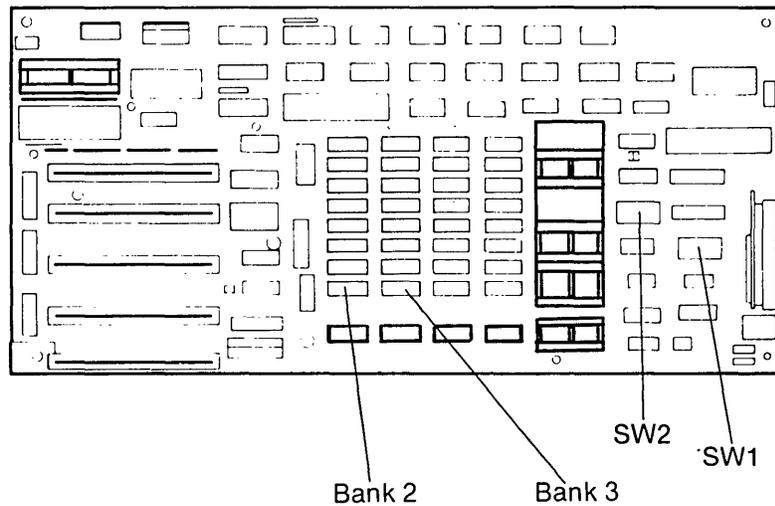


Figure 11-30. Processor Board.

7. Install the memory IC into the sockets as shown in Figure 11-31. You can use a special IC insertion tool, if you have one.

*****CAUTION*****

The pins on the ICs bend easily. Carefully line up the pins in the socket before pressing into place. The notch or PIN 1 locator dot on the IC should be inserted so that it faces toward the five I/O connectors on the board. Bending the pins can make the IC unusable (see Figure 11-31). After insertion, carefully check that all pins are in the socket and that none are bent or are outside of the socket.

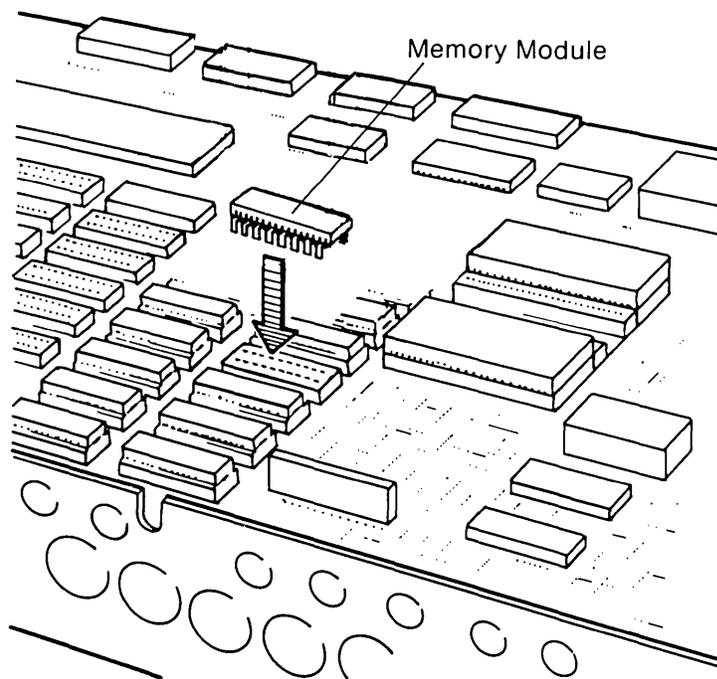


Figure 11-31. Inserting Memory Modules Into Sockets.

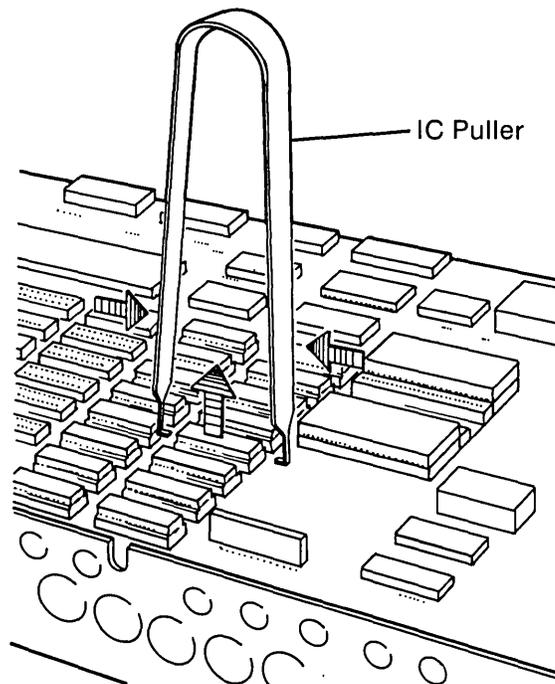


Figure 11-32. IC Puller.

8. The switches on the processor board must be set to be compatible with the memory that has been added.
9. Reinstall the option, VDU, and floppy/printer boards removed earlier. Carefully set the boards in their sockets until they click firmly into place. Reattach the connectors to the floppy/printer, VDU, and option boards and reinstall all bracket screws.
10. Replace the cover over the PCB compartment and tighten the six screws and one nut.
11. Replace the plastic access cover.

OPTION GUIDE

FIXED DISK UPGRADE KIT

Introduction

This guide describes how to install the fixed disk upgrade kit in a COMPAQ Portable Computer. The fixed disk can store (write) data, recall (read) data and erase data when necessary. The fixed disk controller board acts as an interface between the fixed disk drive and the processor board assembly.

The fixed disk drive is mounted in a special enclosure designed to protect the drive from mechanical shocks which could otherwise cause irreparable damage.

*****CAUTION*****

Do not under any circumstances attempt to service the fixed disk or attempt removal from its special enclosure. To do so will void all COMPAQ Computer warranties covering the drive.

The fixed disk controller board assembly will occupy one of the COMPAQ Portable Computer expansion slots. The main functions of this board are as follows:

- Receives data that is to be stored on the fixed disk.
- Arranges the data into appropriate sector formats.
- Encodes the data into usable information to be transmitted to the fixed disk.
- Receives data from the fixed disk and translates the information so that it can be used by the system.
- Mathematically verifies the data read from the fixed disk drive.

Tool Requirements

1. #1 Phillips screwdriver
2. $\frac{3}{16}$ " nut driver
3. $\frac{1}{4}$ " nut driver
4. Wire cutters
5. Needle nose pliers
6. Plastic card

Initial Steps

WARNING

Before you remove the case from the COMPAQ Portable Computer, set the ON/OFF switch to the OFF position and disconnect the power cord from the computer (see Figure 11-1). Failure to disconnect the computer from all AC voltage sources can cause dangerous voltages to be present on the power supply and monitor. Even when the ON/OFF switch is set to the OFF position, any electrically conductive material in this area can cause a severe electrical shock.

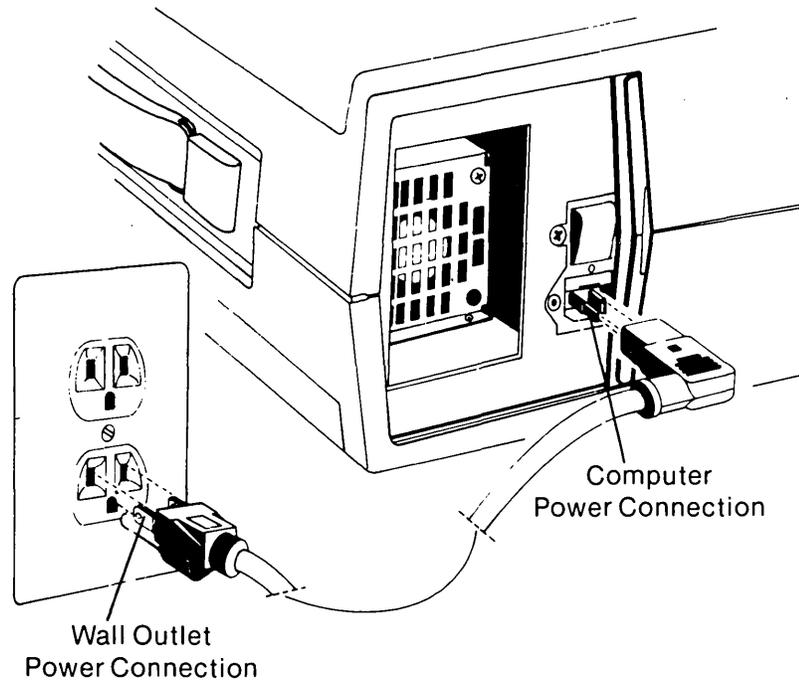


Figure 11-1. Disconnecting the Power Cord From the Computer.

1. Turn off the power to any external options (monitors, printers, and so on).
2. Set the computer's ON/OFF switch to the OFF position.
3. Unplug the computer from its power source.
4. Disconnect any external options attached to the computer.

NOTE: The components which you remove during the installation procedure are very fragile; therefore you must be extremely careful when handling these components. Also remember, printed circuit boards (PCBs) must be protected from electrostatic discharge. Failure to protect these boards can result in failure.

Installation Steps

1. Open the access cover by pressing down on the unit's plastic cover, with your hand placed next to the COMPAQ name plate (see Figure 11-2). As pressure is applied, the plastic cover bulges at the connecting seam which runs directly above the handle. Partially insert a plastic card under the cover at the bulge and release the pressure.

At the opposite end of the plastic cover (see Figure 11-3), apply pressure with your other hand in the same manner.

When this end of the plastic cover bulges, reach under the cover and pull upward and outward, and then slide the cover out (see Figure 11-4). The plastic cover comes completely off, and the chassis access plate is exposed.

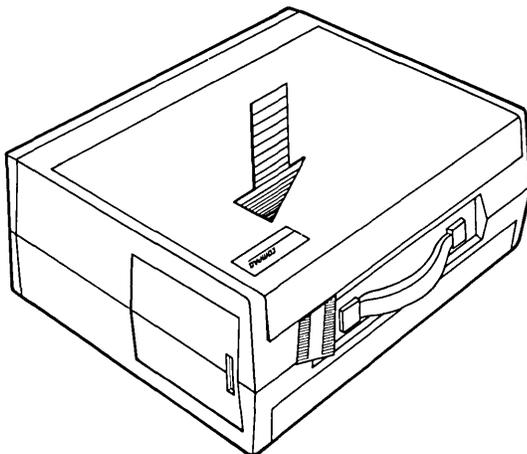


Figure 11-2. Opening the Access Cover.
(Part 1 of 3)

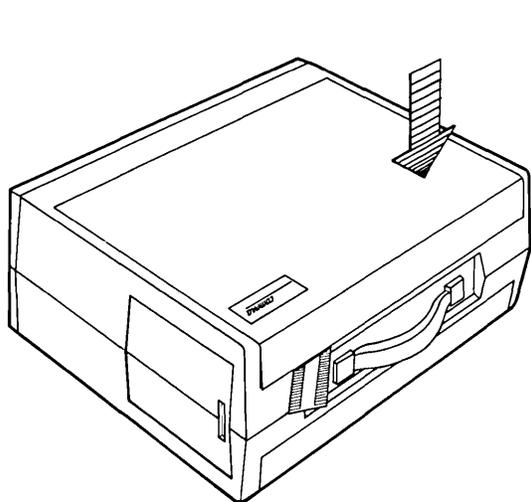


Figure 11-3. Opening the Access Cover.
(Part 2 of 3)

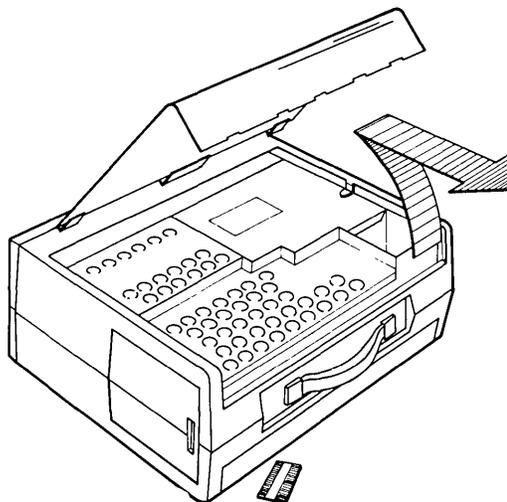


Figure 11-4. Opening the Access Cover.
(Part 3 of 3)

*****WARNING*****

Do not remove the panel which covers the power supply and the monitor (see Figure 11-5). Dangerous voltages may be present even after AC power has been removed. The monitor is fragile and should be handled only by an Authorized COMPAQ Computer Service Representative.

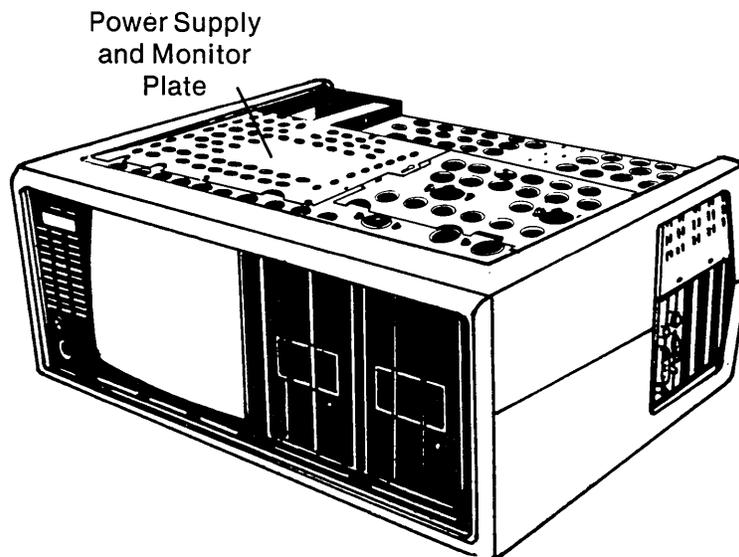


Figure 11-5. Do Not Remove the Panel Cover Which Covers the Power Supply and Monitor.

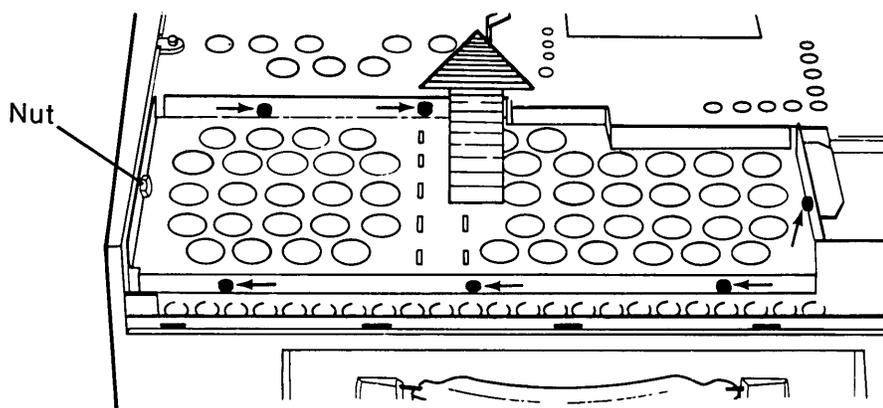


Figure 11-6. Removing the Connector Access Cover.

