



*Personal Computer  
Hardware Reference  
Library*

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**IBM RT PC  
Model 10 Hardware  
Maintenance and Service**



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Hardware Reference  
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Model 10 Hardware  
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## **NOTICE TO USER**

The Diagnostic Diskettes (Diag 1 and Diag 2) referred to in this manual are located in the IBM RT PC Problem Determination Guide binder.

### **First Edition November 1985**

Changes are made periodically to the information herein; these changes will be incorporated in new editions of this publication.

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**Warning:** This equipment has been tested and found to comply with the limits for a Class A computing device pursuant to Subpart J of Part 15 of FCC Rules, which are designed to provide reasonable protection against such interference when operated in a commercial environment. Operation of this equipment in a residential area is likely to cause interference, in which case the user at his own expense will be required to take whatever measures may be required to correct the interference.

This equipment generates, uses, and can radiate radio frequency energy. If not installed and used according to the instruction manual, the equipment may cause interference to radio communications. It has been tested and found to comply with the limits for a Class A computing device pursuant to Subpart J of Part 15 of FCC Rules, which are designed to provide reasonable protection against such interference when operated in a commercial environment. Operation of this equipment in a residential area is likely to cause interference, in which case the user at his own expense will be required to take whatever measures may be required to correct the interference.

If this equipment causes interference to radio communications, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient the receiving antenna.
- Relocate the equipment with respect to the receiver.
- Move the equipment away from the receiver.
- Plug the computer into a different outlet, so that the computer and receiver are on different branch circuits.
- Ensure that card mounting screws, attachment connector screws, and ground wires are tightly secured.



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- Ensure that card slot covers are in place when no card is installed.
  - If peripherals not offered by IBM are used with this equipment, it is suggested to use shielded, grounded cables with in-line filters, if necessary.

If necessary, consult your dealer service representative for additional suggestions.

The manufacturer is not responsible for any radio or television interference caused by unauthorized modifications to this equipment. It is the responsibility of the user to correct such interference.

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# Safety

This manual contains “DANGER” notices on pages 4-22 and 4-23. If desired, translate the text and write your own words on the pages.

This manual contains a “Safety Inspection Guide” on the following pages. The Safety Inspection Guide is used by the IBM Service Representative.

The IBM RT PC Model 10 System Unit contains no hazardous voltages or safety grounds outside the power supply. The power supply is a sealed unit and is not field serviceable.

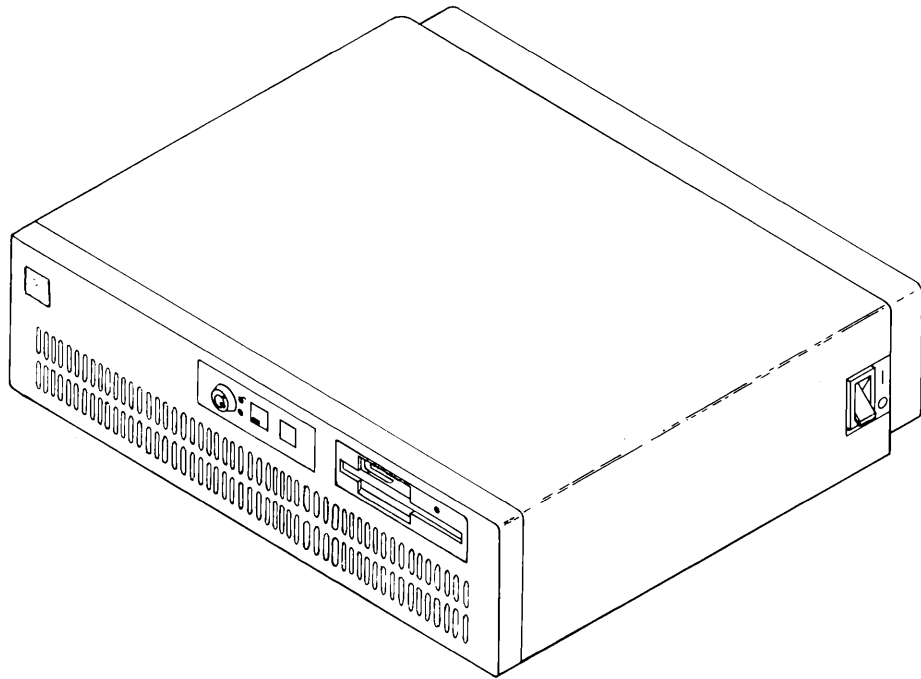
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## Safety Inspection Guide

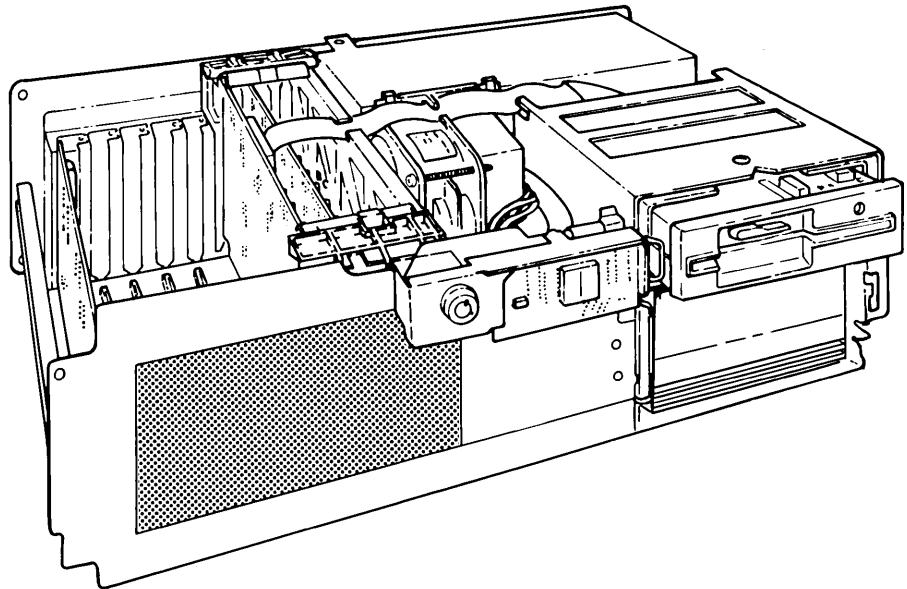
Use this guide to identify unsafe conditions. Use good judgment to identify potential safety hazards not covered by this guide. If unsafe conditions are present, determine how serious the hazards are and whether you should continue before correcting the problem.

Do the following checks:

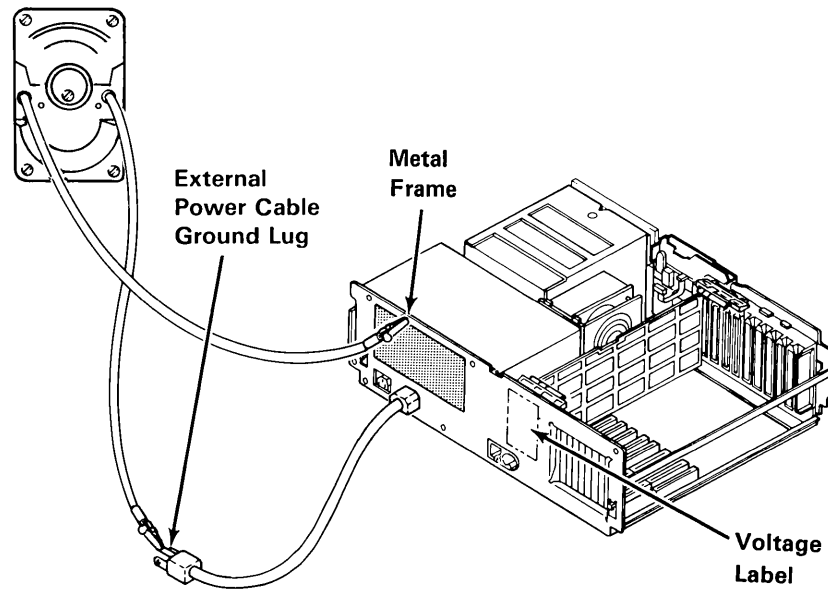
1. Check the covers for damage or alterations that expose the internal parts of the system unit or for sharp edges.
  2. Check the covers for proper fit to the system unit. They should be in place and secure.
- 



- 
3. Set the power switch on the system unit to Off.
  4. Remove the rear cover (page 4-10).
  5. Remove the top cover (page 4-12).
  6. Check for alterations or attachments. If there are any, check for obvious safety hazards such as broken wires, sharp edges, or broken insulation.
  7. Check the internal cables for damage.
  8. Check for dirt, water, and any other contamination within the system unit.
- 



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9. Check the voltage label on the rear of the system unit to ensure it matches the voltage at your outlet.
  10. Check the external power cable for damage.
  11. With the external power cable connected to the system unit, check for less than 0.1 ohm resistance between the ground lug on the external power cable plug and the metal frame of the power supply.
  12. Install the top cover (page 4-13).
  13. Install the rear cover (page 4-11).
- 



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## About this Book

This manual provides service information about the IBM RT PC Model 10 System Unit, adapters, and attached devices that do not have their own service information. This manual does not contain service information about attached printing devices.

Users of this manual should have training on the IBM RT PC Model 10.

This manual is divided into sections to make the information easier to find.

Section 1, “System Description” contains a brief description of the system unit, keyboard, and display.

Section 2, “Diagnostics” contains descriptions of the diagnostic programs, utilities, and the service request number.

Section 3, “Problem Isolation Charts” contains the service procedures used to isolate failures to a field-replaceable unit.

Section 4, “Removal and Replacement Procedures” contains the locations, removal procedures, and replacement procedures. These procedures may direct you to another section for specific details such as switch settings, jumper settings, or terminator resistor settings.

Section 5, “Base System Unit” contains a description, specifications, cabling diagrams, a data flow diagram, and parts information for the base components of the system unit.

Section 6, “System Memory Options” contains a description, specifications, and parts information for each system memory option.

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Section 7, “Diskette Drive” contains a description, specifications, terminator resistor setting, and parts information for the diskette drive.

Section 8, “Fixed-Disk Drive” contains a description, specifications, terminator resistor setting, and parts information for the fixed-disk drive.

Section 9, “Adapters” contains a description, specifications, switch or jumper settings, and parts information for each adapter used in the system unit.

Section 10, “User Input Devices” contains a description, specifications, a removal procedure, a replacement procedure, and parts information for each type device used to input data or commands.

Section 11, “Displays” contains a description, specifications, control adjustment procedures, and parts information for each IBM display used with the IBM PC RT Model 10.

Section 12, “Tape Drive” contains a description, specifications, and parts information for the tape drive used with the IBM PC RT Model 10.

Appendix A, “Tool Requirements” contains descriptions of the tools needed to service the IBM PC RT Model 10.

Appendix B, “SRA to FRU Cross-Reference List” contains a list of each Service Repair Action (SRA) number and the part number and part name of the field-replaceable unit it represents. This list is in SRA number order.

A Reader’s Comment Form and Book Evaluation Form are provided at the back of this book. Use the Reader’s Comment Form at any time to give IBM information that may improve the book. After you become familiar with the book, use the Book Evaluation Form to give IBM specific feedback about the book.

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## Related Publications

- *IBM RT PC Guide to Operations* describes the Model 10, Model 20, and Model 25 system units, the displays, keyboard, and other devices that can be attached. This guide also includes procedures for operating the hardware and moving the Model 10, Model 20, and Model 25 system units.
- *IBM RT PC User Setup Guide* provides instructions for setting up and connecting devices to the system units. This book also gives procedures for testing the setup and for installing the AIX Operating System.
- *IBM RT PC Options Installation* provides instructions for installing optional adapters in Model 10, Model 20, and Model 25 and installing fixed-disk and diskette drives in Model 20 and Model 25.
- *IBM RT PC Problem Determination Guide* provides instructions for running diagnostic routines to locate and identify hardware problems. Also includes problem determination for software. Two high-capacity (1.2MB) diskettes containing the IBM RT PC diagnostic routines are included.
- *IBM RT PC Hardware Technical Reference* is a two-volume set. Volume I describes how the system unit operates, including I/O interfaces, serial ports, memory interfaces, and CPU interface instructions. Volume II describes adapter interfaces for optional devices and communications and includes information about IBM Personal Computer family options and the adapters supported by Model 10, Model 20, and Model 25. (Available optionally)
- *IBM 6157 Streaming Tape Drive Setup and Operating Instructions* provides instructions for setting up and operating the IBM 6157 Streaming Tape Drive. This pamphlet also describes procedures for cleaning the recording head of the tape drive and handling tape cartridges.



- 
- *Setup Instructions for the IBM PC Network Short, Medium, and Long Distance Kits* provides instructions for setting up and connecting the short, medium, and long distance expanders.
  - *Setup Instructions for the IBM PC Network Transformer and Translator Unit* provides instructions for setting up and connecting the transformer and translator.

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To order additional copies of this publication, use either of the following sources:

- To order from your IBM representative, use Order Number SV21-8026.
- To order from your IBM dealer, use Part Number 6280745.

A binder and wrap plugs are included with the order.

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# Section 1. System Description



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## About this Section

This section contains a brief description of the three units that make up the basic IBM RT PC Model 10. These descriptions are for the minimum system. Your system may contain devices that are not described in this section. For service information on a particular device, see the section for that type of device.