2. Loosen (DO NOT REMOVE) the six (6) slotted hex-head screws and the one (1) $\frac{1}{4}$ " nut which secures the card cage access plate (see Figure 11-6a).
3. Gently remove the card cage access plate by lifting it up and away from the system (see Figure 11-6b).

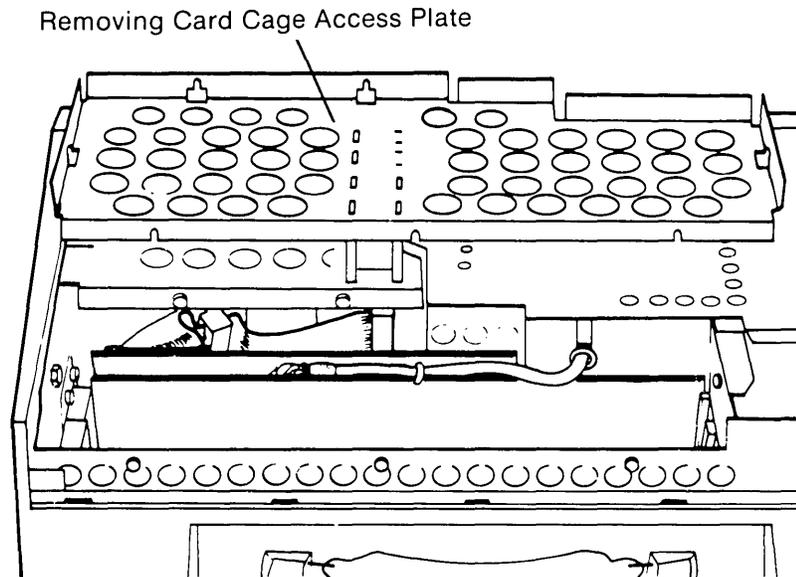


Figure 11-6. Removing the Connector Access Cover.

4. Disconnect the diskette drive cable from the diskette/printer adapter board by pressing on the finger tabs located on either side of the connector (see Figure 11-7).

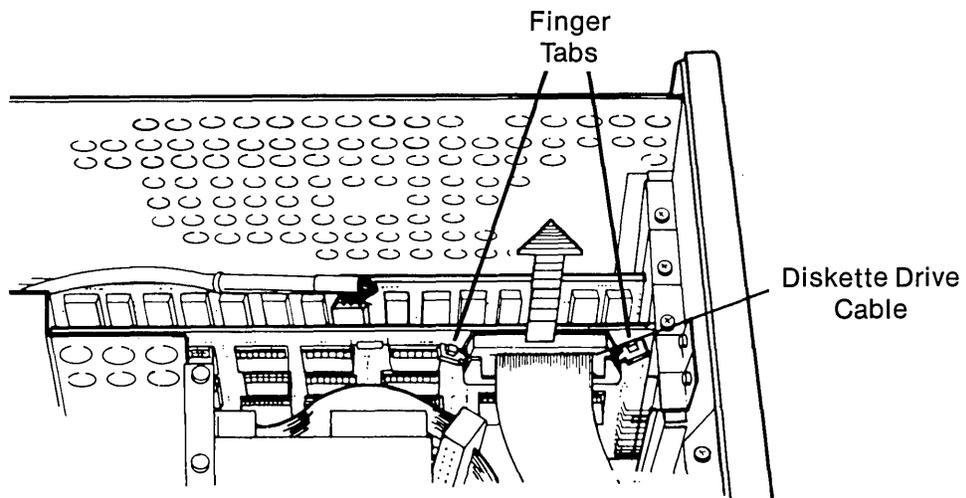


Figure 11-7. Removing the Diskette Drive Cable From Diskette/Printer Adapter Board.

5. Disconnect the VDU cable from the VDU adapter board (see Figure 11-8). Be careful not to pull the cable.

The cable tie holding the VDU cable to the VDU adapter board must be cut before the connector can be disengaged from the VDU adapter board.

NOTE: Tie-wraps may be either beaded or of a nonbeaded type.

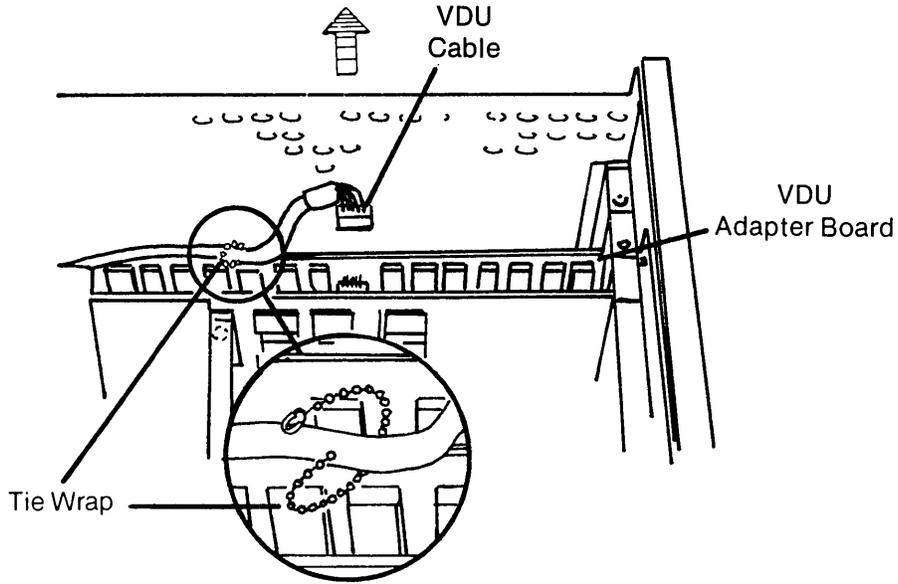


Figure 11-8. Disconnecting the VDU Cable From the VDU Adapter Board.

6. Remove the retaining screws that secure the diskette/printer and the VDU adapter boards to the system chassis (see Figure 11-9).

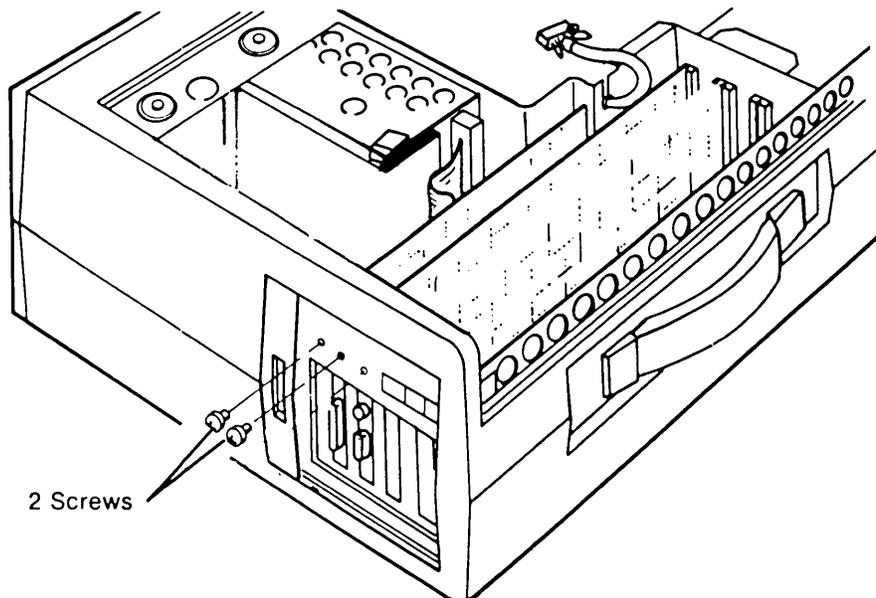


Figure 11-9. Removing the Screws Which Hold the Diskette/Printer Adapter Board and the VDU Adapter Board.

7. Gently remove the adapter boards by pulling them away from the processor board (see Figure 11-10).

Similarly, remove any other option boards which may occupy any additional expansion slots in the processor board.

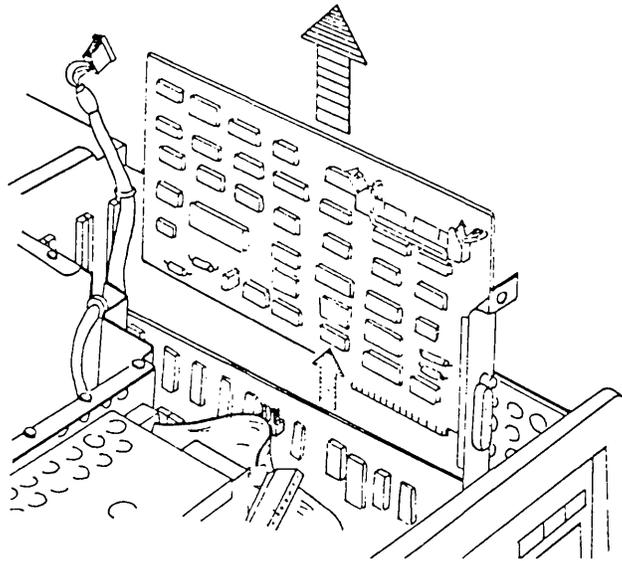


Figure 11-10. Removing the Diskette/Printer Adapter Board.

8. Turn the computer over so that the base of the system is facing upward. Using the same procedure outlined in STEP 1, remove the bottom plastic access cover to expose the base of the system chassis.
9. Place the computer so that the display is facing downward against the work surface. Locate and loosen (DO NOT REMOVE) the two (2) screws which secure the narrow access cover for all the processor board connectors. Remove the narrow access cover by lifting it away from the system chassis (see Figure 11-11).

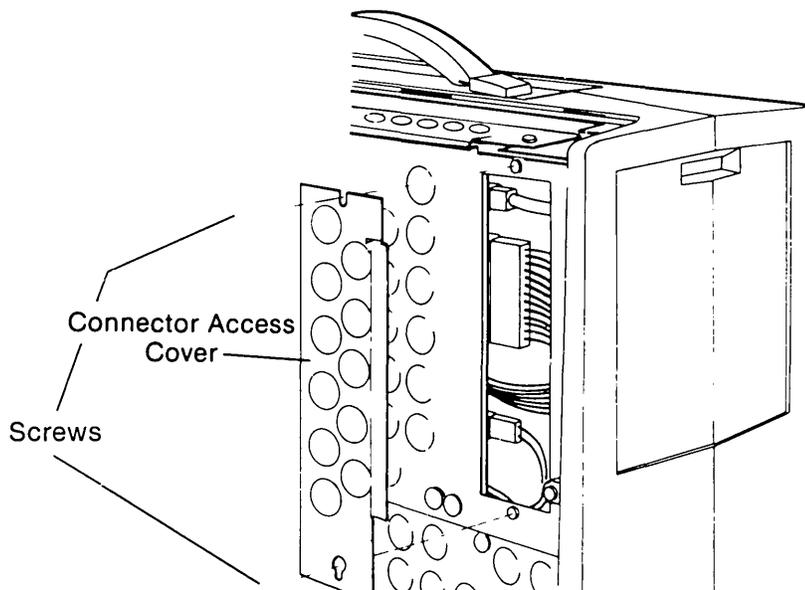


Figure 11-11. Removing the Processor Board Connector Access Cover.

10. Locate and disconnect the following processor board connectors: keyboard connector, power connector, and speaker connector (see Figure 11-12).

The cable tie's holding the connectors must be cut before the connector can be disengaged.

*****CAUTION*****

Be very careful not to cut or nick the cables or wires.

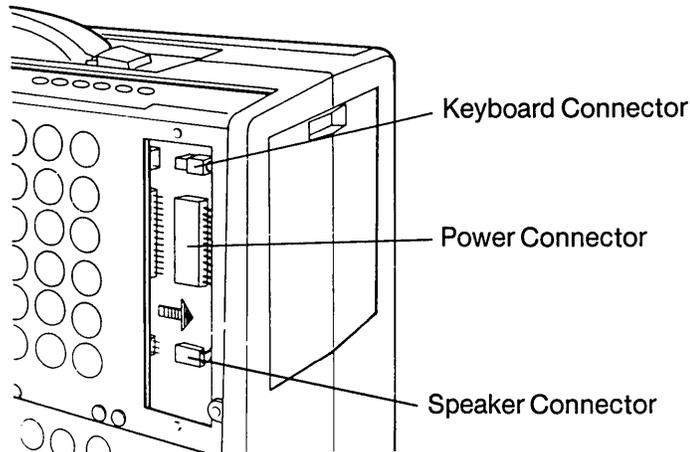


Figure 11-12. Disconnecting the Keyboard Connector, Power Connector, and Speaker Connector.

11. Locate and remove the four (4) screws which secure the processor board mounting plate to the system chassis (see Figure 11-13a).
12. Carefully slide the processor board out of the system (see Figure 11-13b).

IMPORTANT: Six nylon standoffs are attached to the processor board. These standoffs must clear their mounting holes as the processor board is removed.

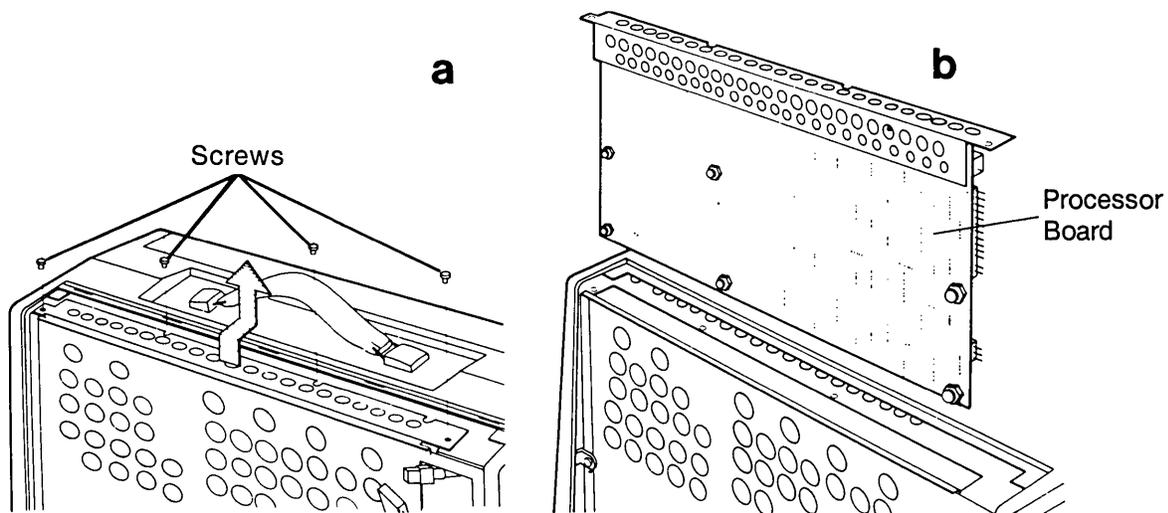


Figure 11-13. Removing the Processor Board.