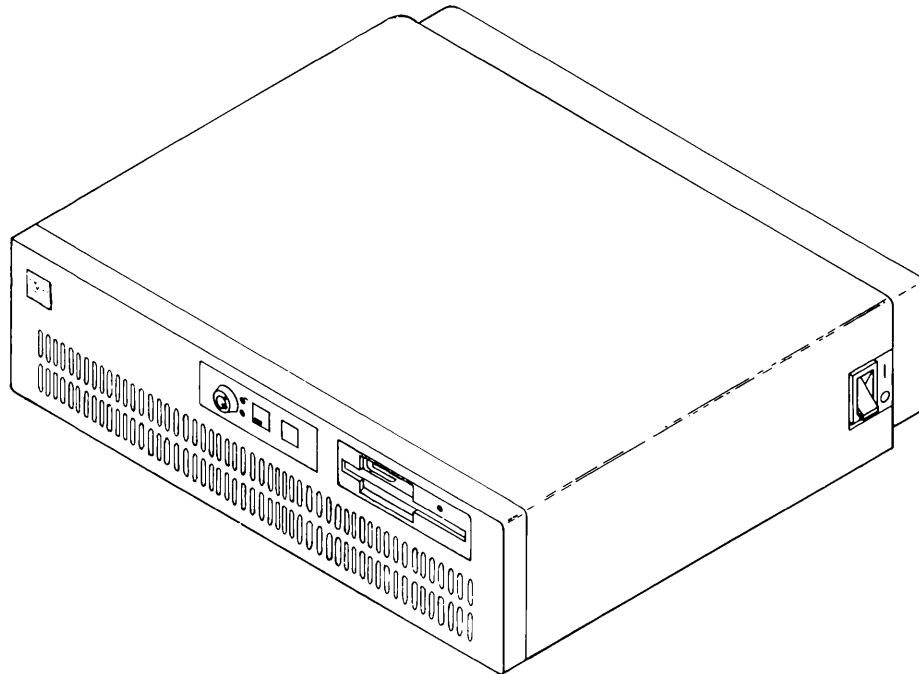
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## Introduction

The IBM RT PC Model 10 is a table-top system consisting of a system unit, display, and keyboard. Your system may contain other devices such as printers and communication devices.

## System Unit

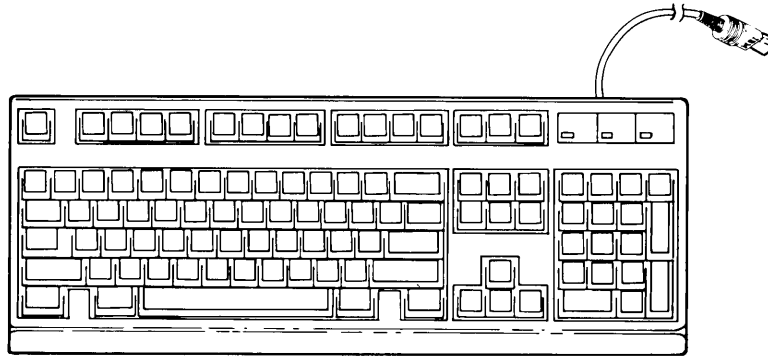
The system unit contains the processor, optional floating-point accelerator, system memory, power supply, fixed-disk drive, diskette drive, and the adapters for the keyboard, display, fixed-disk drive, diskette drive, mouse, printers, tape drive, and communication devices.



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## Keyboard

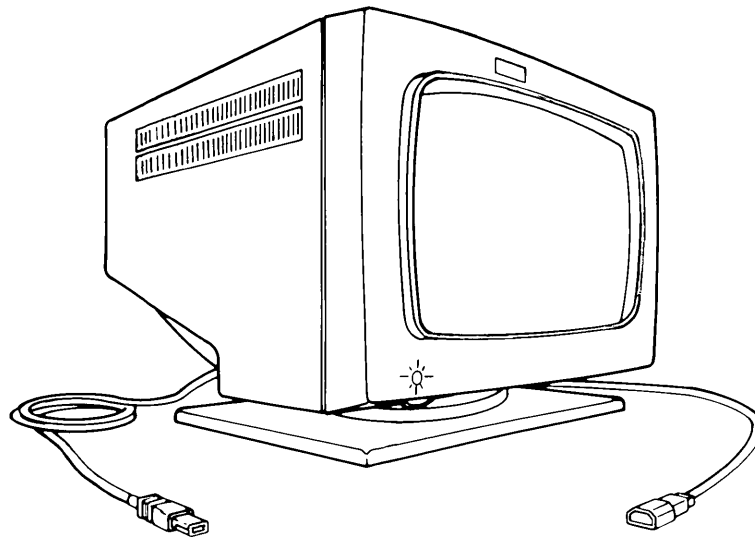
The keyboard is shipped with the system unit. The keyboard adapter is built into the system board. The keyboard attaches to the keyed keyboard connector on the rear panel of the system unit.



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## Display

Several types of display devices can be attached to the system unit. An adapter that is compatible with both the system unit and display device must be installed in the system unit.



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## Section 2. Diagnostics

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## About this Section

This section contains descriptions of the diagnostic programs available on the IBM RT PC Diagnostic Diskettes and a description of the service request number.

Section 3 directs you in the use of these programs during problem isolation.

Use the contents list on the previous page to find information about the diagnostic programs or the service request number.



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## Introduction to Diagnostics

The diagnostic programs are divided into six types:

- The ***Resident Power-On Self-Test*** (POST) programs are in ***Read-Only Memory*** (ROM) modules on the processor board. These programs run when the system unit is first powered on.

The Resident POST programs check the system unit components needed to load programs from the fixed disk or diskette. See page 2-6 for more information about the Resident POST programs.

- The ***Loadable POST*** programs load from the fixed disk or the diagnostic diskettes. These programs run when the Resident POST programs complete.

The Loadable POST programs first sense the adapters and options installed in the system unit and build an ***Installed Features List***. Before any checkout routines are run, the installed features list is compared to the ***Configuration Record*** on the fixed disk. See page 2-6 for more information about the Loadable POST programs.

Pressing the **Ctrl-Alt-Pause** keys cause the Loadable POST programs to run.

- The ***Diagnostic Routines*** are on the diagnostic diskettes. The ***Problem Determination Guide*** directs the system user to run the Diagnostic Routines to check the system unit during problem determination. See page 2-10 for more information about the Diagnostic Routines.
- The ***Utilities*** are on the diagnostic diskettes. They provide utility functions such as exercising communication links, and displaying special information.

The Utility programs are used in a non-directed manner to provide control and information to the system user or service technician. See page 2-12 for more information about the Utilities.

- 
- The ***Advanced Diagnostic Routines*** are on the diagnostic diskettes. These programs are used by the service technician to isolate failures to a ***Field-Replaceable Unit*** (FRU).

The Advanced Diagnostic Routines perform the same tests as the Diagnostic Routines plus additional tests that require action by the service technician. The additional tests may require the use of wrap plugs, keying certain patterns on the keyboard, or answering questions about displayed information. See page 2-15 for more information about the Advanced Diagnostic Routines.

- The ***Installation Verification*** option compares the installed features list built by the Loadable POST programs to the configuration record on the fixed disk. See page 2-16 for more information about the Installation Verification option.

When a problem is detected, the ***Problem Determination Procedures*** (PDPs) in the *Problem Determination Guide* direct the system user in a checkout of the IBM RT PC Model 10. The PDPs ask the system user to record a ***Service Request Number*** (SRN) and provide it to the service organization. The service technician uses the SRN to determine which FRU is needed to repair the system. See page 2-17 for more information about the SRNs.

---

## Power-On Self-Test

The resident Power-On Self-Test (POST) programs are in Read-Only Memory (ROM) modules on the processor board. These programs run when the system unit is first powered on. When the resident POST programs complete, additional POST programs are loaded from the fixed disk or from the diagnostic diskettes.

Numbers display on the *Two-Digit Display* to track the progress of the POST programs. Some tests may run so quickly that the numbers may not be visible.

**Note:** The following chart is for “steady” numbers only. Flashing (approximately one second) numbers are for software failures.

Number	Test description
88	Displays for one second to provide a lamp test. If “88” is displayed steady, the 32-bit processor has stopped.
00	If installed, this test resets the IBM Monochrome Display and Printer Adapter.
01	Tests the ROM modules on the processor board.
02	Tests for correct communication between the 32-bit processor and the system board.
03	Tests the memory controller on the processor board and the system memory boards in slots C and D.
04	Tests the processor board.
05	Tests the processor board.
07	Tests the I/O channel controller on the system board.
08	Tests the I/O channel controller on the system board.
09	Tests the keyboard adapter on the system board.

<b>Number</b>	<b>Test description</b>
99	Indicates testing was stopped because the keylock is in the Locked position.
10	Tests the interval timer on the system board.
11	Tests the interrupt controller on the system board.
12	Tests the direct memory access controller on the system board.
14	Tests the fixed-disk drive adapter.
15	Tests the fixed-disk drive adapter.
16	Tests the diskette drive adapter.
17	Tests the diskette drive adapter.
Beep	Tests the speaker in the keyboard.
20	Tests the battery-powered memory on the system board.
21	An attempt is being made to do an IPL, using the devices specified in the battery-powered memory.
22	An attempt is being made to do an IPL, using the default devices specified in the ROM on the processor board.
23	None of the IPL devices specified in the battery-powered memory or the ROM default list could be identified.
25	An error occurred during IPL. The system unit must be powered off to clear this error.
26	An IPL operation is in progress.
27	The memory capacity was exceeded during IPL.
29	The IPL operation is beginning.
30 - 87	Individual adapter or device tests. Use Section 3 to isolate the failure.
89	A machine or program check was detected.
Blank	This is the normal condition after the POST programs complete.

---

## Standalone Diagnostic Program Descriptions

The IBM RT PC Diagnostic Diskettes contains the diagnostic programs used to checkout and test the system unit. Two diskettes are provided. They are labeled Diagnostics 1 (DIAG-1) and Diagnostics 2 (DIAG-2). The Diagnostics 1 (DIAG-1) diskette is inserted in the diskette drive before the system unit is powered on. After the diagnostic programs load, you are instructed when to change diskettes.

The diagnostic programs do not require an *Operating System* or any other *Licensed Program*. Loading the diagnostic programs removes all other programs from memory.

### Loading the Diagnostic Diskette

**Note:** Before loading the diagnostic programs, all other programs and operating systems must be stopped to prevent loss of data.

Do the following to load the diagnostic programs:

1. Be sure that all programs or operating systems are stopped (get assistance if needed).
2. Set the power switch on the system unit to Off.
3. If present, remove the write-protect tab from the diagnostic diskettes.
4. Insert the Diagnostics 1 (DIAG-1) diskette in the diskette drive and close the drive.
5. Set the power switch on the system unit to On.
6. Wait for the DIAGNOSTIC OPERATING INSTRUCTIONS to display (this may take up to four minutes).
7. Read and follow the instructions displayed. If needed, use the program descriptions in this section for information.

---

## Key Descriptions

The key descriptions provided here are from the DIAGNOSTIC OPERATING INSTRUCTIONS displayed when the diagnostic programs load. Use them to control the diagnostic programs.

Key	Function
Enter	Signals the program to continue
End	Stops the test or action
F10	Return to the previous menu and cancel any changes
Esc	Returns to the DIAGNOSTIC OPERATING INSTRUCTIONS
Page Down	Scrolls forward in a list
Page Up	Scrolls backward in a list
Backspace	Allows keying errors to be corrected
Ctrl-Alt-Pause	Does an initial program load (IPL).

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## Diagnostic Routines

The Diagnostic Routines allow the system user to checkout the system with minimum action. These routines are used during problem determination to determine if the system hardware has a problem and provide a Service Request Number (SRN) for the service organization.

The Diagnostic Routines run more extensive tests on the adapters and options than the Power-On Self-Test (POST) programs. If the configuration record on the fixed disk does not match the installed features list, the program displays the TEST OPTION or the DIAGNOSTIC TEST LIST menu.

When an option is listed in the configuration record but is not sensed by the Loadable POST programs, the TEST OPTION menu displays. This menu indicates that either the option has been removed from the system or the option is failing.

When the Loadable POST programs sense an option that is not in the configuration record, the DIAGNOSTIC TEST LIST menu displays. This menu indicates an option has been added to the system. When an option is deleted from the DIAGNOSTIC TEST LIST menu, that option is not tested until added to the list using the Show and Change Diagnostic Test List Utility.

To run the Diagnostic Routines:

1. Press **Enter** after reading the DIAGNOSTIC OPERATING INSTRUCTIONS.
2. Choose Diagnostic Routines on the FUNCTION SELECTION menu.
3. Choose a checkout option on the DIAGNOSTIC SELECTION menu. An \* (asterisk) by the ID number shows that the test has been run.

---

The Diagnostic Routines options and their functions are:

### **System Checkout**

The System Checkout option checks all the installed features to the extent that they can be tested without special actions.

### **Keyboard Checkout**

The Keyboard Checkout option checks the keyboard adapter and keyboard.

### **Display Checkout**

The Display Checkout option checks the display adapter and the attached display. The Display Checkout displays a pattern. Follow the instructions displayed in that pattern.

### **Diskette Drive(s) Checkout**

The Diskette Drive(s) Checkout option checks the diskette adapter and the diskette drives. The Diskette Drive Checkout requires a formatted High Capacity diskette. A formatted blank Double Sided diskette is required to check the ability of the drive to read a double sided diskette.

### **Fixed-Disk Drive(s) and Media Checkout**

The Fixed-disk Drive(s) and Media Checkout option checks all the fixed-disk drives installed in the system unit. This option does a function test of each drive and a read test on all sector addresses.

### **Other Checkout Options**

The other device checkout options check the adapters and devices installed in the system unit. Your system displays the checkout options for the devices installed.



---

## Utilities

The Utility programs are on the IBM RT PC Diagnostic Diskettes. They provide utilities to:

- Format a fixed disk
- Control or exercise a communications link
- Display the installed features list
- Copy the diagnostic diskette.

To run the Utilities:

1. Press **Enter** after reading the **DIAGNOSTIC OPERATING INSTRUCTIONS**.
2. Choose Utilities on the **FUNCTION SELECTION** menu.
3. Choose the type of utilities on the **UTILITY SELECTION** menu.

The following topics describe the different types of Utilities and their options.

### Fixed Disk Utilities

**Note:** The Format Fixed-Disk utility erases all data on the fixed disk and reformats the fixed disk. Before using this utility, backup all data on the fixed disk being formatted.

Use the Format Fixed-Disk utility only when intermittent read/write errors have occurred on the fixed disk and the diagnostic programs cannot find the problem. The Format Fixed-Disk utility formats the fixed disk and writes new addresses on it.

---

## Diagnostic Diskette Copy Utility

The Diagnostic Diskette Copy Utility provides a program to copy the diagnostic diskettes. The utility provides the following:

- A message when the *source* diskette is needed
- A message when the *target* diskette is needed
- A warning message to tell the system operator that the data on the target diskette will be destroyed
- Formatting of the target diskette
- Copying of the data from the source diskette to the formatted target diskette.

You may have to change the source and target diskettes during the copying procedure. A message displays to inform you when to change the diskettes.

## Async Communication Utility

The Async Communication Utility provides a way to control and display the status of the communication lines going to an attached communication device. This utility can be used to control the communication lines to a modem to test for correct operation.

---

## **Show Installed Options Utility**

The Show Installed Options Utility displays the installed features list created by the Loadable POST programs. All IBM adapters and devices installed in the system unit and recognized by the Loadable POST program are displayed. Use this list to check the configuration of the system.

## **Show and Change Diagnostic Test List Utility**

The Show and Change Diagnostic Test List Utility displays the diagnostic test list. If the list needs changed, menus guide you in changing the list. Only options that are installed in your system can be added to the list.

---

## Advanced Diagnostic Routines

The Advanced Diagnostic Routines options allow the service technician to perform tests on the system unit that require special action such as installing wrap plugs or keying certain responses. The *Problem Isolation Charts* (PICs) use the Advanced Diagnostic Routines to perform the additional tests and repair checkouts.

The Advanced Diagnostic Routines run more extensive tests on the adapters that can be tested with wrap plugs than the Diagnostic Routines. If the configuration record on the fixed disk does not match the installed features list, the program displays the TEST OPTION or the DIAGNOSTIC TEST LIST menu.

When an option is listed in the configuration record, but is not sensed by the Loadable POST programs, the TEST OPTION menu displays. This menu indicates that either the option has been removed from the system or the option is failing.

When the Loadable POST programs sense an option that is not in the configuration record, the DIAGNOSTIC TEST LIST menu displays. This menu indicates an option has been added to the system. When an option is deleted from the DIAGNOSTIC TEST LIST menu, that option is not tested until added to the list using the Show and Change Diagnostic Test List Utility.

To run the Advanced Diagnostic Routines:

1. Press **Enter** after reading the DIAGNOSTIC OPERATING INSTRUCTIONS.
2. Choose Advanced Diagnostic Routines on the FUNCTION SELECTION menu.
3. Choose a checkout option on the ADVANCED DIAGNOSTIC SELECTION menu. An \* (asterisk) by the ID number indicates that the test has been run.

---

## Installation Verification

The Installation Verification programs compares the installed features list created by the Loadable POST programs to the configuration record on the fixed disk.

The Installation Verification program is run during installation and setup to check all the adapters and options after shipment. The program assumes the Diagnostic Routines were run after the last change to the system unit. Running the Diagnostic Routines updates the configuration record on the fixed disk.

To run the Installation Verification:

1. Press **Enter** after reading the DIAGNOSTIC OPERATING INSTRUCTIONS.
2. Choose Installation Verification on the FUNCTION SELECTION menu.
3. If the installed features list and configuration record do not match, follow the displayed instructions.

---

## Service Request Number Description

When a problem is detected with system operation, the Problem Determination Procedures (PDPs) in the *Problem Determination Guide* are used to determine the cause and corrective action. If the PDPs determine the failure is in the hardware, the system user is given a Service Request Number (SRN) to record for use by the service organization.

The SRN is used by the service technician to determine which field-replaceable unit (FRU) is needed to repair the system. The SRN contains from one to four **Service Repair Action** (SRA) numbers. Each SRA number represents a FRU or a special repair action.

The Problem Isolation Charts (PICs) in Section 3 use the SRA numbers to isolate the failure to a failing FRU. Appendix B contains an SRA to FRU Cross-Reference List to provide the service technician with the part number of the failing FRU.

An SRN always contains a **Source Number** and at least one SRA. See the following pages for a description of the source number and the SRA numbers. The following example of an SRN contains a source number and four SRA numbers.

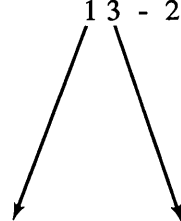
1 3 - 2 3 4 - 1 0 0 - B 3 4 - D 6 4

---

## Source Number

The left two digits of the SRN is the source number. The left digit of the source number identifies the device. The right digit of the source number identifies the procedure that produced the SRN. The following chart identifies the devices and procedures. Use the following SRN for an example.

1 3 - 2 3 4 - 1 0 0 - B 3 4 - D 6 4



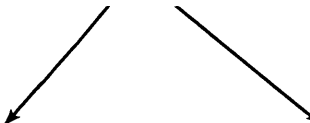
Device	Procedure
1 - System unit	1 - Resident POST program
2 - Display	2 - Loadable POST program
3 - Keyboard	3 - Standalone diagnostic program
4 - Tape drive	4 - Licensed program product
5 - Printer	5 - Support center
6 - Reserved	6 - Problem determination procedures
7 - Reserved	7 - Reserved
8 - Reserved	8 - Reserved
9 - Reserved	9 - Reserved
0 - Reserved	0 - Reserved

---

## Service Repair Action Number

The remaining digits of the SRN are divided into three-digit SRA numbers. The left two digits of the SRA number is the FRU/PIC code. The right digit of the SRA number is the location number. Use the following SRN for an example.

1 3 - 2 3 4 - 1 0 0 - B 3 4 - D 6 4



FRU/PIC Code	Location
See the "Service Repair Action Number Chart" in Section 3 or Appendix B for more information.	1 - Adapter slot 1 2 - Adapter slot 2 3 - Adapter slot 3 4 - Adapter slot 4 5 - Adapter slot 5 6 - Adapter slot 6 7 - Reserved 8 - Reserved 9 - Reserved 0 - System board A through R - Identifies system board slots, drive positions, switch banks, or memory module positions.





---

## Section 3. Problem Isolation Charts

---

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POST Errors 11 or 12 PIC 9830 .....	3-92
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---

## About this Section

This section contains the information used by the service technician to isolate the problem to a field-replaceable unit.

Start all problem isolation with “Start of Call PIC” on page 3-5.

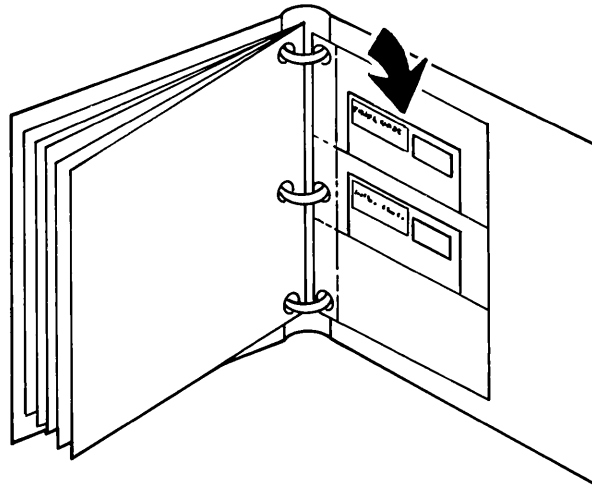
---

## Introduction

Begin the problem isolation at “Start of Call PIC” on page 3-5, then carefully follow the steps to isolate the failure to a field-replaceable unit (FRU).

The IBM RT PC Model 10 problem isolation procedures use the IBM RT PC Diagnostic Diskettes and run tests from the ADVANCED DIAGNOSTIC SELECTION menu.

Information about the tools required is in Appendix A.



---

## Start of Call PIC

### Notes:

1. If an unexpected error occurs (such as blinking 02, 30, or 99 numbers on the two-digit display, a steady C6 displayed on the two-digit display, the system loops, or the system hangs), then go to “Undetermined Problem PIC 9860” on page 3-104.
2. Be sure that all programs or operating systems are stopped (get help if needed).
3. Some system unit components do not cool correctly when the top cover is off. For this reason do not power the system unit on longer than 10 minutes with the top cover off.
4. If the *Service Request Number* (SRN) provided by the customer does not solve the problem, go to the “Problem Determination Procedure” on page 3-22.

### Step 1

You should have an SRN either from information recorded on the “Appendix B. Problem Form” from the *Problem Determination Guide* or from diagnostic tests results. If needed, see “Service Request Number Description” on page 2-17 for a description of the SRN.

---

### DO YOU HAVE A SERVICE REQUEST NUMBER?

- NO**      Go to “Problem Determination Procedure” on page 3-22.
- YES**     Continue on the next page.

---

## Step 2

Compare the leftmost SRA number in your SRN to the SRAs in the table below.

---

4. Write the Service Request Number here:

16 - 982 - \_\_\_\_\_ - \_\_\_\_\_ - \_\_\_\_\_

SRA Number	Go to PIC
21x	“Memory Expansion Option PIC 2100” on page 3-62
37x	“Memory Expansion Option PIC 2100” on page 3-62
880	“Power Supply PIC 8800” on page 3-68
981	“POST Errors 03 or 05 PIC 9810” on page 3-79
982	“POST Errors 00 or 04 PIC 9820” on page 3-87
983	“POST Errors 11 or 12 PIC 9830” on page 3-92
984	“POST Error 23 PIC 9840” on page 3-96
985	“Invalid Display Data PIC 9850” on page 3-100
986	“Undetermined Problem PIC 9860” on page 3-104

### IS THE LEFTMOST SRA NUMBER OF YOUR SRN IN THE TABLE?

**YES** Go to the PIC indicated in the table.

**NO** Continue on the next page.

---

### Step 3

Identify all of the SRA numbers in your SRN.

---

4. Write the Service Request Number here:

16 - 982 - \_\_\_\_\_ - \_\_\_\_\_ - \_\_\_\_\_

---

#### **DOES YOUR SERVICE REQUEST NUMBER CONTAIN ONLY ONE SERVICE REPAIR ACTION NUMBER?**

---

**YES** Do the following:

1. Find your SRA number in the "Service Repair Action Number Chart" on page 3-109.
2. Record the FRU name and the removal procedure reference.
3. Go to "Step 8" on page 3-12.

**NO** Continue on the next page.



---

## Step 4

Look at the SRN. If needed, see page 2-18.

---

4. Write the Service Request Number here:

13 - 234 - 100 - B34 - D64

---

### **IS THE PROCEDURE NUMBER A "3"?**

**NO** Do the following:

1. Find the leftmost SRA number in the "Service Repair Action Number Chart" on page 3-109.
2. Record the FRU name and the removal procedure reference.
3. Go to "Step 8" on page 3-12.

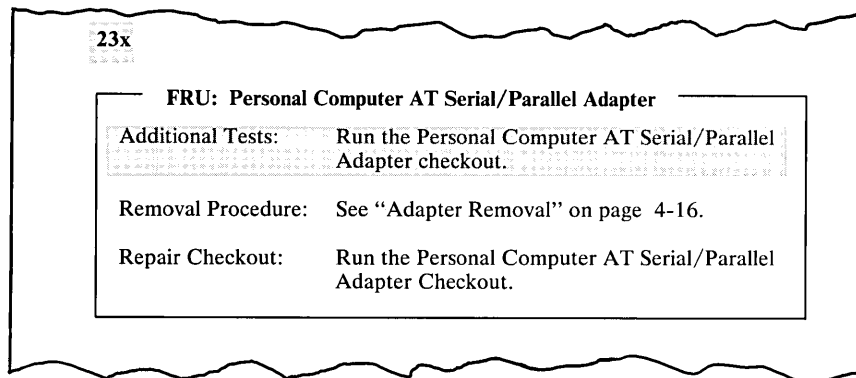
**YES** Continue on the next page.

---

## Step 5

**Note:** The leftmost SRA number is the most likely failing FRU, and should be analyzed first.

1. Find the leftmost SRA number in the “Service Repair Action Number Chart” on page 3-109.
  2. Note the FRU name, the additional tests reference, and the removal procedure reference.
  3. Return here and answer the following question.
- 



### **DOES YOUR SERVICE REPAIR ACTION NUMBER HAVE ADDITIONAL TESTS?**

---

**NO** Go to “Step 8” on page 3-12.

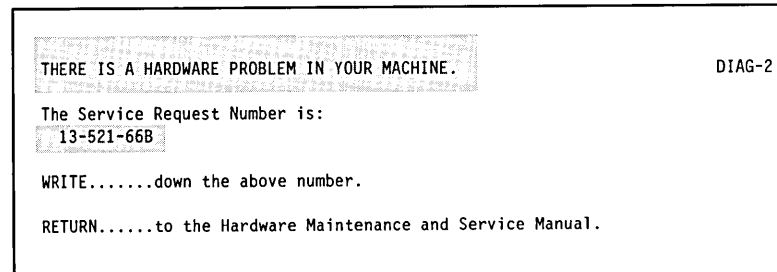
**YES** Continue on the next page.

---

## Step 6

**Note:** Use the ADVANCED DIAGNOSTIC SELECTION menu to choose the additional test. If needed, see page 2-15.

1. Run any “Additional Tests” listed for your SRA number that you have not run since starting to analyze this SRN. If you are not able to select and run the additional tests, go to page 3-22.
  2. Record the result of each additional test. Each test ends with a “No trouble was found” message or the test displays an SRN.
- 



### **DID ANY ADDITIONAL TEST RESULT IN A SERVICE REQUEST NUMBER?**

---

**NO**      Go to “Step 16” on page 3-20.

**YES**     Continue on the next page.

---

## Step 7

Look at the SRN from the additional test, and find the leftmost SRA number.

---

<p>THERE IS A HARDWARE PROBLEM IN YOUR MACHINE.</p> <p>The Service Request Number is: 13-521-66B</p> <p>WRITE.....down the above number.</p> <p>RETURN.....to the Hardware Maintenance and Service Manual.</p>	DIAG-2
--	--------

**IS THE LEFTMOST SERVICE REPAIR ACTION NUMBER THE SAME NUMBER AS THE SERVICE REPAIR ACTION NUMBER YOU HAVE BEEN ANALYZING?**

---

**NO** Do the following:

1. Find the leftmost SRA number from the additional test in the "Service Repair Action Number Chart" on page 3-109.
2. Note the FRU name, the removal procedure reference, and the repair checkout reference.
3. Continue on the next page.

**YES** Continue on the next page.

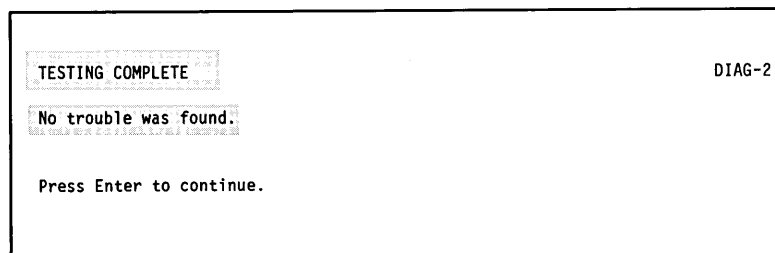
---

## Step 8

1. The rightmost digit of the SRA identifies the FRU location. When the rightmost digit is a "0," either the FRU location could not be determined or the FRU location is assigned. Use the "Removal Procedure" referenced in the data for your SRA number and exchange the FRU.
2. Use the ADVANCED DIAGNOSTIC SELECTION menu to run the "Repair Checkout" test listed in the data for your SRA number. Record the result. If needed, see page 2-15.