13. Turn the computer back over to its original position and loosen (DO NOT REMOVE) the five (5) screws that secure the diskette drive access plate. Remove the top rear mounting screws of the diskette drive (see Figure 11-14a). Slide the metal access cover towards the rear of the computer and lift it off (see Figure 11-14b).

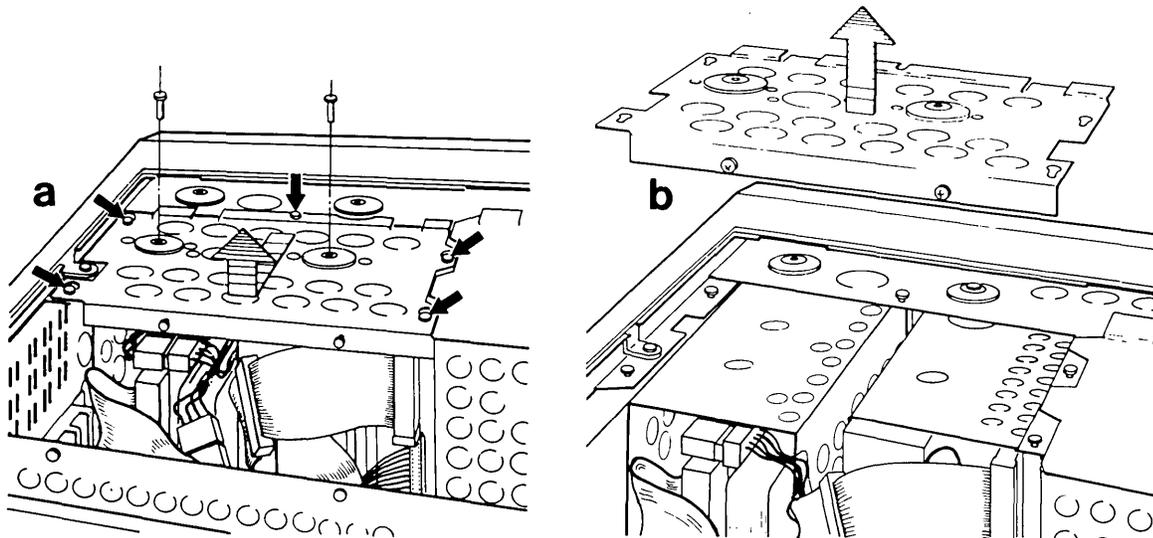


Figure 11-14. Loosening the Screws Which Hold the Diskette Drive.

NOTE: The following Steps 14 through 17 apply **only** if you are upgrading a dual diskette drive system.

14. Disconnect the signal cable and the power cable from the "B" diskette drive (see Figure 11-15 a & b).

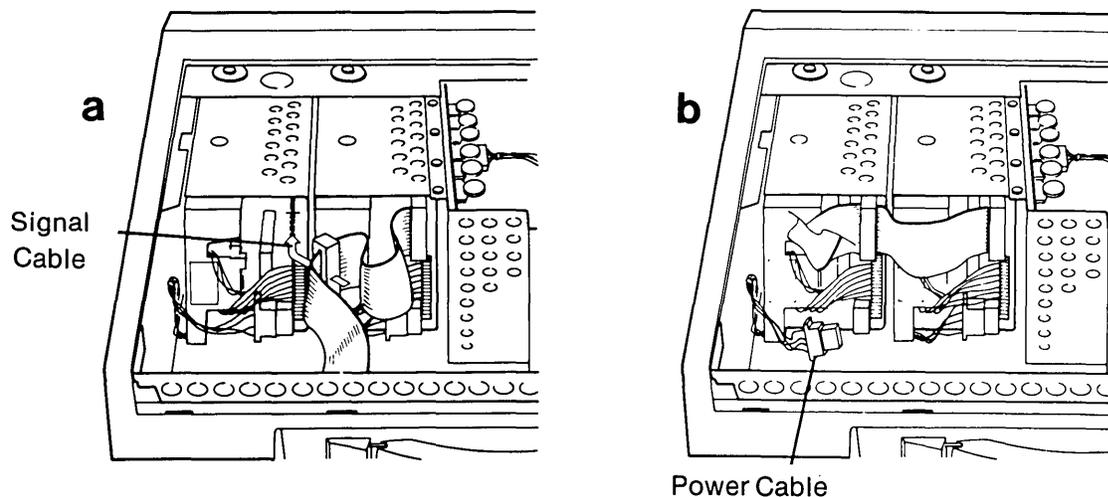


Figure 11-15. Disconnecting the Signal and Power Cable From the Diskette Drive.

15. Place the computer so that the screen is facing down (towards the workbench). Remove the bottom "B" diskette drive mounting screws (see Figure 11-16).

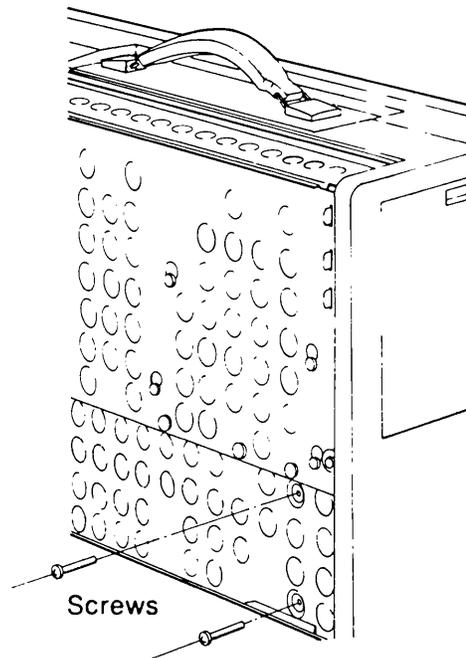


Figure 11-16. Removing the Bottom "B" Diskette Drive Mounting Screws.

16. Return the unit to the flat upright position and remove the remaining front mounting screw from the "B" drive.
17. Carefully slide the diskette drive towards the rear of the computer and away from the system chassis (see Figure 11-17).

*****CAUTION*****

Be extremely careful not to break the diskette drive system chassis ground strap, located under the top front shock mount of each diskette drive, when removing the diskette drive.

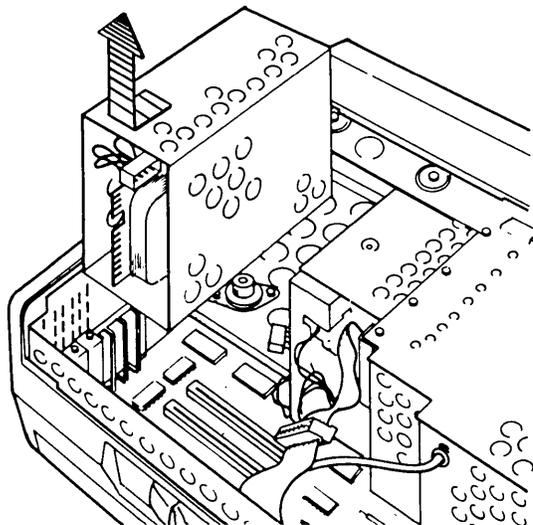


Figure 11-17. Removing the Diskette Drive.

The COMPAQ processor board contains all of the main electronics for the system, including the 8088 microprocessor, read-only memory (ROM), and 128-Kbytes of on-board random-access memory (RAM) as well as expansion sockets for an additional 128-Kbytes of optional random-access memory (totaling 256-Kbytes). The processor board also contains five (5) built-in expansion slots, of which three (3) slots are available for additional option boards.

Processor Board Configuration

The operational characteristics of the whole computer are largely dependent on the configuration of the processor board. In particular, the revision level of the System ROMs must be established and the switch groupings SW1 and SW2, must be properly configured.

System ROMs

The System ROMs contain specialized software which is used by MSTM-DOS for such things as video I/O and diskette I/O. At the time of this writing (Refer to the COMPAQ Computer Service Bulletin Index to determine the current version of the available MS-DOS) there have been 2 revisions of System ROM released: Revision B and Revision C.

The Rev B ROM was originally released with the system. It will allow all currently available versions of MS-DOS to operate, as long as the MS-DOS does not require a fixed disk drive.

The Rev C ROM was released with the COMPAQ PLUS Portable Computer. It will support all available versions of MS-DOS and will permit the use of fixed disk drives. The Rev C ROM is required if a fixed disk drive is to be available under MS-DOS 2.0 Operating System.

To upgrade a processor board to use Rev C ROMs, first determine the revision level of the processor board. Refer to Figure 11-18 for location of the processor board's revision designator.

NOTE: If the processor board is Revision C or below, replace processor PCB before proceeding.

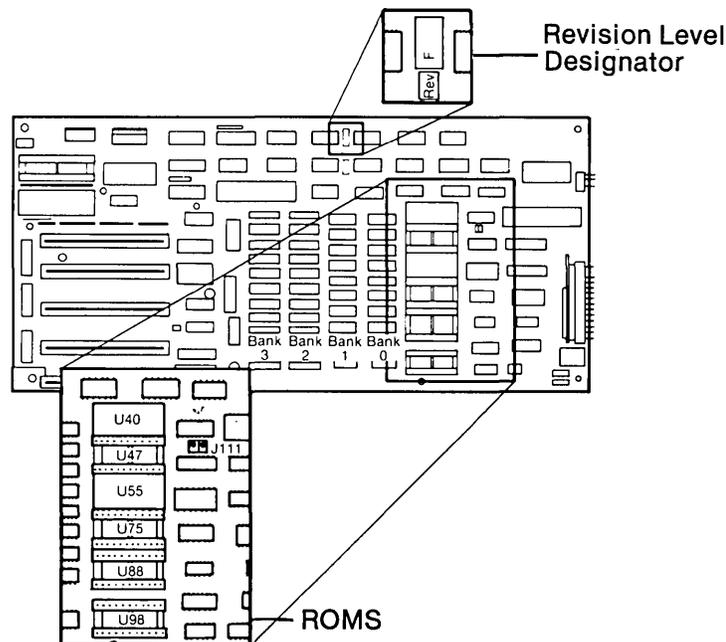
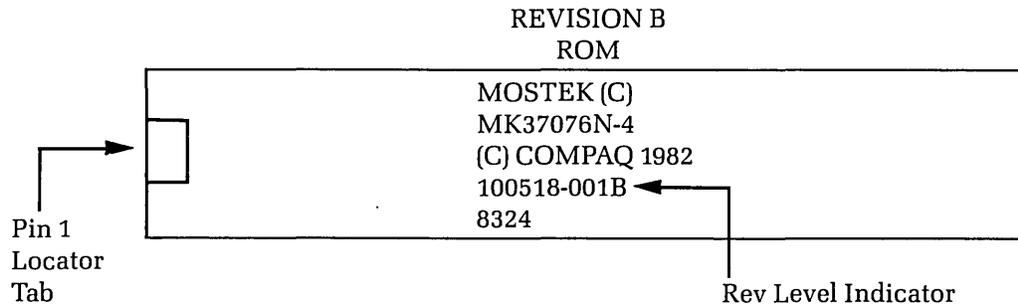


Figure 11-18. Location of Processor Board Revision Level Designator and ROMS.

18. Find the System ROM located in the position of U-40. Determine the revision level by reading the information printed on the chip (see example of Revision B ROM).



If ROM is Revision “B”, carefully remove ROM chip and replace the Revision C ROM, adding the extra revision C ROM chip to slot U-47. Be sure that the chips are properly oriented with pin 1 in proper location. There are no restrictions concerning which (REV C) chip is placed in U-40 or U-47.

NOTE: On Rev J Boards and above, only 1 Revision C ROM is necessary.

Once the processor board’s revision level has been determined, use the following table to determine where to install the Rev C ROMs:

PROCESSOR BOARD REVISION LEVEL			
ROM ¹ LOCATION	REV C ²	REV D THROUGH REV H	REV J ³ AND UP
U40	**	REV C ROM ⁴	REV C ROM ⁴
U47	**	REV C ROM ⁴	EMPTY
U55	**	EMPTY	EMPTY
U75	**	EMPTY	EMPTY
U88	**	EMPTY	EMPTY
U98	**	EMPTY	EMPTY

NOTE: J111 should normally be jumpered pin 2 to pin 3.

Processor Board Switches SW1 & SW2

The way in which the processor board “sees” the rest of the COMPAQ Portable Computer and the COMPAQ PLUS Portable Computer system is defined primarily by the combination of switch settings on SW1 and SW2.

SW1 “describes” to the system how many diskette drives will be available, the type of display to be expected, and whether or not an 8087 co-processor is to be used.

SW2 “describes” the amount of RAM available.

NOTE: If the processor board is Rev J or above SW2 has been removed the locations of SW1 and SW2 are shown in Figure 11-19.

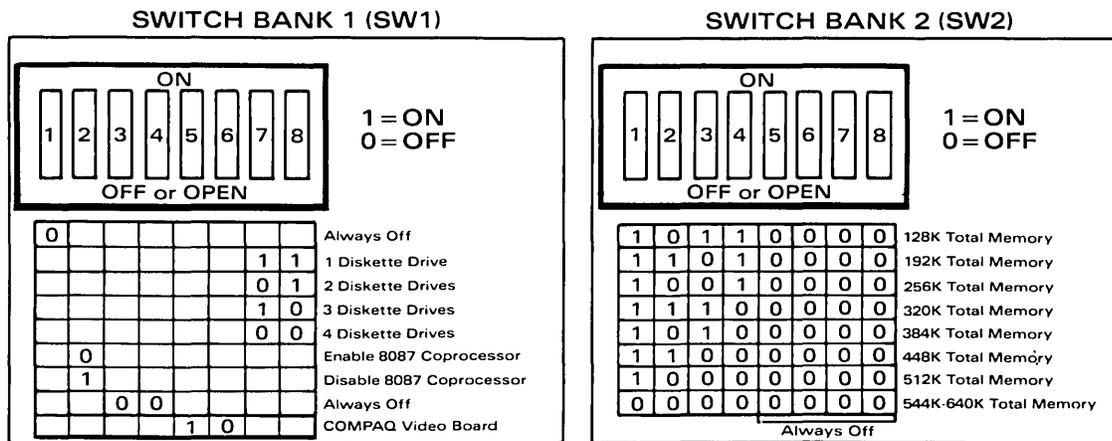
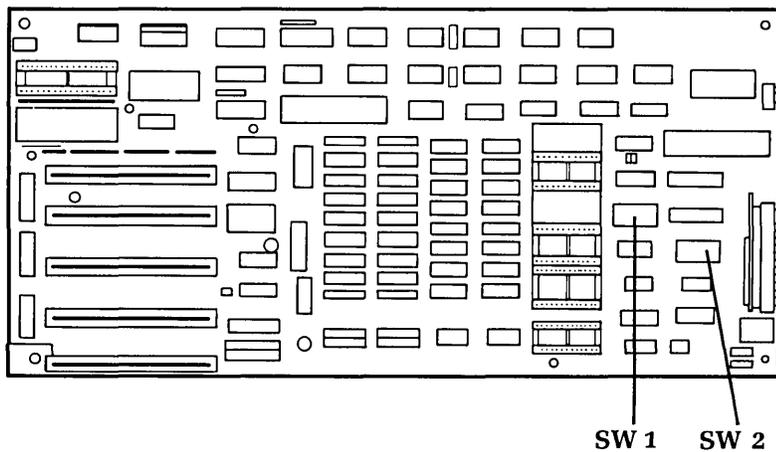
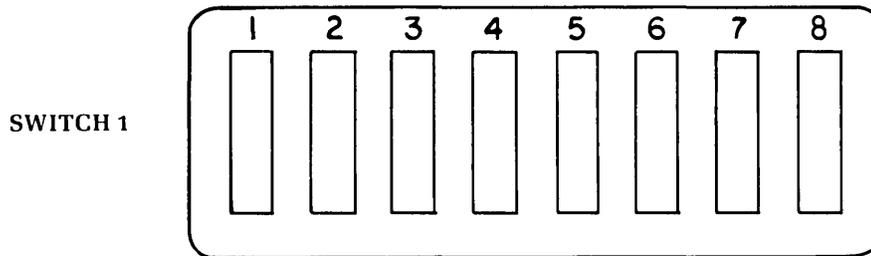


Figure 11-19. Location of SW1 and SW2 on the Processor Board.