If you exchanged the fixed-disk drive, the DIAGNOSTIC TEST LIST menu displays. Be sure the list is correct. If the list is not correct, follow the instructions on the menu to correct the list.

The TEST OPTION menu displays when a device or option listed in the configuration record was not sensed by the Loadable POST programs. If the TEST OPTION menu displays, check for proper installation of the option listed in the menu. If the option listed is the new FRU, it may be defective.



**WERE YOU ABLE TO LOAD AND RUN THE REPAIR CHECKOUT AND DID THE "NO TROUBLE WAS FOUND" MESSAGE DISPLAY?**

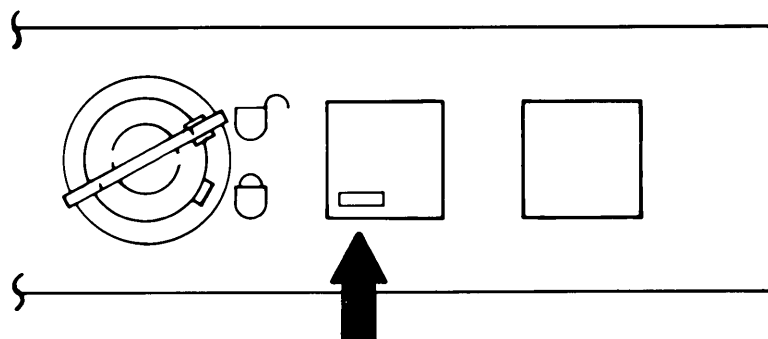
- YES** This completes the repair.
- NO** Continue on the next page.

---

**Step 9**

Look at the operator panel.

---



**IS THE POWER-ON INDICATOR ON?**

---

**NO**      Go to "Power Supply PIC 8800" on page 3-68.

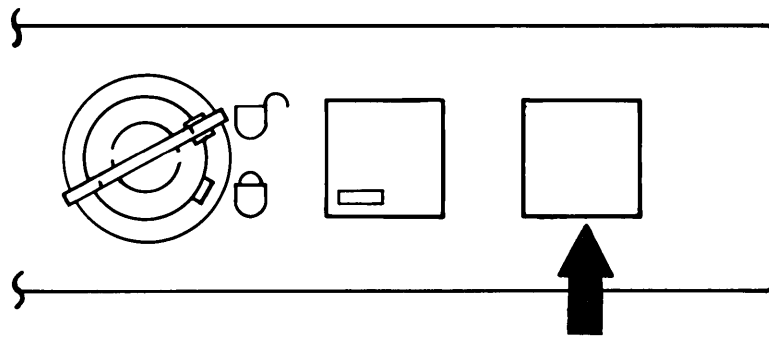
**YES**      Continue on the next page.

---

## Step 10

Look at the operator panel.

---



---

### **IS THE TWO-DIGIT DISPLAY BLANK?**

---

**NO** Do the following:

1. Find the number displayed in the two-digit display in the chart on page 3-35.
2. Record the SRN for the number.
3. Go to "Step 13" on page 3-17.

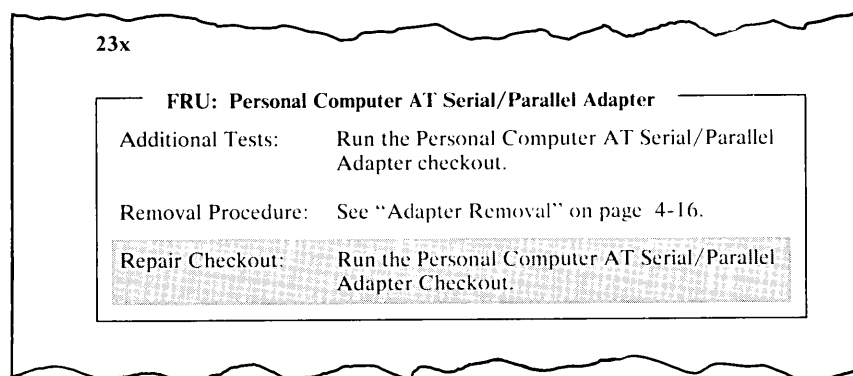
**YES** Continue on the next page.

---

## Step 11

Look at the result you recorded after the repair checkout.

---



### **WERE YOU ABLE TO SELECT AND RUN THE REPAIR CHECKOUT TEST?**

---

**YES** Go to "Step 14" on page 3-18.

**NO** Continue on the next page.



---

## Step 12

Look at the SRN. If needed, see page 2-18.

---

4. Write the Service Request Number here:

16 - 982 - \_\_\_\_\_ - \_\_\_\_\_ - \_\_\_\_\_

---

### **IS THE PROCEDURE NUMBER A "6"?**

**NO**     The SRN is invalid. Go to "Problem Determination Procedure" on page 3-22.

**YES**     Go to "Step 15" on page 3-19.

---

**Step 13**

Look at your SRN.

---

4. Write the Service Request Number here:

16 - 982 - \_\_\_\_\_ - \_\_\_\_\_ - \_\_\_\_\_

**IS THE LEFTMOST SERVICE REPAIR ACTION NUMBER OF YOUR SERVICE REQUEST NUMBER “981” THROUGH “985”?**

**YES**    Go to “Step 17” on page 3-21.

**NO**     Continue on the next page.

---

## Step 14

Look at the SRN you recorded after the repair checkout.

---

THERE IS A HARDWARE PROBLEM IN YOUR MACHINE. DIAG-2

The Service Request Number is:  
13-521-668

WRITE.....down the above number.

RETURN.....to the Hardware Maintenance and Service Manual.

4. Write the Service Request Number here:

13 - 234 - 100 - B34 - D64

**DID THE REPAIR CHECKOUT RUN RESULT IN THE SAME SRN YOU HAVE BEEN ANALYZING?**

---

- NO** Either the system has more than one problem or another problem was created during service. Go to “Step 2” on page 3-6 and analyze the new SRN.
- YES** Remove the new FRU and install the original FRU, then continue on the next page.

---

## Step 15

Look at the SRN.

---

4. Write the Service Request Number here:

13 - 234 - 100 - B34 - D64

### **HAVE YOU ANALYZED ALL THE SRAs IN THE SERVICE REQUEST NUMBER?**

---

- NO**      Select another SRA number within the SRN and go to “Step 8” on page 3-12.
- YES**      If the SRN provided by the customer did not solve the problem, go to “Problem Determination Procedure” on page 3-22. If you have already analyzed the problem in the “Problem Determination Procedure” on page 3-22, contact your service support person.

---

## Step 16

The advanced diagnostic routines did not detect a problem. The problem may be:

- An incorrect SRN
- An intermittent problem
- A procedural problem
- A software problem
- A problem that no longer fails
- An Undetermined problem.

Do one or more of the following actions to further analyze the problem:

- If the problem is an incorrect SRN, go to “Problem Determination Procedure” on page 3-22 and follow the procedure until you get a SRN, then analyze it.
- If the problem is intermittent, run the advanced diagnostic routines in loop mode. Do this by selecting “Run Test Multiple Times” on the TEST METHOD SELECTION menu.
- If the problem is a software or a procedural problem, have the customer use the *Problem Determination Guide* to resolve the problem.
- If the problem is an undetermined problem, go to “Undetermined Problem PIC 9860” on page 3-104.

---

**Step 17**

Find your SRA number in the following table, then go to the PIC listed for your SRA number.

---

<b>SRA Number</b>	<b>Go to PIC</b>
981	“POST Errors 03 or 05 PIC 9810” on page 3-79
982	“POST Errors 00 or 04 PIC 9820” on page 3-87
983	“POST Errors 11 or 12 PIC 9830” on page 3-92
984	“POST Error 23 PIC 9840” on page 3-96
985	“Invalid Display Data PIC 9850” on page 3-100

---

## Problem Determination Procedure

Use this procedure to obtain a Service Request Number (SRN).

This procedure uses the IBM RT PC Diagnostic Diskettes and the advanced diagnostic routines to diagnose hardware problems only.

### Step 1

Check the system for the following problems:

- Broken covers
  - Loose cables
  - Power supply cooling fan not operating
  - Air flow restricted (air vents in the covers)
  - Segments of the Two-Digit Display not working (tested at the first of the power-on self-test)
  - Keyboard indicators or speaker not working (tested during power-on self-test)
  - A damaged field-replaceable unit (FRU).
- 

### **DID YOU FIND ONE OF THE ABOVE PROBLEMS?**

**YES**     Repair or exchange the FRU, then run the System Checkout.

**Notes:**

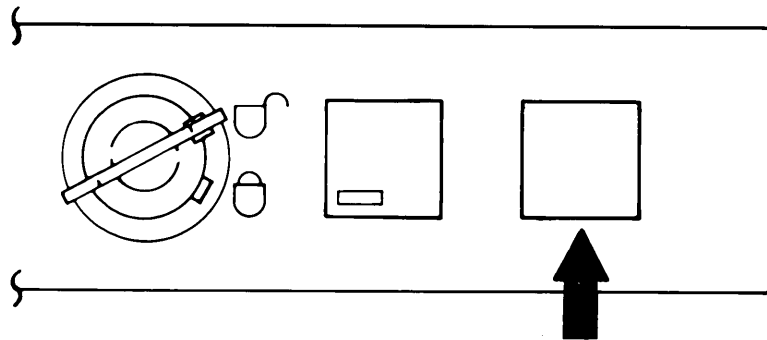
1. If the keyboard indicators or speaker is failing, replace the keyboard.
2. If the Two-Digit Display is failing, replace the Operator Panel Board.

**NO**     Continue on the next page.

---

## Step 2

1. Be sure that all programs or operating systems are stopped (get help if needed).
  2. Set the power switch on the system unit to Off.
  3. If present, remove the write-protect tab from the diagnostic diskettes.
  4. Insert the Diagnostics 1 (DIAG-1) diskette in the diskette drive and close the drive.
  5. Set the keylock to Unlock.
  6. Set the power switch on the system unit and display to On.
  7. Wait four minutes, then answer the following question.
- 



---

### **IS THE TWO-DIGIT DISPLAY BLANK?**

---

- NO**      Go to "Step 10" on page 3-31.
- YES**     Continue on the next page.



---

### Step 3

Look at the display screen.

---

```
DIAGNOSTIC OPERATING INSTRUCTIONS                                DIAG-1

This diskette contains diagnostics and utilities for your system. You
should use these procedures whenever you are having problems with your system
which have not been corrected by any software application procedures available.

In general, the procedures will run automatically. However, sometimes you will
be required to select options, tell the system when to continue, do simple
tasks, and exchange diskettes.

Several keys are used to control the procedures:
- The Enter key continues the procedure or performs an action.
- The End key stops a test or an action.
- The F10 key returns to the previous menu and cancels any changes.
- The Escape key resets the procedures and returns to these instructions.
- The Page Down key allows a list to be scrolled forward.
- The Page Up key allows a list to be scrolled backward.
- The Backspace key allows keying errors to be corrected.

Press Enter to continue.
```

---

#### **ARE THE "DIAGNOSTIC OPERATING INSTRUCTIONS" DISPLAYED COMPLETELY LEGIBLE?**

---

**NO**      Go to "Step 16" on page 3-39.

**YES**     Continue on the next page.

---

## Step 4

Read the “DIAGNOSTIC OPERATING INSTRUCTIONS,” then press the Enter key.

---

```
FUNCTION SELECTION                                     DIAG-1

ID  ITEM
1  Diagnostic Routines
   This selection allows you to test your machine's hardware and
   determine if you have a hardware problem. Any problem will be indicated
   by a SRN (Service Request Number). The SRN will allow your service
   representative to quickly determine what parts are required to repair
   your machine.
2  Utilities
   This selection allows you to look at the machine's configuration,
   format fixed disks, and exercise your communication equipment.
3  Advanced Diagnostic Routines
   This selection will normally be used by your service
   representative.
4  Installation Verification
   This selection allows you to test your machine after it has been
   installed.

To choose an item, type its ID and press Enter:  _
```

---

### IS THE “FUNCTION SELECTION” MENU DISPLAYED?

---

**NO**      Go to “Step 35” on page 3-58.

**YES**     Continue on the next page.

---

## Step 5

Choose the Advanced Diagnostic Routines.

---

```
ADVANCED DIAGNOSTIC SELECTION                                DIAG-1

The System Checkout Option will test all functions that do not require you to
do anything. The other options allow you to test only that option.
An * in front of the ID shows that the test has been run.

Choose the test you would like to run.
ID  ITEM
*1  System Checkout
  2  Keyboard Checkout
  3  Display Checkout
  4  Diskette Drive(s) Checkout
  5  Fixed-disk Drive(s) Checkout
  6  Async RS232 Native Ports Checkout
  7  AT Serial/Parallel Adapter 1 in Slot X Checkout
  8  4 Port Asynchronous RS232C Adapter 1 in Slot X Checkout
  9  4 Port Asynchronous RS232C Adapter 2 in Slot X Checkout
 10  Floating Point Accelerator Checkout
 99  Exit Diagnostic Routines

To see additional items in the list, use Page Up and Page Down.
To choose an item, type its ID and press Enter: _
```

### DID THE "ADVANCED DIAGNOSTIC SELECTION" MENU DISPLAY?

**YES**     Go to "Step 9" on page 3-30.

**NO**       Continue on the next page.

---

## Step 6

Look at the displayed information.

---

<b>TEST OPTION</b>	DIAG-1
The following option was detected previously by the diagnostics, but is now undetected.	
- Option	
Has the option been removed from the system or moved to another slot?	
<u>ID</u>	<u>ITEM</u>
1	The option has <u>not</u> been removed from the system or moved to another slot.
2	The option has been removed from the system or moved to another slot.
To choose an item, type its ID and press Enter: _	
Note: If you are unsure if the option has been removed or moved choose item 1.	

---

### **DID THE “TEST OPTION” MENU DISPLAY?**

---

**NO**      Go to “Step 8” on page 3-29.

**YES**      Continue on the next page.

---

## Step 7

The TEST OPTION menu displays because the configuration record stored on the fixed disk contains an option that the Loadable POST programs did not sense during POST. The option listed in the TEST OPTION menu was not sensed.