The following charts are designed to acquaint you with the various combinations of switch settings that may be used with the COMPAQ Portable Computer and the COMPAQ PLUS Portable Computer. You may also use this information as a reference guide when you troubleshoot the CPU/memory subsystem.

Switch Settings

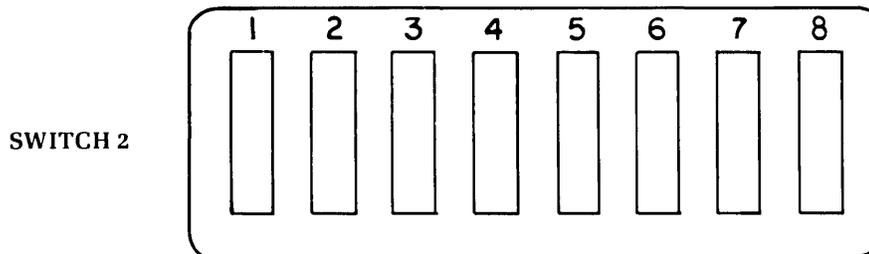


Position:

7-8
2
5-6

Function:

Number of 5¼" diskette drives installed.
Reserved for co-processor. Must be on.
Type of monitor being used.



Position:

1-2-3-4
5-6-7-8

Function:

Quantity of optional memory installed.
Always off.

NOTE: On Processor Board Rev J and above SW2 has been removed.

HOW TO CONFIGURE THE COMPAQ PORTABLE COMPUTER AND THE COMPAQ PLUS PORTABLE COMPUTER

		1	2	3	4	5	6	7	8	
SWITCH 1		0	1	0	0	1	0	1	1	1 DISKETTE DRIVE
		0	1	0	0	1	0	0	1	2 DISKETTE DRIVES
		0	1	0	0	1	0	1	0	3 DISKETTE DRIVES
		0	1	0	0	1	0	0	0	4 DISKETTE DRIVES

Position #2 of Switch Bank #1 should always be set to an "ON" (1) condition except when an 8087 co-processor chip is added to the system.

Position #5 of Switch Bank #1 should always be set to an "ON" (1) condition except when configuring the system to operate with optional video monochrome boards.

		1	2	3	4	5	6	7	8	
SWITCH 2		1	0	1	1	0	0	0	0	128K TOTAL MEMORY
		1	1	0	1	0	0	0	0	192K TOTAL MEMORY
		1	0	0	1	0	0	0	0	256K TOTAL MEMORY
		1	1	1	0	0	0	0	0	320K TOTAL MEMORY
		1	0	1	0	0	0	0	0	384K TOTAL MEMORY
		1	1	0	0	0	0	0	0	448K TOTAL MEMORY
		1	0	0	0	0	0	0	0	512K TOTAL MEMORY
		0	0	0	0	0	0	0	0	544-640K TOTAL MEMORY**

**REVISION "C" ROM MUST BE INSTALLED TO USE THIS OPTION

NOTE: 0 = OFF
1 = ON

- Set SW1 and SW2 according to your RAM memory configuration and for one diskette drive.

Installation Of The Fixed Disk Drive

1. Carefully slide the processor board back into the system (see Figure 11-20a).
2. Replace the four (4) screws which secure the processor board mounting plate to the system chassis (see Figure 11-20b).

IMPORTANT: Six nylon standoffs are attached to the processor board. These standoffs must return to their mounting holes as the processor board is returned to the system.

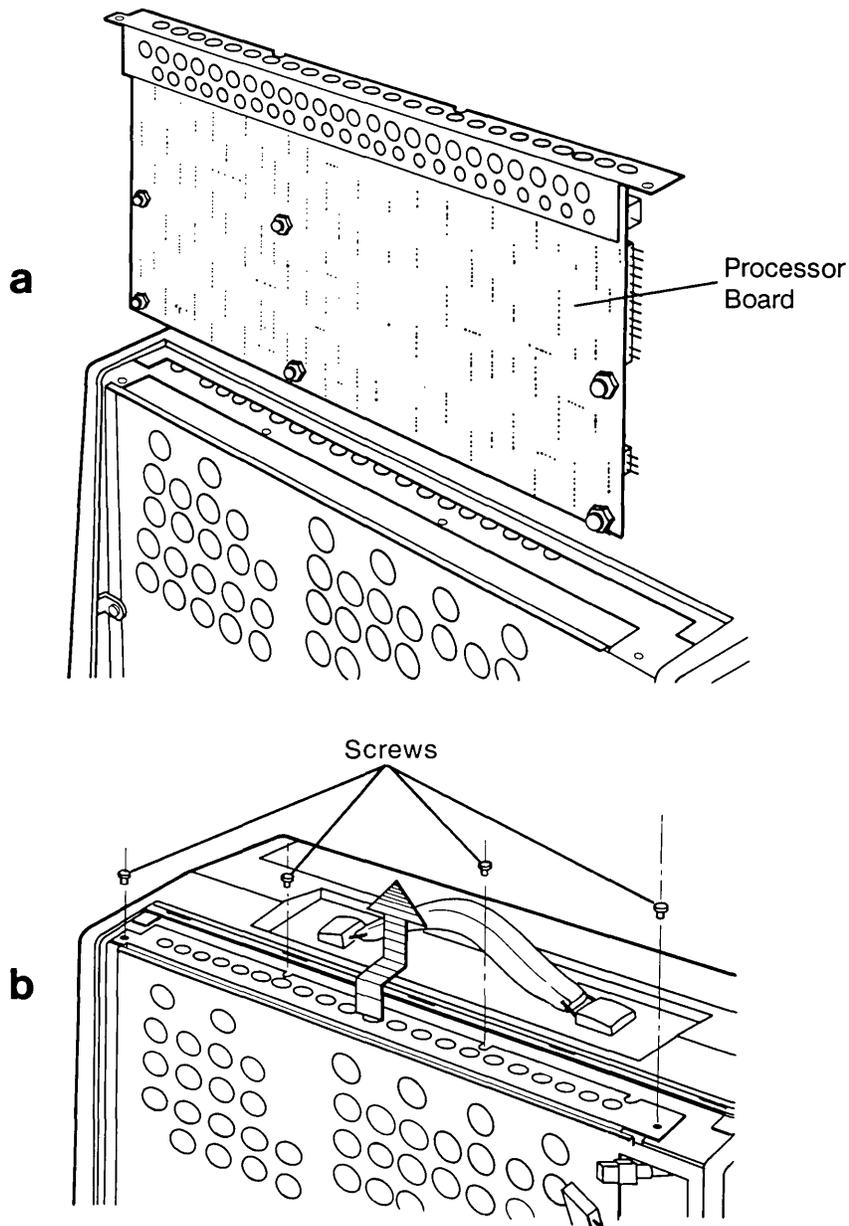


Figure 11-20. Replacing the Processor Board.

3. Connect the following processor board connectors: keyboard connector, power connector, and speaker connector (see Figure 11-21).

Replace the tie wraps, which are included in your kit, to hold the connectors in place.

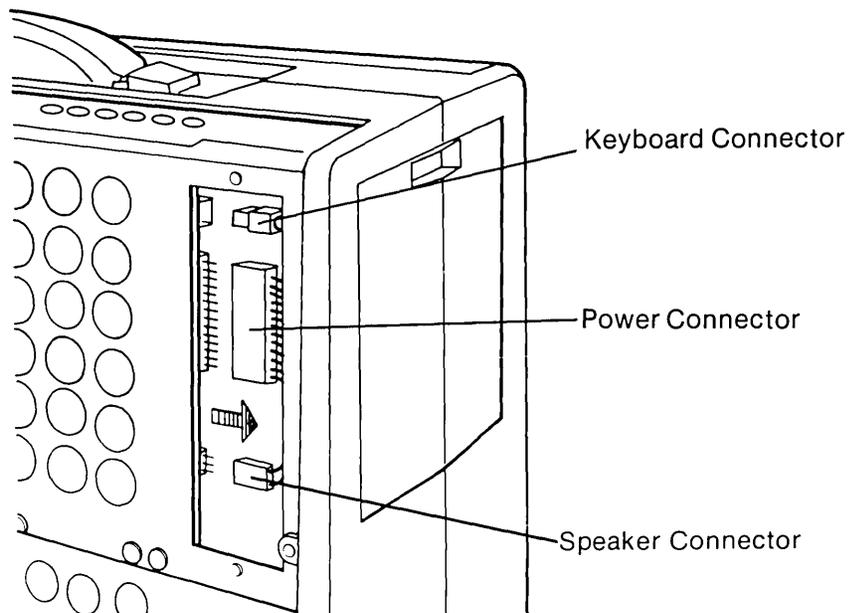


Figure 11-21. Connecting the Keyboard Connector, Power Connector, and Speaker Connector.

4. Replace the narrow access cover and tighten the two (2) screws, to secure the cover over the processor board connectors (see Figure 11-22).

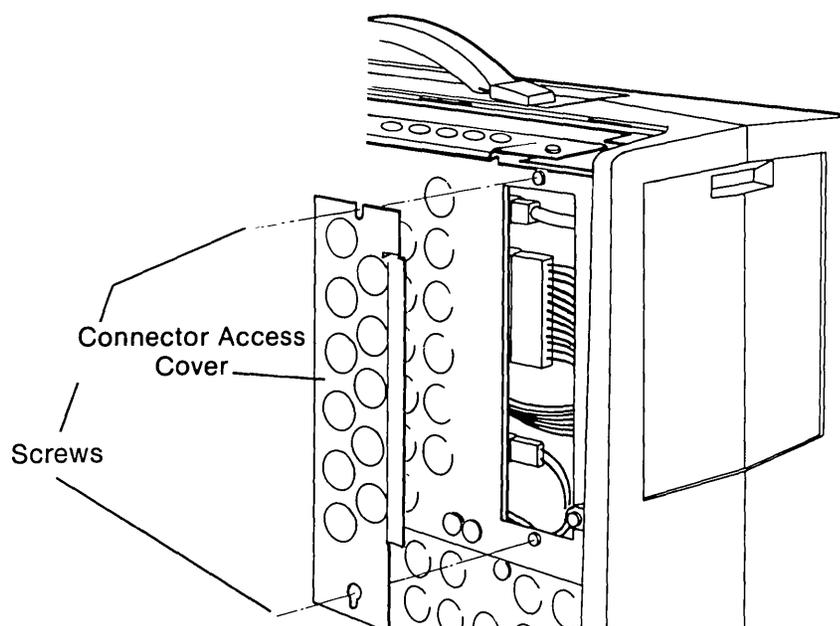


Figure 11-22. Replacing the Processor Board Connector Access Cover.

5. Turn the computer back over and carefully slide the fixed disk drive into the computer chassis, (see Figure 11-23), be careful not to bend the grounding strap.
6. Reinstall the bottom mounting screws.
7. Replace the bottom plastic access cover to the exposed base of the system chassis.

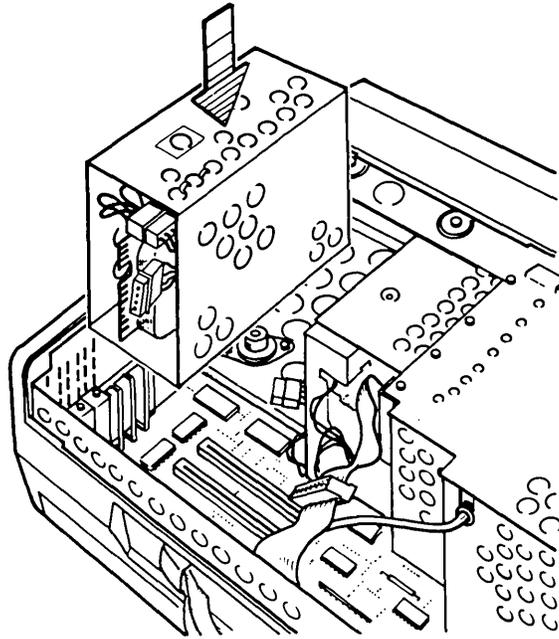


Figure 11-23. Installing the Fixed Disk Drive.

8. Connect the power cable and the two (2) signal cables to the fixed disk drive (see Figure 11-24 a & b).

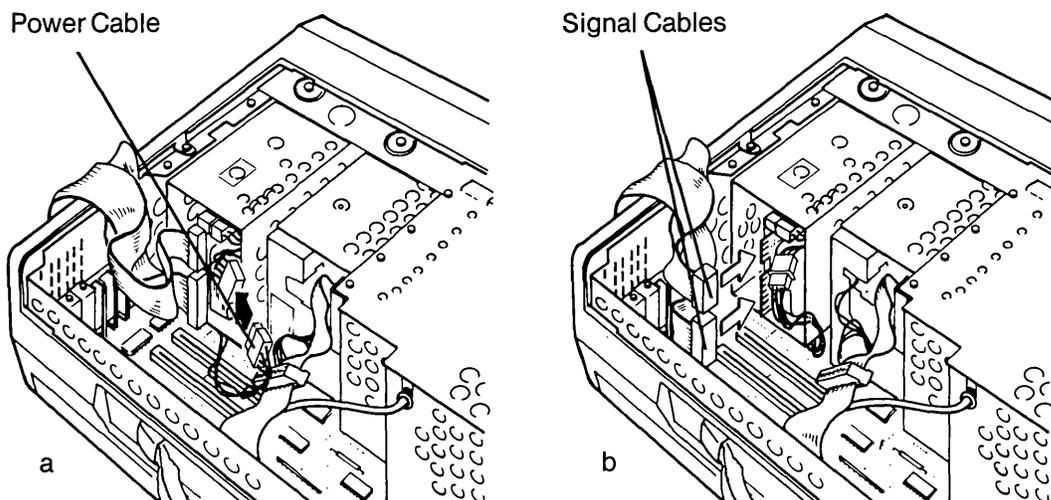


Figure 11-24. Connecting the Power Cable and the Signal Cable to the Fixed Disk Drive.