---

```
TEST OPTION                                     DIAG-1
-----
The following option was detected previously by the diagnostics, but is
now undetected.

- Option

Has the option been removed from the system or moved to another slot?

ID  ITEM
```

### HAS THE OPTION LISTED IN THE "TEST OPTION" MENU BEEN REMOVED FROM THE SYSTEM OR MOVED TO ANOTHER SLOT?

- YES** Choose "The option has been removed from the system or moved to another slot." If the "TEST OPTION" menu displays, repeat this step. Continue on the next page when another menu displays.
- NO** Choose "The option has not been removed from the system or moved to another slot." If the "TEST OPTION" menu displays, repeat this step. Go to "Step 2" on page 3-6 when you get an SRN.

---

## Step 8

Look at the displayed information.

---

```
DIAGNOSTIC TEST LIST                                     DIAG-1

The following options will be tested by the Diagnostic Routines.
- Slot B - Floating Point Accelerator
- Slot 1 - Fixed-disk and Diskette Drive Adapter
- Slot 2 - Advanced Monochrome Graphics Display Adapter
- Slot 4 - Streaming Tape Adapter
- Slot 5 - 4 Port Asynchronous RS232C Adapter 1
- Slot 7 - 4 Port Asynchronous RS232C Adapter 2
- Slot 8 - AT Coprocessor
- XXX bytes of I/O Channel Memory starting at address 0.
- Diskette Drive in location A - AT High Capacity Diskette Drive
- Fixed-disk Drive in location C - 40 MB Fixed-disk Drive

To see additional items in the list, use Page Up and Page Down.

ID  ITEM
 1  The list is correct.
 2  The list is incorrect.

To choose an item, type its ID and press Enter: _
```

---

### **DID THE “DIAGNOSTIC TEST LIST” MENU DISPLAY?**

---

**YES** Follow the displayed instructions to correct the list. When the “ADVANCED DIAGNOSTIC SELECTION” menu displays, continue on the next page.

**NO** Go to “Step 35” on page 3-58.

---

## Step 9

Run the checkout routines for all areas of the system. Start with the areas you suspect are failing. Record the result of each test. If any test results in an SRN, stop testing and answer the question below.

---

THERE IS A HARDWARE PROBLEM IN YOUR MACHINE. DIAG-2

The Service Request Number is:  
13-521-66B

WRITE.....down the above number.

RETURN.....to the Hardware Maintenance and Service Manual

You may restart your system by depressing Ctrl, Alt, and Pause simultaneously.

---

### **DID ANY TEST RESULT IN A SERVICE REQUEST NUMBER?**

**YES**     Go to “Step 2” on page 3-6.

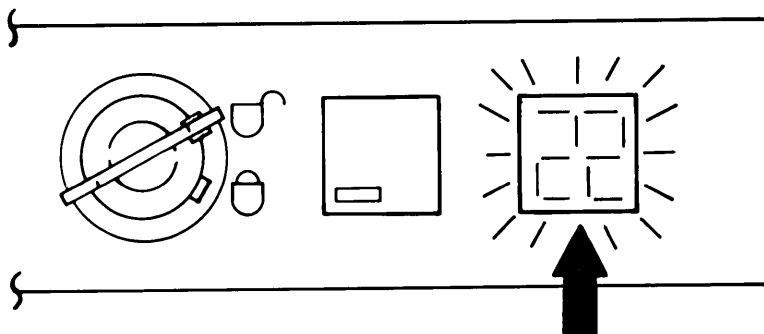
**NO**     No trouble was found. If the problem is intermittent, run the Advanced Diagnostic Routines in loop mode. To do this, choose “Run Test Multiple Times” on the TEST METHOD SELECTION menu.

---

**Step 10**

Look at the two-digit display.

---



**IS THE TWO-DIGIT DISPLAY FLASHING?**

---

**YES**    Go to “Step 36” on page 3-59.

**NO**     Continue on the next page.



---

**Step 11**

Find the number displayed in the two-digit display in the following table.

---

<b>Number</b>	<b>Go to Step</b>
22	“Step 15” on page 3-38.
94	“Step 39” on page 3-61.
99	“Step 14” on page 3-37.

**DID YOU FIND THE NUMBER IN THE TABLE?**

---

**YES**     Go to the step listed.

**NO**     Continue on the next page.

---

## Step 12

Turn the Brightness control on the display fully clockwise.

---

```
DIAGNOSTIC OPERATING INSTRUCTIONS                                DIAG-1

This diskette contains diagnostics and utilities for your system. You
should use these procedures whenever you are having problems with your system
which have not been corrected by any software application procedures available.

In general, the procedures will run automatically. However, sometimes you will
be required to select options, tell the system when to continue, do simple
tasks, and exchange diskettes.

Several keys are used to control the procedures:
- The Enter key continues the procedure or performs an action.
- The End key stops a test or an action.
- The F10 key returns to the previous menu and cancels any changes.
- The Escape key resets the procedures and returns to these instructions.
- The Page Down key allows a list to be scrolled forward.
- The Page Up key allows a list to be scrolled backward.
- The Backspace key allows keying errors to be corrected.

Press Enter to continue.
```

### **ARE THE “DIAGNOSTIC OPERATING INSTRUCTIONS” DISPLAYED CORRECTLY?**

---

**YES**     Record SRN 11-630-100, then go to “Step 2” on page 3-6.

**NO**     Continue on the next page.

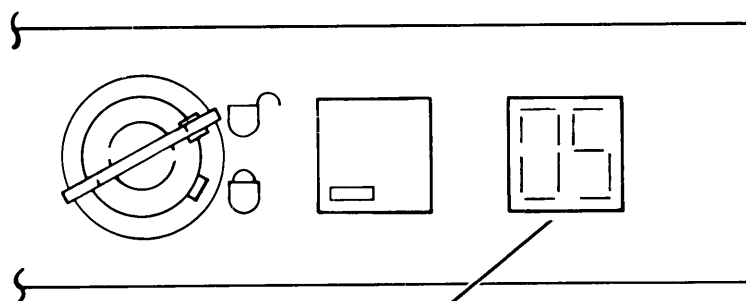
---

## Step 13

**Note:** The chart on the following pages is for “steady” Power-On Self-Test (POST) numbers only. Flashing (approximately one second) numbers are for software failures.

Find the POST number displayed in the two-digit display in the “POST Indicator Chart” on page 3-35, then return here to answer the following question.

---



02	11-100-19B
03	11-981-12C-15C-84A
04	11-982-84A-100
05	11-981-84A-12C-15C
07	11-100-84A-19B
08	11-84A-100-19B
09	11-100

---

### **DID YOU FIND THE NUMBER IN THE CHART?**

---

**NO** Record SRN 11-84A-630-100-981, then go to “Step 2” on page 3-6.

**YES** Record the SRN for the number, then go to “Step 2” on page 3-6

---

## POST Indicator Chart

Number	Service Request Number or Action
00	11-982-84A-100
01	11-84A
02	11-100-19B
03	11-981-12C-15C-84A
04	11-982-84A-100
05	11-981-84A-12C-15C
07	11-100-84A-19B
08	11-84A-100-19B
09	11-100
10	11-100-84A
11	11-100-84A
12	11-983-100-84A
14	11-526
22	11-526-640-A10
23	11-984-520-100
25	Software problem during IPL. Power off to clear the problem.
27	11-981, or the program is too large for memory
30	12-490
31	12-410
32	12-430
35	12-74C-526-A10
43	12-200-240
44	12-19B

---

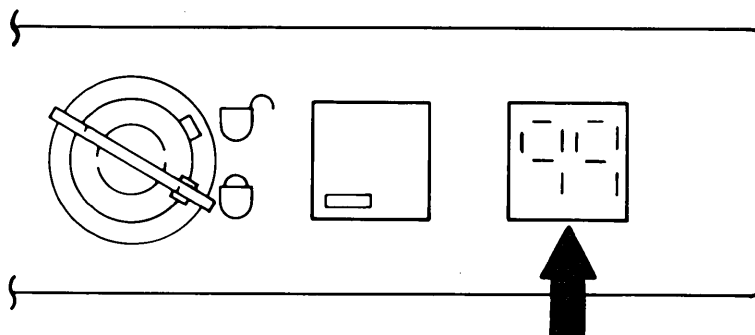
<b>Number</b>	<b>Service Request Number or Action</b>
58	12-320
71	12-15C
72	12-12C
76	12-12D
77	12-15D
81	32-780
88	12-84A-100
89	12-981-84A-100-19B
93	12-64A-526

---

## Step 14

The number “99” in the two-digit display indicates the keylock is in the Locked position. Look at the keylock.

---



---

### IS THE KEYLOCK IN THE LOCKED POSITION?

**NO** Record SRN 11-630-100, then go to “Step 2” on page 3-6.

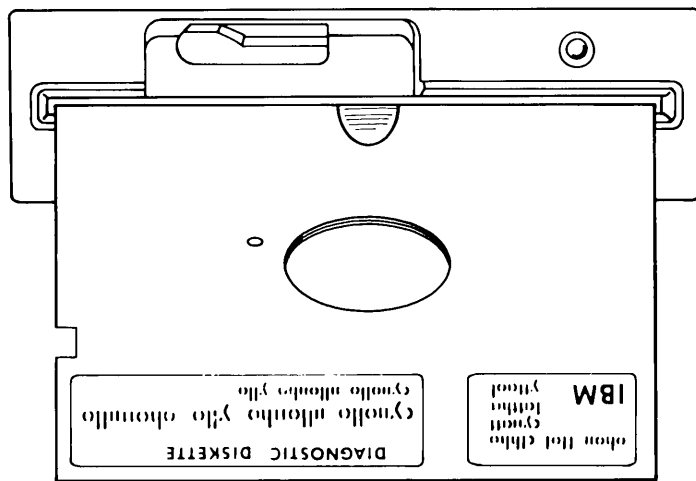
**YES** Set the keylock to Unlock, then go to “Step 2” on page 3-23.

---

## Step 15

Be sure the Diagnostics 1 (DIAG-1) diskette is inserted correctly in the diskette drive.

---



### DID YOU FIND A PROBLEM?

---

**YES** Go to "Step 2" on page 3-23.

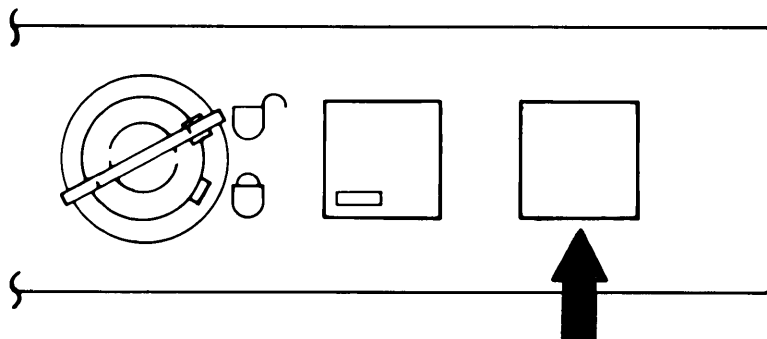
**NO** Record SRN 16-526-64A-A10, then go to "Step 2" on page 3-6.

---

## Step 16

Look at the Power-On indicator on the operator panel.

---



### IS THE POWER-ON INDICATOR ON?

---

**YES**    Go to “Step 18” on page 3-41.

**NO**     Continue on the next page.

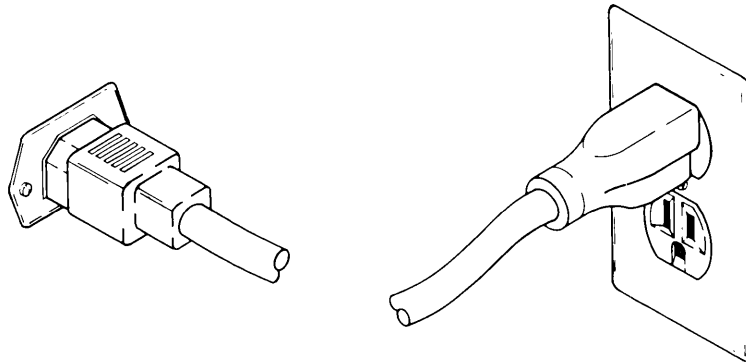


---

## Step 17

Be sure the external power cable to the system unit is plugged into an outlet and that the outlet has power.

---



---

### **DID YOU FIND A PROBLEM?**

**YES**     Have the customer correct the problem.

**NO**     Record SRN 16-880, then go to “Step 2” on page 3-69.

---

## Step 18

When the POST programs complete, the *Operating System* will load from the fixed disk if:

- The Diagnostics 1 (DIAG-1) diskette is not in the diskette drive.
  - The diskette drive with the diagnostic diskette inserted is failing
  - The diagnostic diskette is defective or not inserted correctly
  - The fixed-disk and diskette drive adapter is failing.
- 

### **DID THE CUSTOMER'S OPERATING SYSTEM LOAD FROM THE FIXED DISK?**

---

**NO**      Go to "Step 20" on page 3-43.

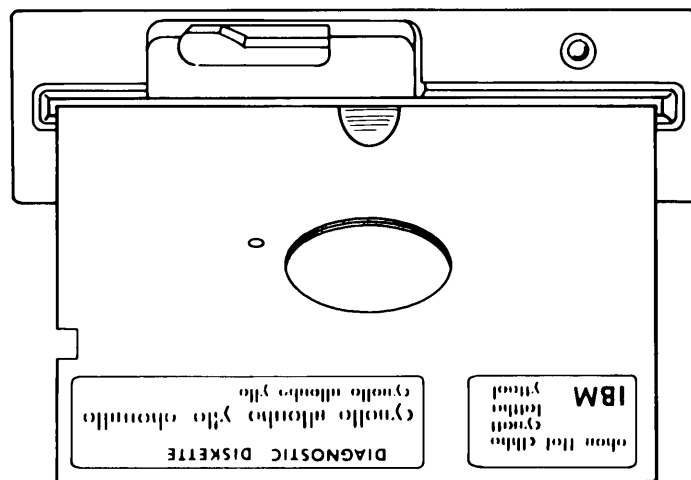
**YES**     Continue on the next page.

---

## Step 19

Be sure the Diagnostics 1 (DIAG-1) diskette is correctly inserted in the diskette drive.