9. Install the power jumper cable with the ground lug on diskette drive "A (see Figure 11-25).

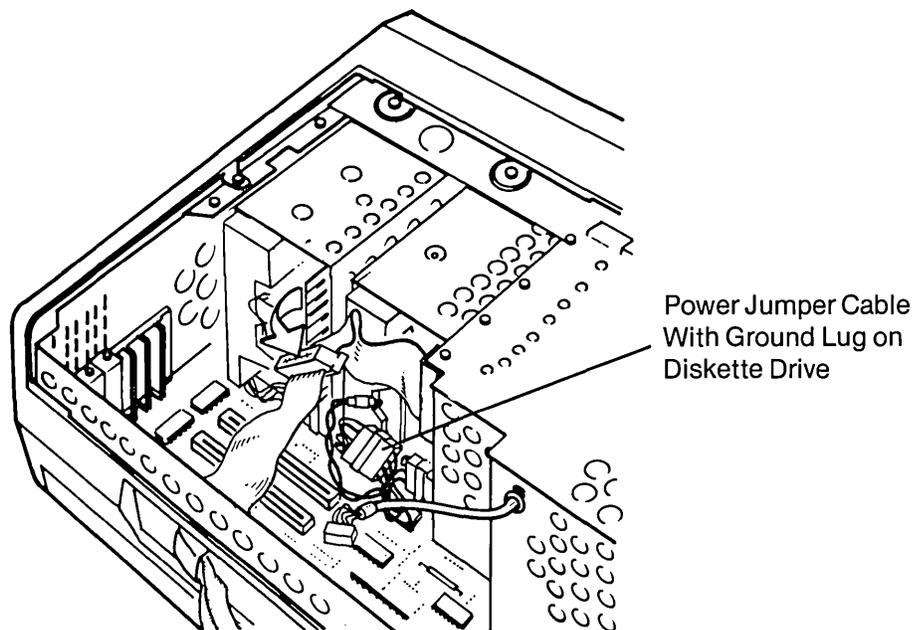


Figure 11-25. Installing the Power Jumper Cable.

10. Remove the metal option slot cover for location where the fixed disk controller will reside (see Figure 11-26).

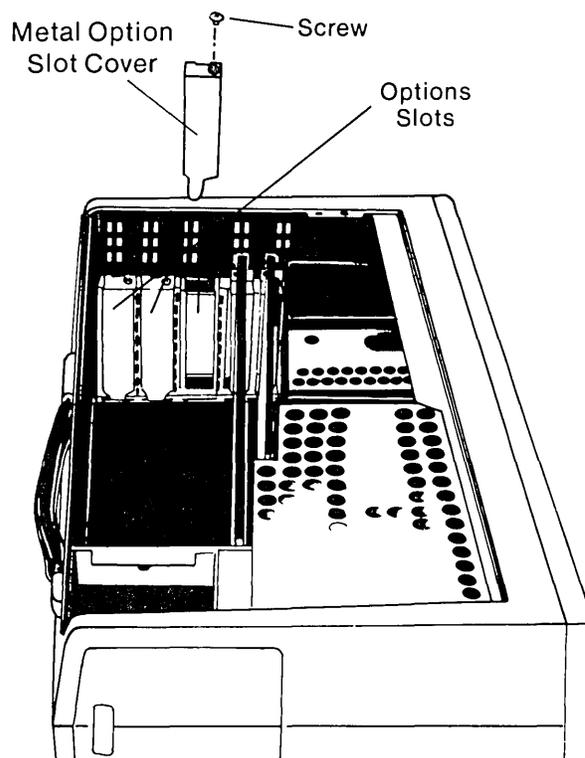


Figure 11-26. Metal Option Slot Cover.

11. Carefully replace the adapter boards by inserting them into the processor board (see Figure 11-27).

Similarly, replace any other option boards which may occupy any additional expansion slots on the processor board, but leave room for the fixed disk adapter board in the third slot.

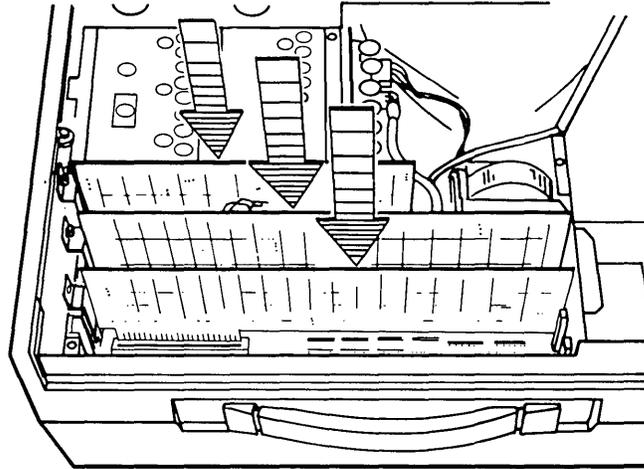


Figure 11-27. Replacing the Adapter Boards.

12. Carefully insert the fixed disk adapter board assembly by inserting it into the processor board. Due to the cable length the recommended slot is immediately following the VDU adapter board.
13. Insert the retaining screw that secures the fixed disk adapter board assembly to the system chassis, along with the screws to the other adapter boards (see Figure 11-28).

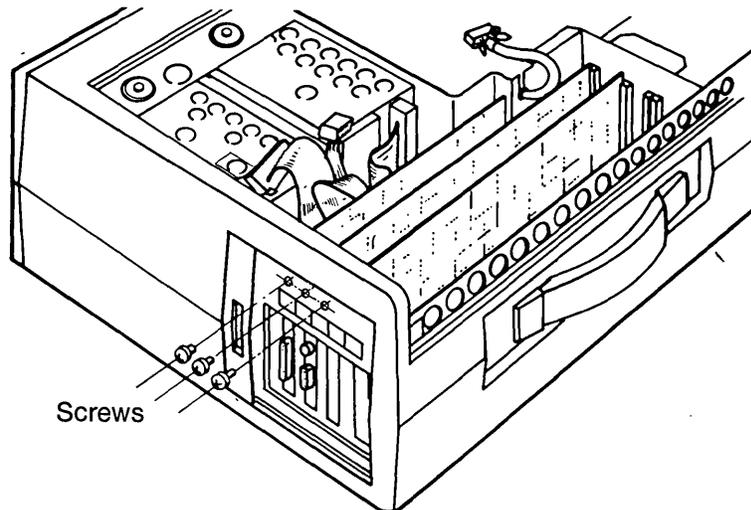


Figure 11-28. Inserting the Screws Which Hold the Adapter Boards.

14. Connect the diskette drive connector cable to the diskette/printer adapter board by pressing on the cable (see Figure 11-29).

*****CAUTION*****

Do not confuse the diskette signal cable with the fixed disk controller cable.

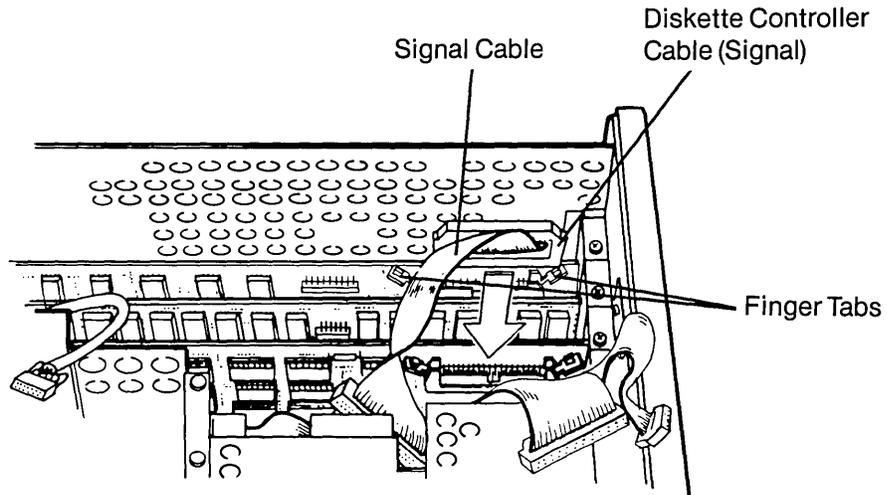


Figure 11-29. Connecting the Diskette Drive Connector Cable.

15. Connect the VDU cable to the VDU adapter board (see Figure 11-30). Replace the tie wrap to secure the cable to the board.

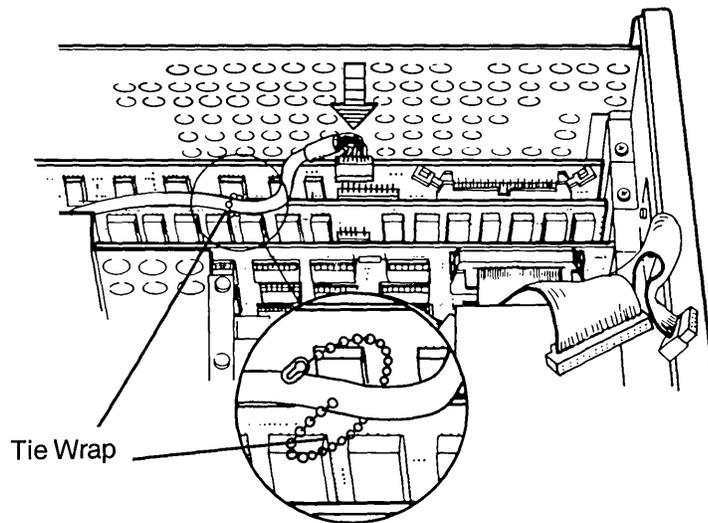


Figure 11-30. Connecting the VDU Cable to the VDU Adapter Board.

16. Carefully connect the two (2) flat-ribbon signal cables to the fixed disk adapter board, observe the correct orientation of the cable connector to the board (see Figure 11-31).

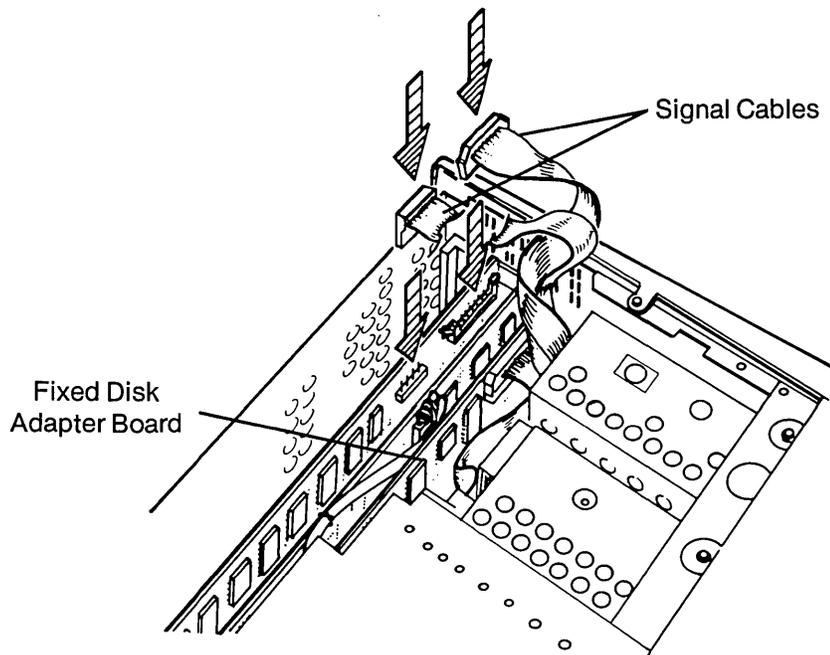


Figure 11-31. Connecting the Signal Cables to the Fixed Disk Adapter Board.

17. Place the access cover over the drives. Insert the three (3) top mounting screws into the drives (see Figure 11-32 a & b).

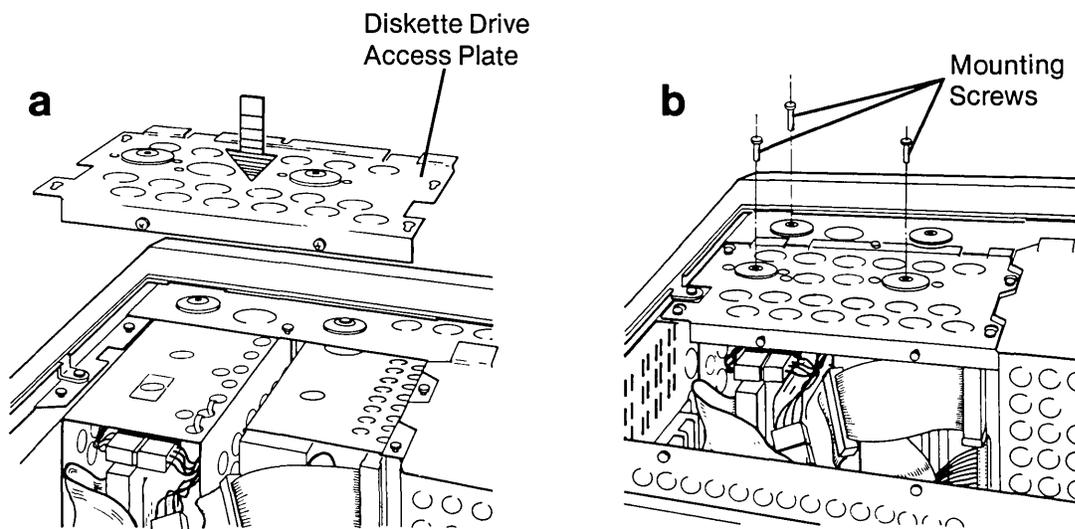


Figure 11-32. Replacing the Top Mounting Screws into the Drives.

18. Replace the card cage access plate onto the chassis (see Figure 11-33a). Tighten the six (6) screws and the one (1) $\frac{1}{4}$ " nut to secure the card cage access plate (see Figure 11-33b).
19. Reinstall the plastic access panel on the top of the unit.