---



### DID YOU FIND A PROBLEM?

---

**YES** Go to "Step 2" on page 3-23.

**NO** Record SRN 16-64A-526-A10, then go to "Step 2" on page 3-6.

---

**Step 20**

Look at the display attached to your system. If needed, see Section 11.

---

<b>Display Type</b>	<b>Model</b>	<b>Go to Step</b>
IBM Personal Computer Display	5151	“Step 21” on page 3-44
Enhanced Color Display	5154	“Step 25” on page 3-48
Advanced Monochrome Graphics Display	6153	“Step 31” on page 3-54

**IS THE DISPLAY ATTACHED TO YOUR SYSTEM LISTED IN THE TABLE?**

---

**YES**     Go to the step for your display.

**NO**        Go to the service documentation for the attached display.

---

## Step 21

Turn the Brightness and Contrast controls fully clockwise.

---

**DIAGNOSTIC OPERATING INSTRUCTIONS**

DIAG-1

This diskette contains diagnostics and utilities for your system. You should use these procedures whenever you are having problems with your system which have not been corrected by any software application procedures available.

In general, the procedures will run automatically. However, sometimes you will be required to select options, tell the system when to continue, do simple tasks, and exchange diskettes.

Several keys are used to control the procedures:

- The Enter key continues the procedure or performs an action.
- The End key stops a test or an action.
- The F10 key returns to the previous menu and cancels any changes.
- The Escape key resets the procedures and returns to these instructions.
- The Page Down key allows a list to be scrolled forward.
- The Page Up key allows a list to be scrolled backward.
- The Backspace key allows keying errors to be corrected.

Press Enter to continue.

---

### **ARE THE "DIAGNOSTIC OPERATING INSTRUCTIONS" DISPLAYED CORRECTLY?**

---

**YES** Set the Brightness and Contrast controls to the desired level. This completes the repair.

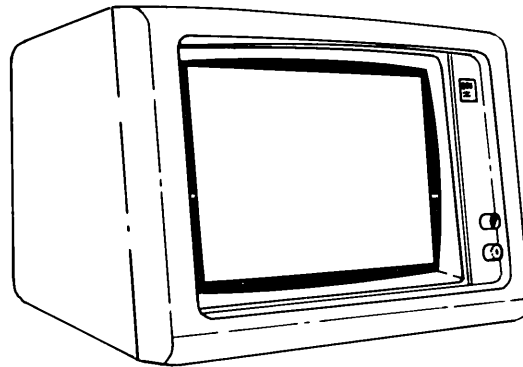
**NO** Continue on the next page.

---

**Step 22**

Look at the display screen.

---



**IS THE BACKGROUND OF THE DISPLAY SCREEN LIGHTED?**

**YES**    Go to “Step 24” on page 3-47.

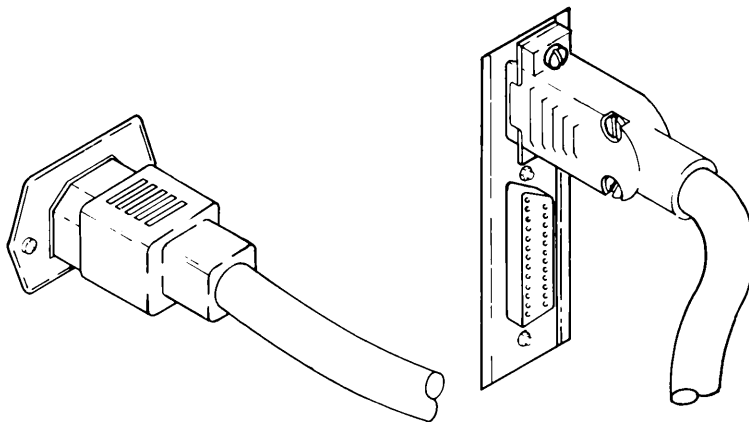
**NO**     Continue on the next page.

---

## Step 23

Be sure that both the display power cable and the display signal cable are correctly connected to the system unit.

---



### **DID YOU FIND A PROBLEM?**

---

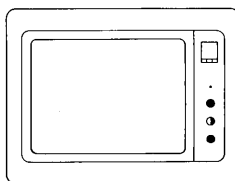
- YES** This completes the repair.
- NO** Record SRN 26-540-490, then go to “Step 2” on page 3-6.

---

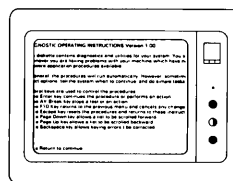
## Step 24

Look at the display screen.

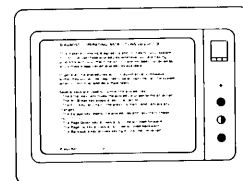
---



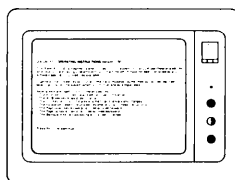
**Too Dim**



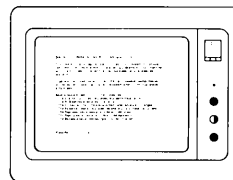
**Too Wide**



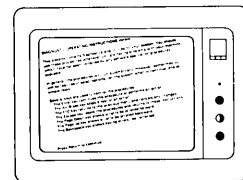
**Too Narrow**



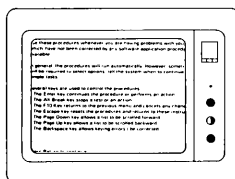
**Too Short**



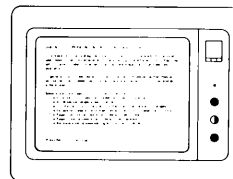
**Too Small**



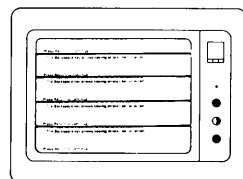
**Tilted**



**Changes Size When  
Brightness Control  
Turned**



**Out of Focus**



**Rolling**

---

**DOES YOUR DISPLAY HAVE A PROBLEM SIMILAR TO ANY OF THE DISPLAY SCREENS ABOVE?**

---

**NO** Record SRN 26-985-490-100-540, then go to “Step 2” on page 3-6.

**YES** Record SRN 26-540-490, then go to “Step 2” on page 3-6.

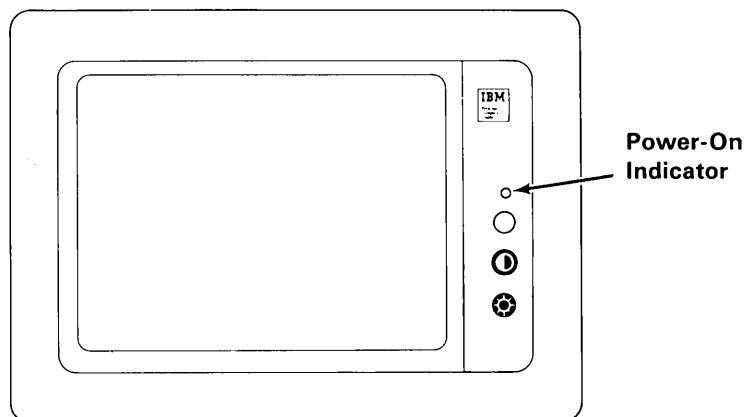


---

## Step 25

Look at the Power-On indicator on the display.

---



### IS THE POWER-ON INDICATOR ON?

---

**YES**    Go to "Step 27" on page 3-50.

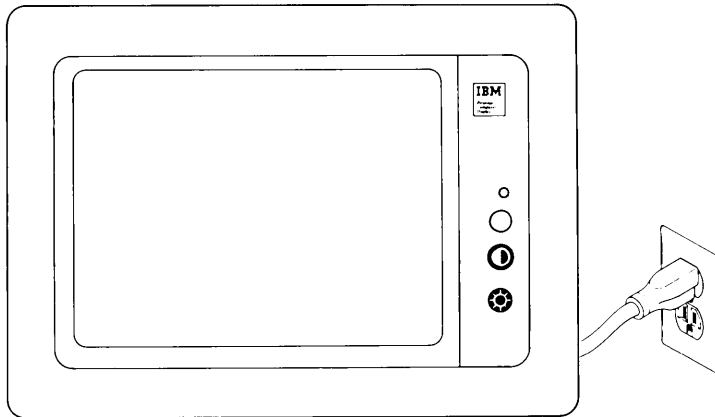
**NO**     Continue on the next page.

---

## Step 26

Be sure the external power cable to the display is plugged into an outlet and the outlet has power.

---



### **DID YOU FIND A PROBLEM?**

---

- YES** This completes the repair.
- NO** Record SRN 26-580-410, then go to “Step 2” on page 3-6.

---

## Step 27

1. Turn the Brightness control fully clockwise.
  2. Pull out on the Contrast control, then turn it fully clockwise.
- 

**DIAGNOSTIC OPERATING INSTRUCTIONS**

DIAG-1

This diskette contains diagnostics and utilities for your system. You should use these procedures whenever you are having problems with your system which have not been corrected by any software application procedures available.

In general, the procedures will run automatically. However, sometimes you will be required to select options, tell the system when to continue, do simple tasks, and exchange diskettes.

Several keys are used to control the procedures:

- The Enter key continues the procedure or performs an action.
- The End key stops a test or an action.
- The F10 key returns to the previous menu and cancels any changes.
- The Escape key resets the procedures and returns to these instructions.
- The Page Down key allows a list to be scrolled forward.
- The Page Up key allows a list to be scrolled backward.
- The Backspace key allows keying errors to be corrected.

Press Enter to continue.

---

### **ARE THE "DIAGNOSTIC OPERATING INSTRUCTIONS" DISPLAYED CORRECTLY?**

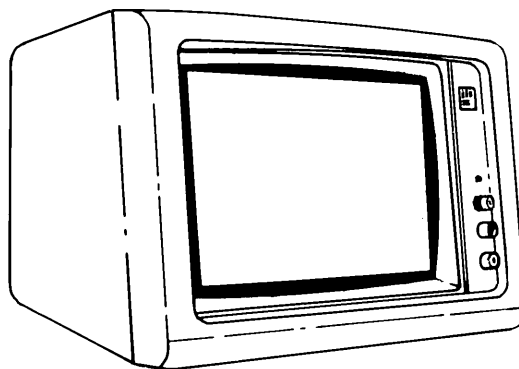
---

- YES**     Set the Brightness and Contrast controls to the desired level. This completes the repair.
- NO**      Continue on the next page.

---

## Step 28

1. Set the power switch on the system unit and display to Off.
  2. Remove the rear cover of the system unit (page 4-10).
  3. Disconnect the display signal cable.
  4. Set the power switch on the system unit and display to On.
  5. Wait one minutes, then answer the following question.
- 



### IS THE DISPLAY SCREEN COMPLETELY LIGHTED?

---

- NO**      Record SRN 26-580, then go to “Step 2” on page 3-6.
- YES**      Continue on the next page.

---

## Step 29

1. Set the power switch on the system unit and display to Off.
  2. Connect the display signal cable.
  3. Install the rear cover of the system unit (page 4-11).
  4. Set the power switch on the system unit and display to On.
  5. Wait four minutes, then set the Brightness and Contrast controls to the desired level.
- 

DIAGNOSTIC OPERATING INSTRUCTIONS

DIAG-1

This diskette contains diagnostics and utilities for your system. You should use these procedures whenever you are having problems with your system which have not been corrected by any software application procedures available.

In general, the procedures will run automatically. However, sometimes you will be required to select options, tell the system when to continue, do simple tasks, and exchange diskettes.

### **ARE THE “DIAGNOSTIC OPERATING INSTRUCTIONS” DISPLAYED CORRECTLY?**

---

**YES**     This completes the repair.

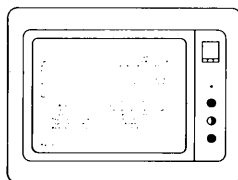
**NO**      Continue on the next page.

---

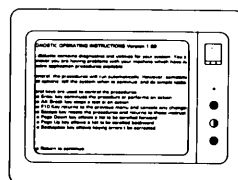
## Step 30

Look at the display screen.

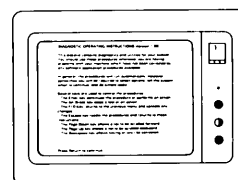
---



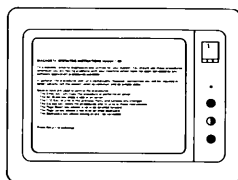
**To Dim**



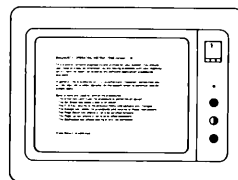
**Too Wide**



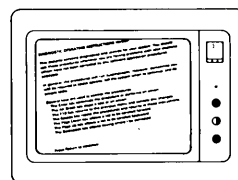
**Too Narrow**



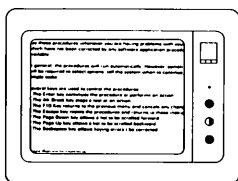
**Too Short**



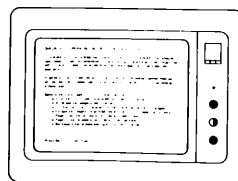
**Too Small**



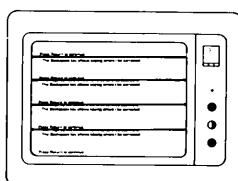
**Tilted**



**Changes Size When  
Brightness Control  
Turned**



**Out of Focus**



**Rolling**

---

**DOES YOUR DISPLAY HAVE A PROBLEM SIMILAR TO ANY OF  
THE DISPLAY SCREENS ABOVE?**

---

**NO** Record SRN 26-985-410-100-580, then go to "Step 2" on page 3-6.

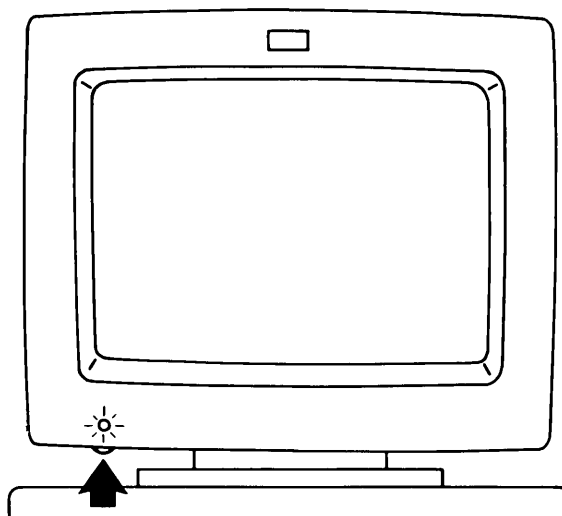
**YES** Record SRN 26-580-410, then go to "Step 2" on page 3-6.