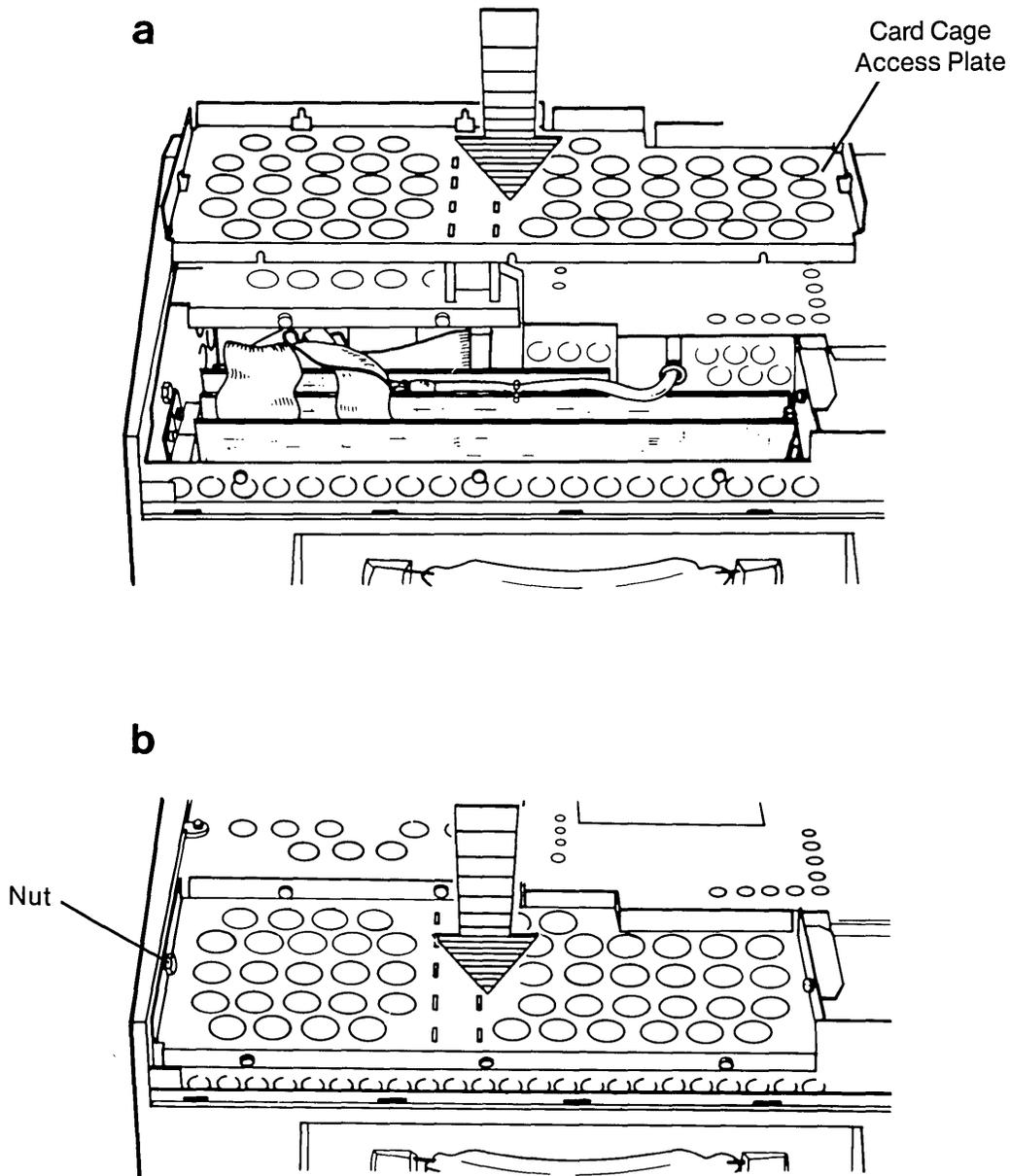


Figure 11-33. Card Cage Access Plate.

To replace the access cover, see STEP 1 on Page 5.

You have now upgraded a COMPAQ Portable Computer to a COMPAQ PLUS Portable Computer. Remove the silver COMPAQ logo label and replace the label with the gold COMPAQ PLUS logo label to finalize this action.

Once the fixed disk drive and fixed disk adapter board is completely installed, you must load the fixed disk (FDISK) utility.

The fixed disk (FDISK) utility is used to install a partition on the fixed disk. A partition is an area that is set aside for an operating system. To use an operating system, such as MS-DOS, you must install at least one partition on the fixed disk.

Turn your system on and insert your MS-DOS diskette into drive A: To install an MS-DOS partition on your fixed disk, open the door to your diskette drive and load your MS-DOS diskette. Make sure the A prompt appears on the screen. Type:

fdisk

and press ENTER.

The screen displays the following menu.

```
COMPAQ Personal Computer
Fixed Disk Management, Version 1.XX
(C)Copyright COMPAQ Computer Corp. 1983, 84
```

```
* FDISK Menu *
```

```
Current Fixed Disk Drive:  1
Available Fixed Disk Drives: 1
```

```
Choose one of these options:
```

1. Install MS-DOS Partition
2. Modify Active Partition
3. Remove MS-DOS Partition
4. List Partition Information

```
Enter your choice:  1
```

```
Press ESC to return to MS-DOS
```

Since you want to install a partition for the MS-DOS operating system, simply press ENTER. The FDISK menu uses default choices, indicated in brackets (). A default value is the value that the computer automatically assumes unless it is given a different value or instruction. Since 1 is the default value for this menu, all you need to do is press ENTER.

The screen then displays:

```

COMPAQ Personal Computer
Fixed Disk Management, Version 1.XX
(C)Copyright COMPAQ Computer Corp. 1983, 84

Current Fixed Disk Drive:    1
Available Fixed Disk Drives: 1

Do you wish to use the entire
fixed disk for MS-DOS (Y/N)?  Y

Press ESC to return to FDISK Menu

```

Because you want to set up the entire fixed disk as one partition for MS-DOS, you can simply press ENTER, since Y (yes) is the default response.

The screen appears:

```

COMPAQ Personal Computer
Fixed Disk Management, Version 1.XX
(C)Copyright COMPAQ Computer Corp. 1983, 84

* Reset System *

Current Fixed Disk Drive:    1
Available Fixed Disk Drives: 1

An MS-DOS Partition has been changed
A System Reset will occur to update MS-DOS

Insert MS-DOS Diskette in Drive A.
Press Enter when ready

Press ENTER -

```

1. Press ENTER.
2. Enter today's date.
3. Enter the correct time.

When the A> prompt appears, you now need to format the partition. The partition must be formatted before you can use it.

NOTE: The unit must have reached a stable operating temperature prior to formatting.

Since you want the system to be able to boot from the fixed disk, use the /S with the FORMAT command. To give a volume name to the entire block of information that will be stored in the partition on the fixed disk, use the /V option. If you do not assign this volume label when the prompt for it appears, you cannot add it later. Type:

format c:/s/v

and press ENTER.

The screen displays:

```
A< format c:/s/v
Press any key to begin formatting C:
```

Once you strike any key, the screen displays:

```
Warning! The data in drive C will be destroyed.
Do you want to continue the format (Y/N)?  N
```

Since you do not have any data on the fixed disk, the answer is yes. No (N) is the default response. Since you want to continue formatting the partition, type:

y

and press ENTER.

The screen then displays:

```
Formatting . . .
```

During the formatting operation, the IN USE indicator on the fixed disk panel lights up.

After several minutes, the screen displays:

```
Formatting . . . Format complete
System Transferred
```

The screen displays:

```
Volume label (11 characters, ENTER for none)?
```

Enter your volume label (name) now. It cannot be added later.

Once formatting is complete, the screen displays something similar to this:

```
10592256 bytes total disk space
 49152 bytes used in system
 12288 bytes in bad sectors
10550784 bytes available on disk
```

NOTE: Do not be concerned about bytes in bad sectors. This does not indicate a failure. This number only reflects surface imperfections which are expected on any hard disk media.

The screen displays:

```
A>
```

Now, type:

COPY *.* C:

and press ENTER.

This transfers everything that is on the MS-DOS diskette to the partition on the fixed disk.

NOTE: You cannot use DISKCOPY because that command can be used only to copy the contents of an entire diskette onto another diskette.

Remove the MS-DOS diskette from the diskette drive, leave the door open, and do a system reset (^ALT + DEL). The system cycles through its internal diagnostics, and then the screen displays the date and time prompts. After you enter or default past the date and time, the screen displays the fixed disk prompt, C>.

Now determine if the fixed disk drive subsystem is functioning properly. To check for this see Problem Isolation Procedure (PIP) in Chapter 10, FIXED DISK DRIVE SUBSYSTEM of the Service Guide.

GLOSSARY AND MNEMONIC DICTIONARY

acronym

A word formed from the initial letters of a long or difficult term. For example: radar is the acronym for radio detecting and ranging.

alphanumeric

A contraction of the words alphabetic and numeric; characters that are either letters of the alphabet, numerals or special characters #/\$! etc.

applications program

A computer program designed to meet specific user needs, such as a program that controls inventory or monitors a manufacturing process.

ASCII

Mnemonic for American Standard Code for Information Interchange. ASCII is a standardized 7-bit code used by most computers to process data. The COMPAQ uses an extended 8-bit ASCII.

asynchronous communication

A way of transmitting data from one device to another in which each serially transmitted character is preceded by a START bit and followed by a STOP bit. Also called start/stop transmission.

back-up

(1) A second copy of a diskette or other medium which protects against accidental loss or destruction of the original data.

(2) On-site or remote equipment which is available to complete an operation in the event of primary equipment failure.

BASIC

Acronym for Beginner's All-purpose Symbolic Instruction Code, an easy-to-use computer language that is widely used by beginning users of personal computers.

batch processing

A technique for automatically executing a series of similar programs or instructions during the same machine run.

baud

A unit of measurement of data processing speed, equivalent to bits per second. Typical baud rates are 110, 300, 1200, 2400, 4800, and 9600.

A-2 Maintenance and Service Guide

binary

(1) A system of numbers which uses two as its base instead of ten. The binary system uses only two digits, 0 and 1, in its written form.

(2) A device whose design uses only two possible states or levels to perform its functions. A computer executes programs in binary form.

bit

A contraction of binary digit. A bit is the smallest unit of information recognizable by a computer. All information processed by a computer is written in bit form.

boot

A machine routine whose first few instructions are sufficient to bring the rest of itself into the computer from an input device. This usually involves either the manual entering of a few instructions, or the use of a special key on the keyboard. Short for "bootstrap".

buffer

A temporary storage area for data to be transferred to or from various devices.

bus

An electronic circuit that transmits data or power. A bus is often used as a common connection for many locations in the circuitry.

byte

A term that signifies the number of bits that represents a character to the computer. Usually, a byte comprises eight bits.

calculation

A series of numbers and mathematical signs that, when entered into a computer, is executed according to a series of instructions.

card cage

The structure that holds the printed circuit boards (PCBs) in the computer.

cathode-ray tube

An electronic vacuum tube that can translate electronic signals into images on its screen. The picture tube on a television set is an example of a cathode-ray tube. Cathode-ray tube is usually abbreviated to CRT.

character

Any single letter of the alphabet, numeral, punctuation mark, or other symbol that a computer can read, write, and store.

chip

A slang term for an integrated circuit (IC).

circuit

A group of related electronic components and pathways through which electronic signals pass to perform a specific function.

COBOL

Acronym for Common Business-Oriented Language, a computer language suitable for writing complicated business applications programs.

command

A pulse or signal that causes a computer to start, stop, or continue a specific operation. Command is often used incorrectly as a synonym for instruction, which is a program step that tells the computer what to do next.

compatible

(1) A term referring to a device having characteristics which make it usable with another device with similar characteristics. COMPAQ is compatible with the IBM Personal Computer and with the hardware and software that has been designed for the IBM system.

(2) Computers that can work together with other computers that are not alike in capability or design.

configuration

A group of inter-related devices that constitute a system.

CRT

Mnemonic term for cathode-ray tube.

current limiting

Electronic means whereby current from a power supply is limited to a safe value.

cursor

A blinking line or box on a CRT screen that indicates the next location for data entry.

data

A general term used to signify all the basic elements that can be produced or processed by a computer.

default

(1) To instruct a device to not finish an assigned task.

(2) Describes an action that occurs automatically, unless otherwise instructed.

A-4 Maintenance and Service Guide

device

A piece of hardware that can perform a specific function. A printer is an example of a device.

diagnostic programs

Special programs that are used to isolate equipment malfunctions and errors.

DIN

Mnemonic term for Deutsche Industrie Norme, an organization that provides standards for electronics and manufacturing industries.

DIP

Acronym for dual-inline package, a standard way of packaging semiconductor components.

diskette

A flat, flexible Mylar[™] platter coated with magnetic material, enclosed in a protective paper envelope and used for storage of software and data.

Disk Operating System

A collection of procedures and techniques that enable the computer to operate using a floppy disk drive system for data entry and storage. Disk Operating System is usually abbreviated to DOS.

display

Visible representation of data on a screen, usually on a cathode-ray tube. Also see cathode-ray tube.

DOS

Mnemonic term for Disk Operating System. DOS is pronounced to rhyme with “boss”.

dot-matrix printer

A printer that produces characters from a two-dimensional array of dot patterns.

double-density

A type of diskette that has twice the storage capacity of standard single-density diskettes.

double-sided

A diskette that can record on both of its sides.

down time

The period of time during which a device cannot be used because of equipment failure.

drive

A device that holds and manipulates a diskette or magnetic tape so that the computer can read data from or write data to the diskette or tape.

EIA

Mnemonic term for Electronic Industries Association.

Electronic Industries Association

An organization that standardizes electrical and functional characteristics of interface devices.

error message

An audible or visual indication of hardware or software malfunction or of an illegal data-entry attempt.

extension

With the COMPAQ Computer, a one-to-three-character set that follows a filename. The extension further defines or clarifies the filename. It is separated from the filename by a period(.).

field-replaceable unit

Specific hardware modules in a system that are quickly and easily replaced. Field-replaceable unit can be abbreviated to FRU.

file

A collection of related data or programs that is treated as a unit by the computer.

file name

The set of alphabetic and numeric characters which identify a particular file. A COMPAQ Computer file name can have a maximum of eight characters, followed by a . (period) and an optional three-letter extension. For example: FILENAME.EXT is a valid COMPAQ Computer file name.

floppy/printer PCB

The circuit board containing the circuitry that controls the disk drive(s) and printer.

FRU

Mnemonic term for field-replaceable unit.

function keys

Specific keys on the keyboard that, when pressed, instructs the computer to perform a particular operation.

graphics

A technique of using lines and symbols to display information, rather than using alphanumeric characters.

hard copy

Information that is output from the computer to the printer, which produces it on paper in a readable form.

hardware

The physical equipment that is comprised by a system.

head

A component of a drive that reads, writes, or erases a diskette, tape, or other magnetic-storage medium.

hertz

A unit of measuring frequency, equal to cycles per second. The abbreviation for hertz is Hz.

HZ

Hertz.

IC

Mnemonic term for integrated circuit.

input/output

A general term for devices that communicate with a computer. Input/output is usually abbreviated to I/O.

instruction

A program step that tells the computer what to do next. Instruction is often used incorrectly as a synonym for command, which is a pulse or signal that causes a computer to start, stop, or continue a specific operation.

integrated circuit

A complete electronic circuit contained in a small semiconductor component.

interactive

Capable of conducting a dialogue, through a keyboard, with a user; rather than simply responding to commands.

interface

An electronic circuit that serves as a common boundary between different circuits or devices.