---

## Step 31

Turn the Brightness and Raster Test control fully clockwise until it clicks into the *raster test* position.

---



---

**IS THE DISPLAY SCREEN COMPLETELY LIGHTED?**

---

**NO**     Go to "Step 33" on page 3-56.

**YES**     Continue on the next page.

---

## Step 32

Turn the Brightness and Raster Test control about one-fourth turn counter-clockwise to turn the raster test off.

---

```
DIAGNOSTIC OPERATING INSTRUCTIONS                                DIAG-1

This diskette contains diagnostics and utilities for your system. You
should use these procedures whenever you are having problems with your system
which have not been corrected by any software application procedures available.

In general, the procedures will run automatically. However, sometimes you will
be required to select options, tell the system when to continue, do simple
tasks, and exchange diskettes.

Several keys are used to control the procedures:
- The Enter key continues the procedure or performs an action.
- The End key stops a test or an action.
- The F10 key returns to the previous menu and cancels any changes.
- The Escape key resets the procedures and returns to these instructions.
- The Page Down key allows a list to be scrolled forward.
- The Page Up key allows a list to be scrolled backward.
- The Backspace key allows keying errors to be corrected.

Press Enter to continue.
```

### **ARE THE “DIAGNOSTIC OPERATING INSTRUCTIONS” DISPLAYED CORRECTLY?**

---

- NO**      Go to “Step 34” on page 3-57.
- YES**     Set the Brightness and Raster Test control to the desired level.  
            This completes the repair.

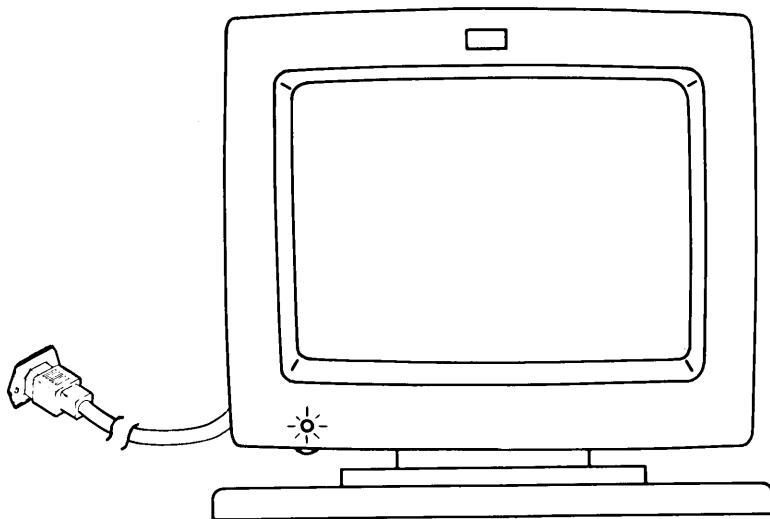


---

### Step 33

Be sure that the display power cable is correctly connected to the system unit.

---



#### DID YOU FIND A PROBLEM?

---

**YES** This completes the repair.

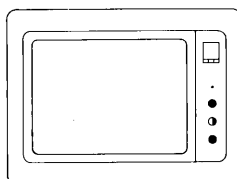
**NO** Record SRN 26-600, then go to “Step 2” on page 3-6.

---

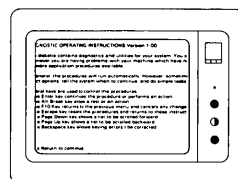
## Step 34

Look at the display screen.

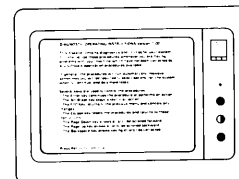
---



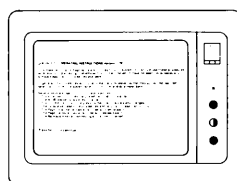
**Too Dim**



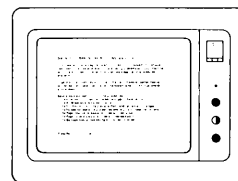
**Too Wide**



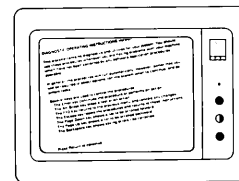
**Too Narrow**



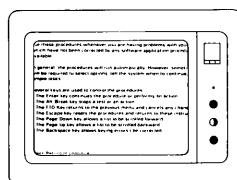
**Too Short**



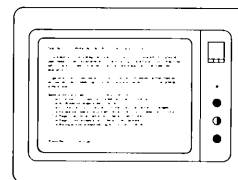
**Too Small**



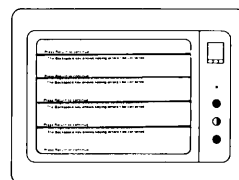
**Tilted**



**Changes Size When  
Brightness Control  
Turned**



**Out of Focus**



**Rolling**

---

**DOES YOUR DISPLAY HAVE A PROBLEM SIMILAR TO ANY OF THE DISPLAY SCREENS ABOVE?**

---

**NO** Record SRN 16-985-430-100-600, then go to “Step 2” on page 3-6.

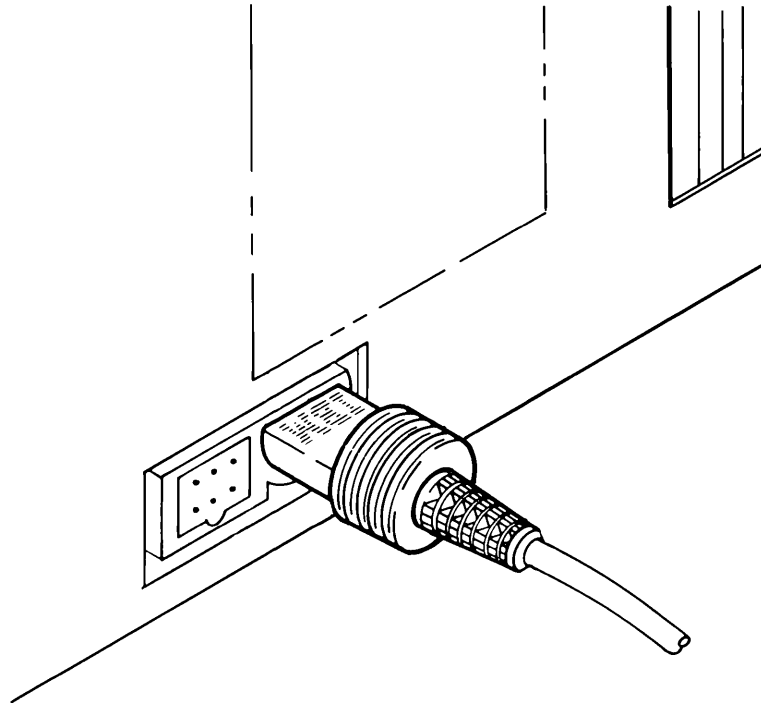
**YES** Record SRN 26-600-430, then go to “Step 2” on page 3-6.

---

## Step 35

Be sure that the keyboard cable is correctly connected to the system unit.

---



### **DID YOU FIND A PROBLEM?**

---

**YES** This completes the repair.

**NO** Record SRN 36-780, then go to “Step 2” on page 3-6.

---

**Step 36**

This step is for flashing numbers only.

Find the number displayed in the two-digit display in the following table.

---

<b>Number</b>	<b>Go to Step</b>
02	“Step 37” on page 3-60
30	“Step 37” on page 3-60
99	“Step 38” on page 3-60

---

**DID YOU FIND THE NUMBER IN THE TABLE?**

---

**YES**    Go to the step listed.

**NO**    Go to “Step 38” on page 3-60.

---

### **Step 37**

The Diagnostics 1 (DIAG-1) diskette may be defective. Try a new Diagnostics 1 (DIAG-1) diskette.

If the new Diagnostics 1 (DIAG-1) diskette does not work, record SRN 12-64A-526 and go to “Step 2” on page 3-6.

### **Step 38**

A program or machine check occurred. Record SRN 12-986 and go to “Step 2” on page 3-6.

---

**Step 39**

Determine the type of display adapter the display is attached to. Find the adapter type in the table below.

---

Type Display Adapter	SRN
Enhanced Graphics Adapter	12-410
Advanced Monochrome Graphics Display Adapter	12-430
IBM Monochrome Display and Printer Adapter	12-490

---

**DID YOU FIND THE ADAPTER IN THE TABLE?**

---

**YES** Record the SRN, then go to “Step 2” on page 3-6.

**NO** The display adapter is not supported in this documentation.

---

## Memory Expansion Option PIC 2100

This PIC analyzes the 21x and 37x SRA numbers. The 21x SRA isolates the failure to an option. The 37x SRA isolates the failure to a single memory module. The starting addresses can be used to determine the address range where the failure occurred.

### Step 1

Look at your SRN.

---

4. Write the Service Request Number here:

13 - 37K - 21B - \_\_\_\_\_ - \_\_\_\_\_

---

### IS ANY OF THE SRAs "210"?

- YES**    The diagnostic programs were unable to determine the location of the failing option. Exchange the options one at a time and run the AT 512 KB Memory Expansion Option Checkout.
- NO**     Continue on the next page.

---

## Step 2

1. Look at the letter in the 21x (x=any letter) SRA, then find the column for that letter in the following tables.
  2. Record the switch settings shown for the letter. Go to “Step 3” on page 3-65.
- 

SRA Letter	A	B	C	D	E	F
	Off On	Off On	Off On	Off On	Off On	Off On
Switch 1	X	X	Not	Not	X	X
Switch 2	X	X	valid	valid	X	X
Switch 3	X	X	I/O	I/O	X	X
Switch 4	X	X	memory	memory	X	X
Switch 5	X	X	addresses	addresses	X	X
Switch 6	X	X			X	X
Switch 7	Either	Either			Either	Either
Switch 8	Either	Either			Either	Either
Starting Address of 256K bytes	000000	040000	080000	0C0000	100000	140000



SRA Letter	G	H	I	J	K	L
	Off On	Off On	Off On	Off On	Off On	Off On
Switch 1	X	X	X	X	X	X
Switch 2	X	X	X	X	X	X
Switch 3	X	X	X	X	X	X
Switch 4	X	X	X	X	X	X
Switch 5	X	X	X	X	X	X
Switch 6	X	X	X	X	X	X
Switch 7	Either	Either	Either	Either	Either	Either
Switch 8	Either	Either	Either	Either	Either	Either
Starting Address of 256K bytes	180000	1C0000	200000	240000	280000	2C0000

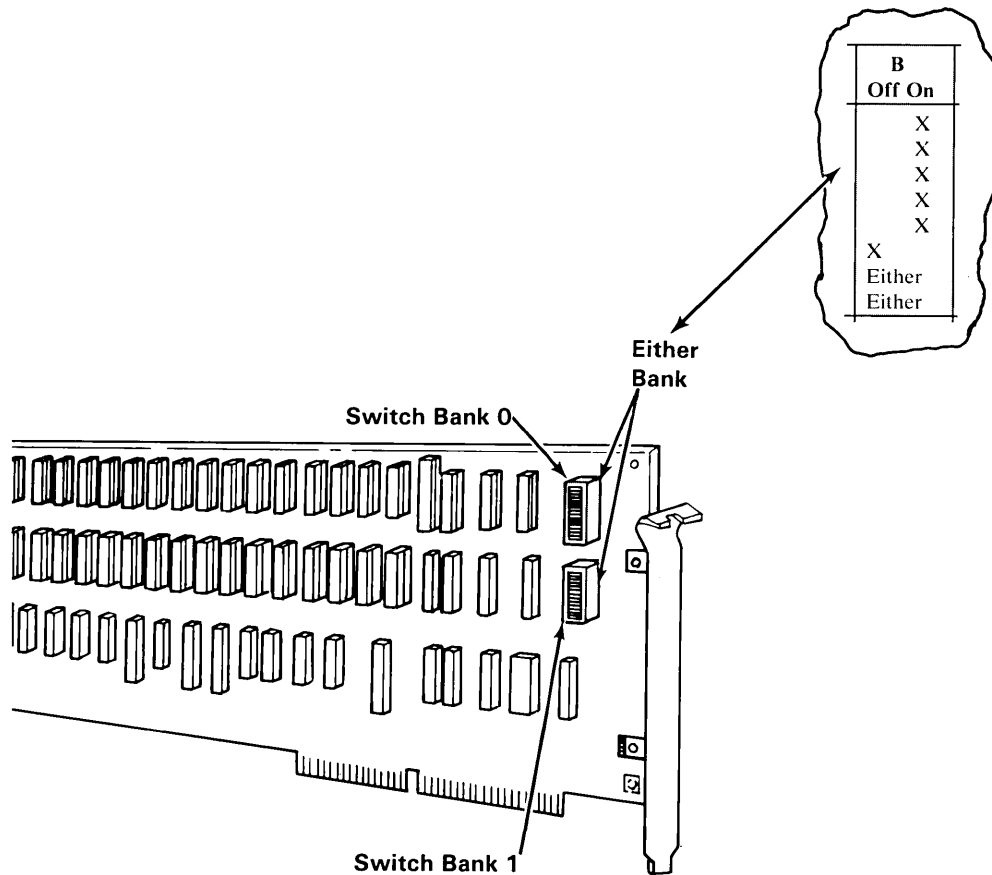
SRA Letter	M	N	O	P
	Off On	Off On	Off On	Off On
Switch 1	X	X	X	X
Switch 2	X	X	X	X
Switch 3	X	X	X	X
Switch 4	X	X	X	X
Switch 5	X	X	X	X
Switch 6	X	X	X	X
Switch 7	Either	Either	Either	Either
Switch 8	Either	Either	Either	Either
Starting Address of 256K bytes	300000	340000	380000	3C0000

---

### Step 3

Find the AT 512 KB Memory Expansion Option installed in your system unit with *either* Switch Bank 0 or Switch Bank 1 set like you recorded.

---



---

Continue on the next page.

---

## Step 4

Look at your SRN.