I/O

Mnemonic term for input/output.

job

A collection of tasks viewed by the computer as a unit.

K

The symbol signifying the quantity 2, which is equal to 1024. K is sometimes confused with the abbreviation k, which is equal to 1000.

k

The symbol signifying the quantity 10, which is equal to 1000. The symbol k is often confused with K, which is equal to 1024.

Kbyte

1024 bytes.

keyboard

A device that transmits encoded alphanumeric character information when it senses that a key has been pressed.

Mbyte

1,048,576 (2) bytes.

media

The plural of medium.

medium

The physical material on which data is recorded and stored. Magnetic tape, punched cards, and diskettes are examples of media.

memory

The storage area in the computer where data can be copied, held, and retrieved.

menu

A list of choices from which an operator can select a task or operation to be performed by the computer.

microprocessor

A semiconductor central processing unit (CPU) in a computer.

mnemonic

A short, easy-to-remember abbreviation or acronym for a long or difficult term. For example, FRU is the mnemonic term for field-replaceable unit.

modem

Acronym for modulator demodulator. A modem converts data from the computer to high-frequency signals that can be transmitted through telephone lines, and vice versa.

operating system

A program that manages the overall operation of the computer.

option module

An add-on device that provides expanded capabilities to a system.

parallel output

Sending more than one bit simultaneously to and from interconnected devices.

parity

An extra-bit code that is used to detect data errors by making the sum of the 1 bits in a data unit either an odd or an even number.

PCB

Mnemonic term for printed circuit board.

peripheral

An input/output or other device not under direct computer control.

pixel

Mnemonic term for picture element. A pixel is a specific location on a CRT screen that can be accessed as a single bit.

port

The entry channel to and from the central computer for connection of a communications line or other peripheral device.

power supply

The functional area of a system that transforms external ac line voltage into internal dc supply voltage.

printed circuit board

A Fiberglass board that contains all the electronic components and pathways that perform a specific function.

printer

A device that produces the printed paper copy of a document, file, or screen display.

processor board

The main control board of the computer.

program

A series of steps that tells a computer how to solve a problem or execute instructions.

prompt

A word or series of words which appear on the CRT screen to inform the user of what is to happen next.

RAM

Acronym for random-access memory.

random-access memory

A type of memory providing access to storage locations in the memory by using a system of vertical and horizontal coordinates. The computer can write information into or read information from the random-access memory. Random-access memory is often called RAM.

read-only memory

A type of memory that contains permanent data or instructions. The computer can read from but not write to the read-only memory. Read-only memory is often called ROM.

real time

- (1) The actual time required to solve a problem.
- (2) The process of solving a problem during the actual time that a related physical process takes place so that results can be used to guide the physical process.

remote

A term used to refer to devices that are located at sites away from the central computer.

reverse video

A feature of a CRT that displays dark characters on a light background, opposite of the usual display.

ROM

Acronym for read-only memory.

RS-232

The communications interface between a modem and terminal devices which complies with EIA Standard RS-232C.

scratch diskette

A blank formatted diskette used during testing to prevent the disk drive from writing to and destroying the Diagnostics diskette.

screen

The viewing surface of a CRT.

self-test

A circuit used by a device to check its own operation, usually when power is first applied.

serial output

Sending only one bit at a time to and from interconnected devices.

single-density

The standard recording density of a diskette. Single-density diskettes can store approximately 3400 bits per inch (bpi).

single-sided

A term used to describe a diskette that can record on one side only.

software

The tasks and programs that tell a computer how to perform its functions.

system

A collection of hardware, software, and firmware that is interconnected to operate as a unit to perform specific functions.

system board

Another name for processor board.

task

A machine run; a program in execution.

toggle

(1) Alternation of function of successive strokes of a particular key.

(2) To use a toggle key.

track

A specific area on a moving-storage medium, such as a diskette or magnetic tape, that can be accessed by the drive heads.

upgrade

To expand a system by installing options or using revised software.

VDU

Mnemonic term for video display unit.

VDU controller

A circuit providing VDU control and graphics capabilities.

video display unit

The COMPAQ Computer CRT monitor (see cathode-ray tube).

Winchester drive

A hard disk enclosed in a permanently-sealed drive that protects it from environmental interference.

word

The set of bits comprised by the largest unit that the computer can handle in a single operation. A word is usually divided into bytes. With COMPAQ, a word has 16 bits (two bytes).

word processing

Processing text by performing functions such as formatting, paragraphing, justification, arrangement of pages, moving text, and printing.

word-wrapping

A feature that automatically shifts text from a line that is too long and places it on the line below. Word-wrapping eliminates the need for carriage returns.

write-protect notch

A cut-out opening in the sealed envelope of a diskette which, when covered by a paper tab or piece of tape, prevents writing to a diskette, but allows unimpeded reading from the diskette.

PERFORMANCE DATA AND SPECIFICATIONS

ELECTRICAL AND MECHANICAL SPECIFICATIONS	Dimensions:	Environmental Requirements:
	Height: 4843.3 mm (190.68 in.)	Temperature: 10 degrees to 40 degrees C.
	Depth: 2590.8 mm (102 in.)	Operating - 40 + (o)C to + 60 + (o)C nonoperating
	Width: 6089.5 mm (239.74 in.)	Non-Condensing Humidity: 20% to 80% operating 5% to 95% non-operating.
	Weight: With one disk drive: 27.5 lbs (12.47 kilos)	
	With two disk drives: 30.5 lbs (13.83 kilos).	
	Desk Space Required: 7315.2 mm (288 in.) by 6096 mm (240 in.)	Cable Lengths and Sizes: AC Power: 6'7" long, 18 AWG (79 in.) (2006.6 mm)
	Power Requirements: Voltage: 115 Vac Frequency: 60 Hz Current: 2 amps	Keyboard: 6'0" long, 28 AWG (72 in.) (1828.8 mm)

KEYBOARD SPECIFICATIONS	Type:	Number of Keys:
	Capacitive technology	83
	Size:	
	Length: (5562.9 mm)(219.01 in.) Depth: (2154 mm)(84.80 in.) Height: (459.9 mm)(18.10 in.)	

VDU DISPLAY SPECIFICATIONS	General Description:	Display Size:
	Nine-inch diagonal, 90-degree deflection High-persistence green phosphor Etched surface to reduce glare	80 character by 25 line screen 40 character by 25 line screen
		Video Signal: Maximum video bandwidth of 18.981 MHz
	Vertical Drive: Screen refreshed at 50/60 Hz, with 350/200 vertical lines of resolution and 720/640 horizontal lines of resolution.	
	Horizontal Drive: Positive-level, TTL-compatible frequency, 18.5/15.7 KHz	

B-2 Maintenance and Service Guide

DISK DRIVE SPECIFICATIONS

Media:
Industry-standard
5¼" diskette

Tracks Per Inch:
48

Number of Tracks:
40

Dimensions:
Height: 85.8 mm
(3.38 in.)
Width: 149.4 mm
(5.88 in.)
Depth: 210.6 mm
(8.29 in.)
Weight: 1.45 kg
(3.2 lb)

Temperature:
(Exclusive of Media)
Operating: 4.4 degrees C to 46.1 degrees C
(40 degrees F to 115 degrees F)
Non-operating: -40 degrees C to 60 degrees C
(-40 degrees F to 140 degrees F)

Humidity:
(Exclusive of Media)
Operating: 20% to 80% (non-condensing)
Non-operating: 5% to 95% (non-condensing)

POWER SUPPLY SPECIFICATIONS

Input Requirements:
Line Voltage: 90 to 132 Vac, single phase; 180 to 264 Vac single phase;
changeover involves a jumper and alternate fan

Line Frequency: 47 to 62 Hz

Current: 2.0 amps maximum at input voltage of 120 Vac, 60 Hz

VDC Output:

Nominal Voltage Vdc	Current Amps		Regulation Tolerance %
	Min.	Max.	
+ 5.0	2.0	10.0	5
- 5.0	0.0	0.5	5
+ 12.0	1.0	5.0	5
- 12.0	0.0	0.5	5

PARTS CATALOGUE

INTRODUCTION

This section is provided to help the Service Technician in determining specific COMPAQ part numbers when placing an order through COMPAQ Computer Corporation. Any additions, deletions or modifications to this section made by COMPAQ will be documented and published accordingly to all authorized dealerships.

The information contained in this section is divided into seven separate parts listings designed to illustrate the COMPAQ Portable Computer or COMPAQ PLUS Portable Computer from major assemblies to individual components. Diagrams are included and conveniently placed directly opposite each parts listing. The seven parts listings include:

1. System (Front View)
2. Keyboard (Front View)
3. Chassis Assembly (Front View)
4. Common Chassis (Front View)
5. Mechanical Chassis (Rear View)
6. Monitor Enclosure (Front View)
7. System Chassis (Front View)

Each parts listing consists of four columns of information for your use:

ITEM - This number corresponds to the particular part as it is shown in the diagram on the opposite page.

PART NUMBER - This is the actual part number designated by COMPAQ. It should be used only when placing a special order through COMPAQ Computer Corporation. Please refer to the COMPAQ Authorized Dealer Guide for more information on ordering procedures.

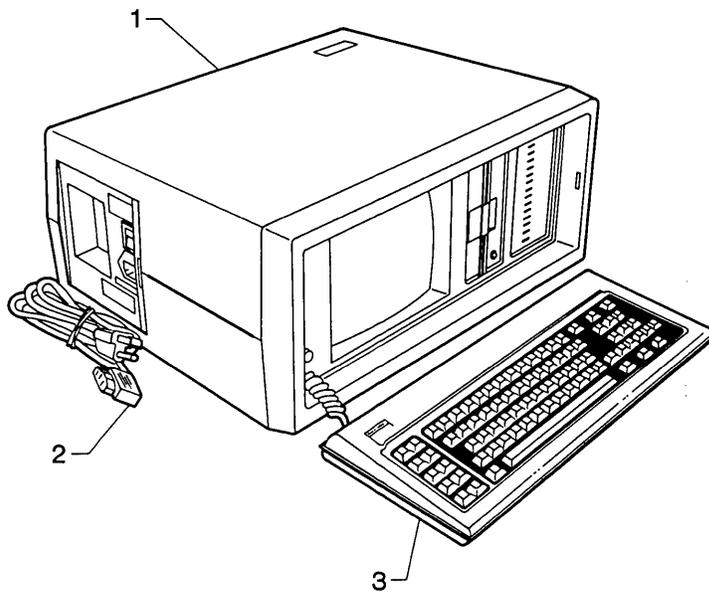
DESCRIPTION - Describes the individual module, assembly, subassembly or part (as applicable). This information may also be used when placing orders through COMPAQ. Please refer to the COMPAQ Authorized Dealer Guide for more information on ordering procedures.

ORDER NUMBER - COMPAQ has designed several pre-packaged replacement "kits" for most modules (e.g., keyboard assembly, monitor assembly, etc.). When a replacement kit is not available for a particular part, the Order Number will be the same as the Part Number, and should be used for each special order. Please refer to the COMPAQ Authorized Dealer Guide for more information on ordering procedures.

C-2 Maintenance and Service Guide

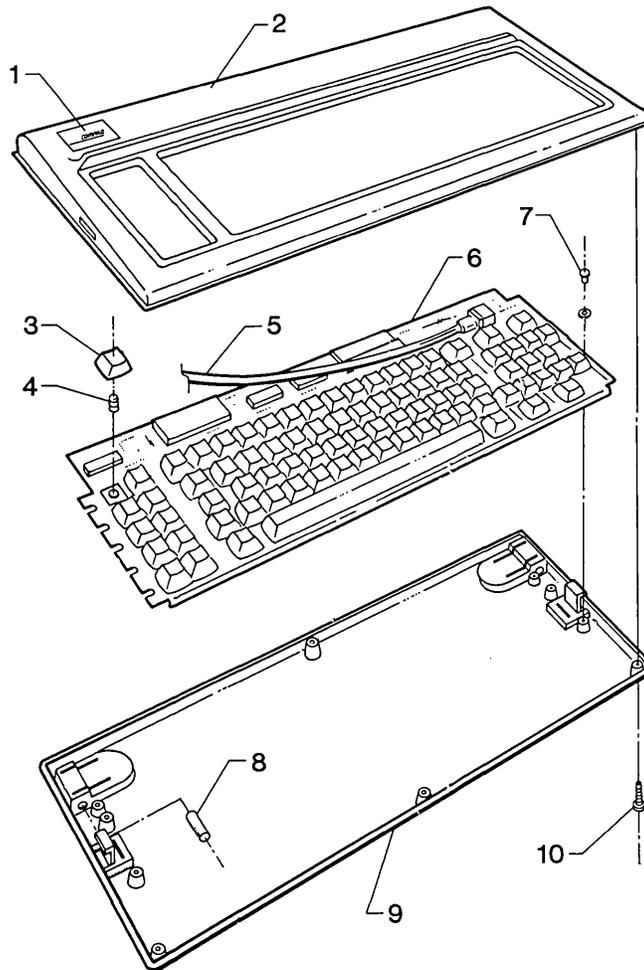
SYSTEM (FRONT)

ITEM	PART NUMBER	DESCRIPTION	ORDER NO.
1	100019-001	Assembly, Enclosed Chassis	100019-001
2	100374-001	AC Line Power Cord	100485-001
3	100006-001	Keyboard Assembly	100487-001



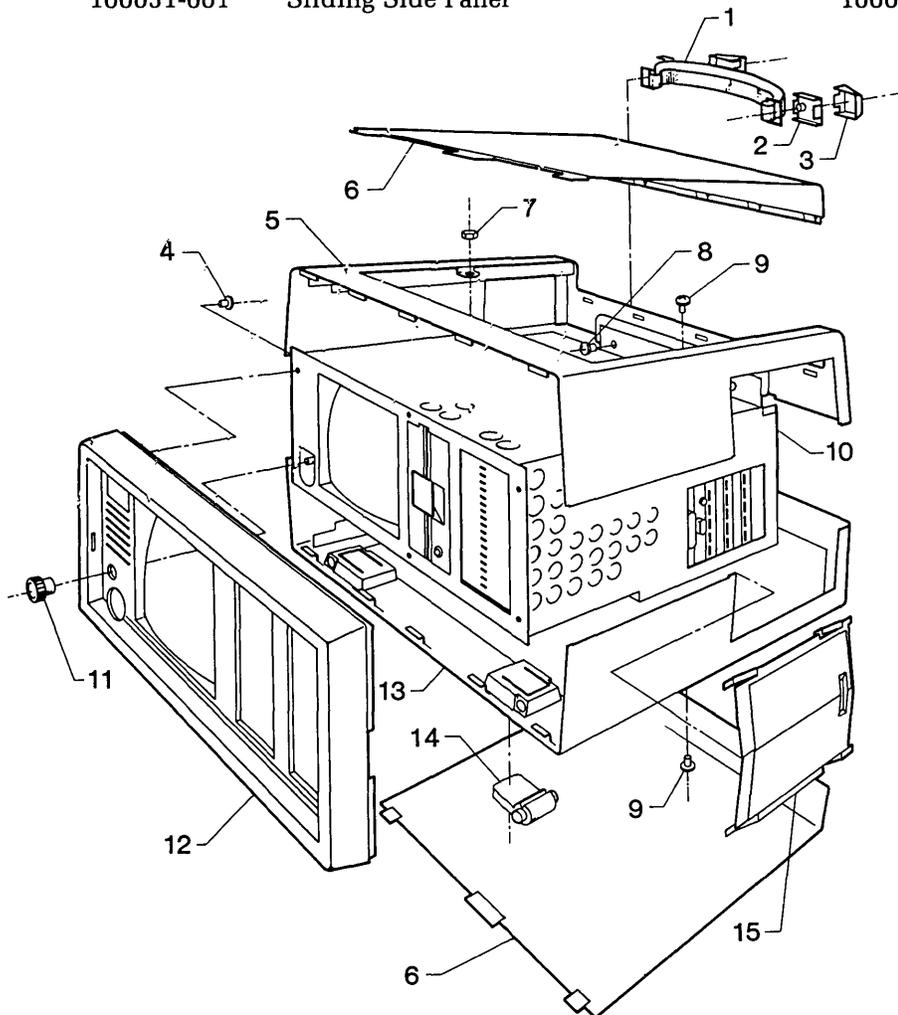
KEYBOARD (FRONT)

ITEM	PART NUMBER	DESCRIPTION	ORDER NO.
1	100307-001	Logo, Bezel/Keyboard	100307-001
2	100013-001	Case, Top	100013-001
3		Keytop	
4		Key Spring	
5	100009-001	Keyboard Cable Assembly	100009-001
6	100106-001	Keyboard	100106-001
7	100353-002	Screw, 6x1/4 Panhead Phillips	100405-001
8	100015-001	Keyboard Spacing Pin	100015-001
9	100008-001	Bottom Case Assembly	100008-001
10	100353-001	Screw, 4x5/8 Panhead Phillips	100405-001



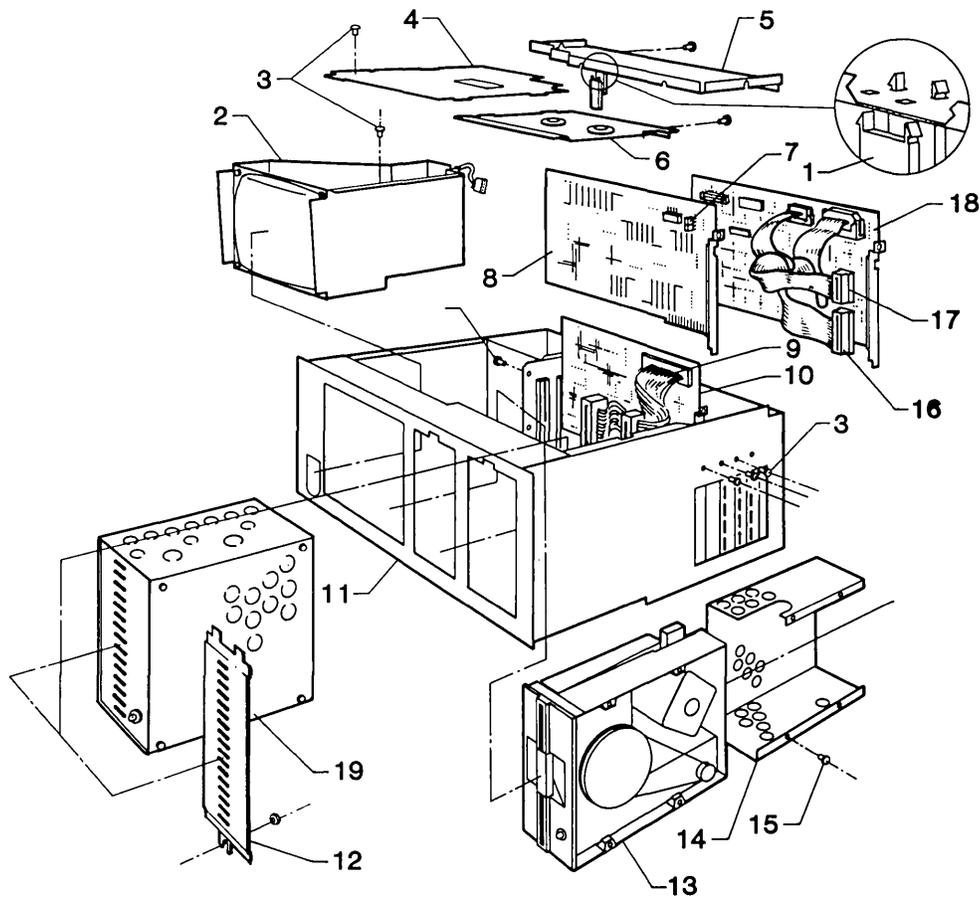
CHASSIS (FRONT)

ITEM	PART NUMBER	DESCRIPTION	ORDER NO.
1	100418-001	Handle	100417-001
2	100419-001	Handle Bushing	100417-001
3	100420-001	Handle End Cap	100417-001
4	100349-003	Screw, 6-32x3/8 Panhead Phillips Locking	100405-001
5	100022-001	Upper Case	100022-001
6	100024-001	Access Door	100024-001
7	100251-002	Nut, Hex Self-Locking 4-40	100405-001
8	100349-004	Screw, 10-32x3/8 Panhead Phillips Locking	100349-004
9	100348-002	Screw, 4-40x3/8 Trusshead Phillips	100348-002
10	100311-001	Chassis Assembly	100311-001
11	100310-001	Brightness Knob Assembly	100491-001
12	100020-001	Computer Faceplate/Bezel	100020-001
13	100021-001	Lower Case	100021-001
14	100077-001	VDU Foot/Detent	100077-001
15	100031-001	Sliding Side Panel	100031-001



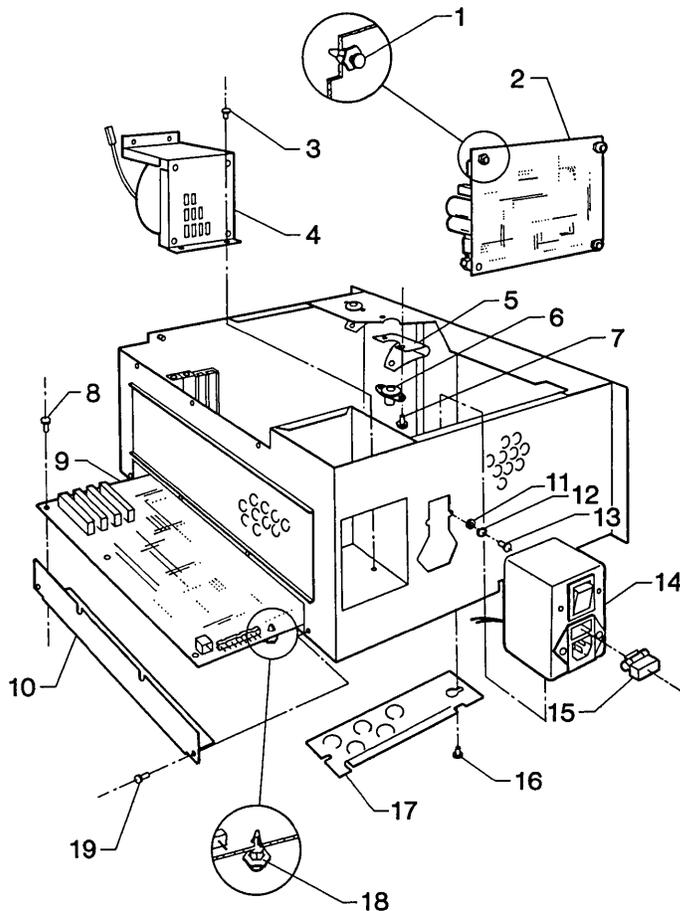
COMMON CHASSIS (FRONT)

ITEM	PART NUMBER	DESCRIPTION	ORDER NO.
1	100030-001	PC Board Retainer	100030-001
2	100050-001	Monitor Assembly	100481-001
3	100348-001	Screw, 4-40x1/4 Trusshead Phillips	100405-001
4	100027-001	Monitor Assembly Cover	100027-001
5	100028-001	Card Cage Cover	100028-001
6	100330-001	Disk Drive Cover	100330-001
7	100081-001	2-Position "Mini-Jump" Jumper	100081-001
8	000007-001	VDU Adapter PCB Assembly	100479-001
9	100048-001	Floppy Control Cable Assembly	100484-001
10	000010-001	Floppy/Printer Adapter PCB Assembly	100480-001
11	100311-001	Chassis (common) subassembly	100311-001
12	100101-001	Vacant Disk Drive Cover	100101-001
13	100043-001	Floppy Disk Drive	100333-001
14	100444-001	Disk Drive Shield	100444-001
15	100376-181	Screw, 6-32x1/4 Panhead Phillips	100376-181
16	100625-001	34 Position Hard Disk Control Cable	100641-002
17	100625-002	20 Position Hard Disk Control Cable	100641-002
18	100636-001	Hard Disk Controller Board	100644-001
19	100634-001	Hard Disk Drive	100643-001



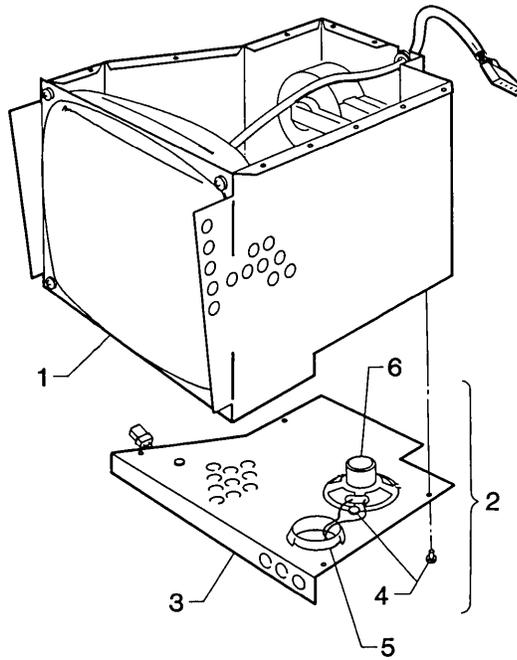
MECHANICAL CHASSIS (REAR)

ITEM	PART NUMBER	DESCRIPTION	ORDER NO.
1	100035-001	PCB Standoff	100405-001
2	000001-001	Switching Mode Power Supply PCB Assembly	100475-001
3	100348-001	Screw 4-40x1/4 Trusshead Phillips	100405-001
4	100314-001	Fan (with bracket) Assembly	100482-001
5	100430-001	Ground Strap	100430-001
6	100287-001	Disk Drive Shock Mount	100287-001
7	100376-197	Screw, 6-32x7/8 Panhead Phillips	100405-001
8		Screw	
9	000004-001	Processor PCB Assembly	100478-001
10	100038-001	Processor PCB Support Bracket	100478-001
11	100208-003	#8 Flat Washer	100208-003
12	100207-003	#8 Lock Washer	100207-003
13	100206-005	Screw, 8-32x3/8 Panhead Phillips	100405-001
14	100041-001	Power Switch Assembly	100476-001
15	100228-001	AC Line Fuse	100477-001
16	100348-001	Screw, 4-40x1/4 Trusshead Phillips	100405-001
17	100029-001	Bottom Cover	100029-001
18	100348-001	Screw, 4-40x1/4 Trusshead Phillips	100405-001



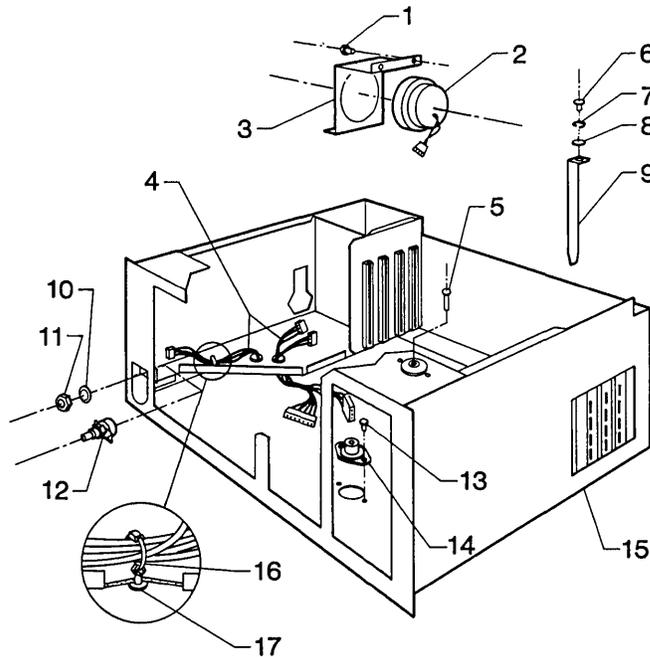
MONITOR ENCLOSURE (FRONT)

ITEM	PART NUMBER	DESCRIPTION	ORDER NO.
1	100332-001	Monitor Assembly	100481-001
2	100315-001	Monitor Floor Assembly	100315-001
3	100052-001	Monitor Floor	100052-001
4	100348-001	Screw, 4-40x1/4 Trusshead Phillips	100405-001
5	100233-001	Snap Bushing	100233-001
6	100039-001	Speaker (with cable) Assembly	100039-001



SYSTEM CHASSIS (FRONT)

ITEM	PART NUMBER	DESCRIPTION	ORDER NO.
1		Screw	
2	100042-001	Fan Assembly	100482-001
3	100056-001	Fan Bracket	100482-001
4	100260-001	Power Cable Harness Assembly	100260-001
5	100349-002	Screw, 6-32x1/4 Panhead Phillips Locking	100349-002
6	100348-001	Screw, 4-40x1/4 Trusshead Phillips	100405-001
7	100207-001	Lock Washer #4	100207-001
8	100208-001	Flat Washer #4	100208-001
9	100103-001	I/O Mounting Bracket (Blank)	100103-001
10	100350-001	Washer, Internal-tooth 1/4 Thin	100350-001
11	100251-002	4-40 Self-Locking Hex Nut	100405-001
12	100267-001	Potentiometer, 100Kohms (+ 30%)	100491-001
13	100349-003	Screw, 6-32x3/8 Panhead	100405-001
14	100287-001	Disk Drive Shock Mount	100287-001
15	100054-001	System Chassis	100054-001
16	100266-001	Tie-Wrap	100266-001
17	100247-001	Push Mount	100405-001



ADMINISTRATION

To be provided at a later date.

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SERVICE ADVISORY

Insert your Service Advisory notices here.

SERVICE BULLETINS

Insert your Service Bulletins here.