---

4. Write the Service Request Number here:

13 - 37K - 21B - \_\_\_\_\_ - \_\_\_\_\_

### **DOES YOUR SRN HAVE A "37x" SRA?**

---

**NO**      Exchange the memory option, then run System Checkout.

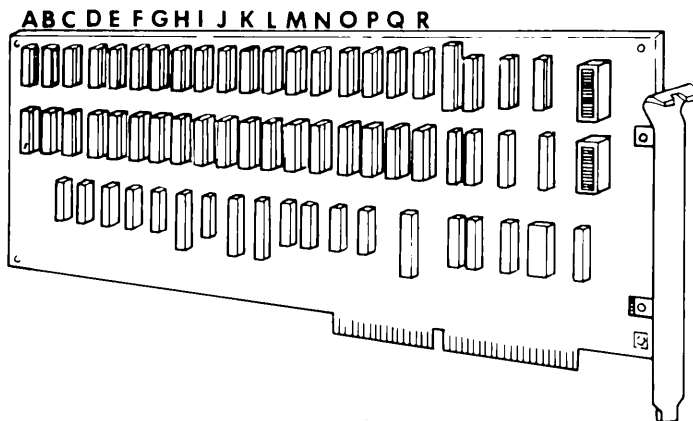
**YES**      Continue on the next page.

---

## Step 5

The letter of the 37x SRA identifies the failing module within a horizontal row of modules. The horizontal row is determined by the switch bank setting that corresponds to the letter in the 21x SRA.

1. Find the switch bank that corresponds to the letter in the 21x SRA.
2. Find the module within the same horizontal row that corresponds to the letter in the 37x SRA.
3. Exchange the module.
4. Run I/O Channel Memory Checkout.



### DID A FAILURE OCCUR WITH THE SAME SRN?

- YES**    Exchange the AT 512 KB Memory Expansion Option.
- NO**     This completes the repair.

---

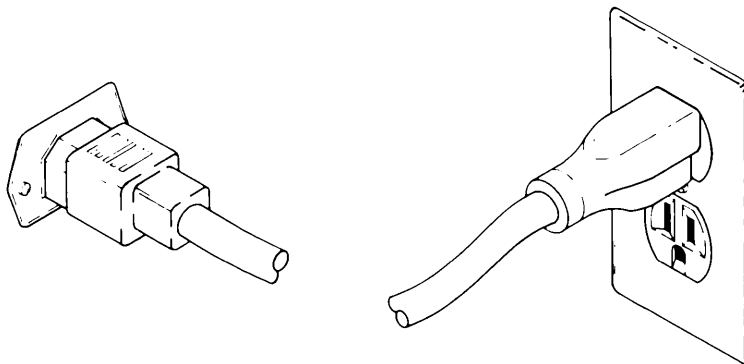
## Power Supply PIC 8800

**Note:** When you set the power switch on the system unit to Off, wait 30 seconds before setting the power switch to On.

### Step 1

Be sure that the system unit external power cable is plugged into both the system unit and the outlet and that the outlet has power.

---



---

#### **DID YOU FIND A PROBLEM?**

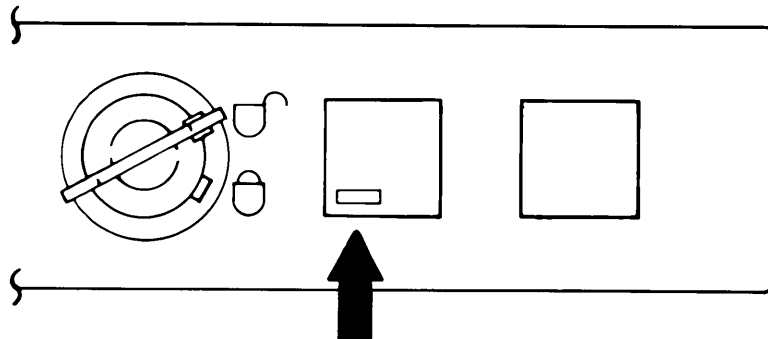
**YES** This completes the repair.

**NO** Continue on the next page.

---

## Step 2

1. Set the power switch on the system unit to Off.
  2. Do the "Top Cover Removal" on page 4-12.
  3. Unplug the external power cable to the system unit.
  4. Disconnect the large power connector from the system board, the power connector from the fixed-disk drive, and the power connector from the diskette drive.
  5. Plug in the external power cable to the system unit.
  6. Set the power switch on the system unit to On.
  7. Wait 15 seconds, then answer the following question.
- 



---

### IS THE POWER-ON INDICATOR ON?

---

**NO**      Go to "Step 6" on page 3-73.

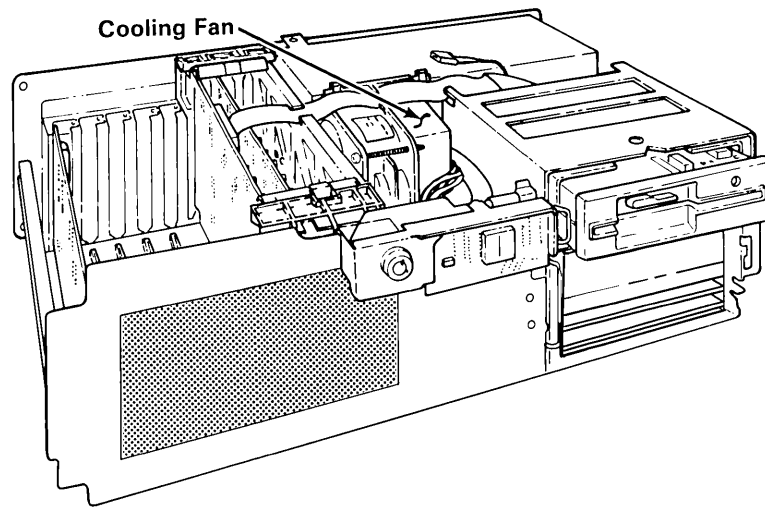
**YES**      Continue on the next page.

---

### Step 3

Listen to the system unit or hold a piece of paper near the air outlet.

---



#### **IS THE COOLING FAN OPERATING?**

---

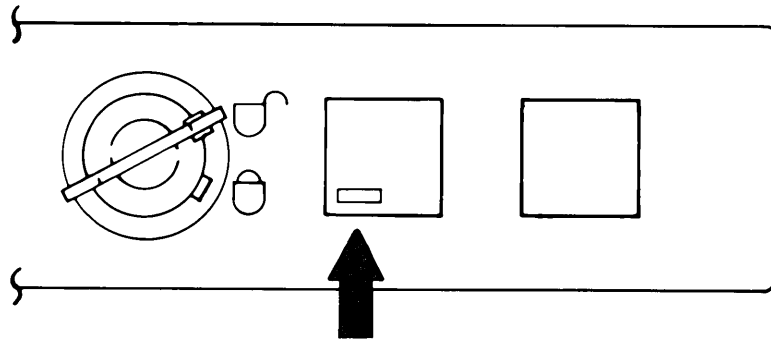
**NO** Exchange the cooling fan assembly. This completes the repair.

**YES** Continue on the next page.

---

## Step 4

1. Set the power switch on the system unit to Off.
  2. Unplug the external power cable to the system unit.
  3. Connect the large power connector to the system board.
  4. Plug in the external power cable to the system unit.
  5. Be sure the power has been off 30 seconds, then set the power switch on the system unit to On.
  6. Wait 15 seconds, then answer the following question.
- 



---

### IS THE POWER-ON INDICATOR ON?

---

**NO**     Go to “Step 9” on page 3-76.

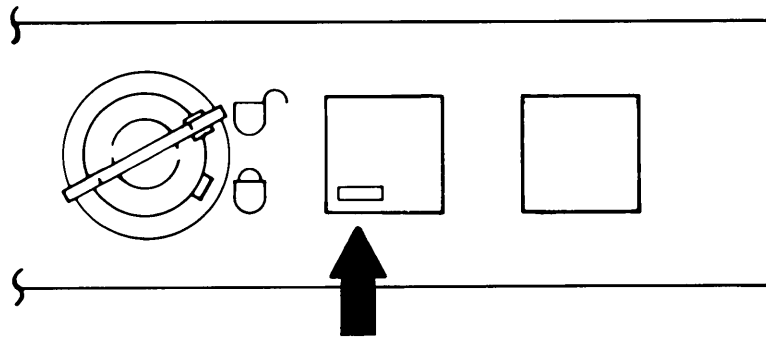
**YES**     Continue on the next page.



---

## Step 5

1. Set the system unit power switch to Off.
  2. Connect the power connector to the diskette drive.
  3. Be sure the power has been off 30 seconds, then set the power switch on the system unit to On.
  4. Wait 15 seconds, then answer the following question.
- 



### IS THE POWER-ON INDICATOR ON?

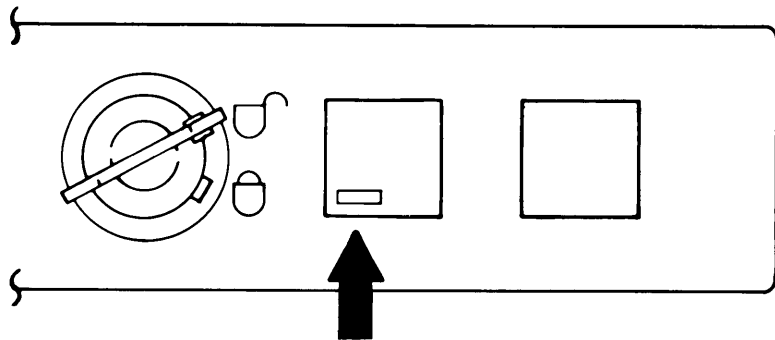
---

- NO**     Exchange the diskette drive. This completes the repair.
- YES**     Exchange the fixed-disk drive. This completes the repair.

---

## Step 6

1. Set the power switch on the system unit to Off.
  2. Disconnect the power connector at the cooling fan.
  3. Be sure the power has been off 30 seconds, then set the power switch on the system unit to On.
  4. Wait 15 seconds, then answer the following question.
- 



### IS THE POWER-ON INDICATOR ON?

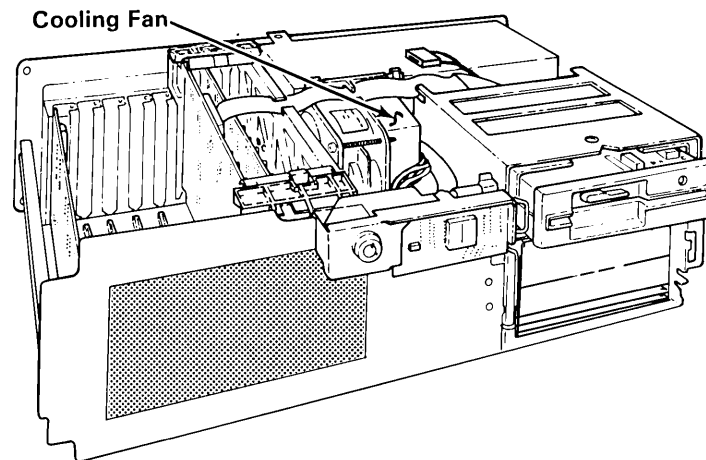
---

- YES** Exchange the cooling fan assembly, then connect any connectors that are disconnected. This completes the repair.
- NO** Continue on the next page.

---

## Step 7

1. Set the power switch on the system unit to Off.
  2. Connect the power connector to the cooling fan.
  3. Disconnect the smaller power cable connector from the system board.
  4. Be sure the power has been off 30 seconds, then set the power switch on the system unit to On.
  5. Wait 15 seconds, then answer the following question.
- 



### **IS THE COOLING FAN OPERATING?**

---

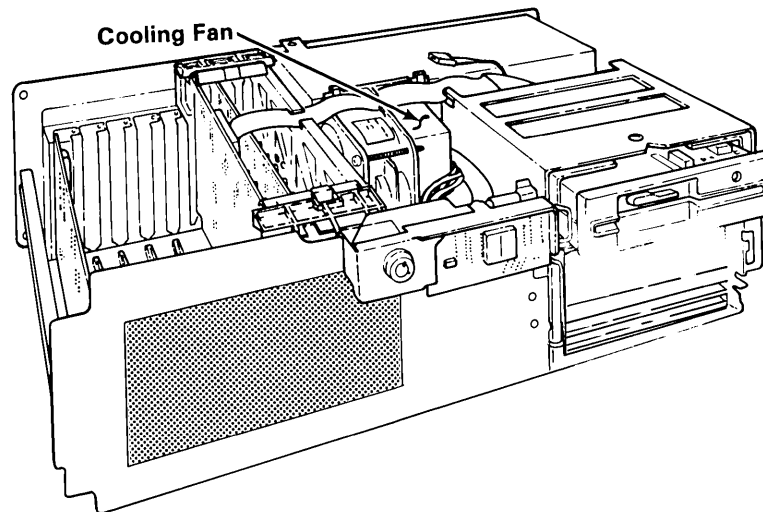
**NO** Check the external power cable for damage, if none, exchange the power supply. This completes the repair.

**YES** Continue on the next page.

---

## Step 8

1. Set the system unit power switch to Off.
  2. Connect the smaller power cable connector to the system board.
  3. Disconnect the operator panel cable from the system board.
  4. Be sure the power has been off 30 seconds, then set the power switch on the system unit to On.
  5. Wait 15 seconds, then answer the following question.
- 



### IS THE COOLING FAN OPERATING?

---

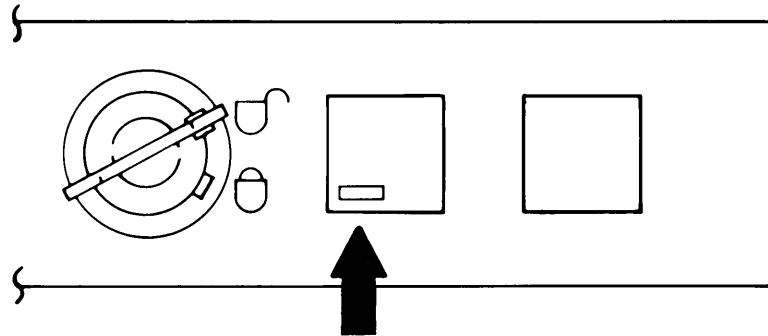
**NO**      Exchange the system board.      This completes the repair.

**YES**      Exchange the operator panel. This completes the repair.

---

## Step 9

1. Set the system unit power switch to Off.
  2. Disconnect the keyboard and mouse cables.
  3. Disconnect all of the external device cables.
  4. Be sure the power has been off 30 seconds, then set the power switch on the system unit to On.
  5. Wait 15 seconds, then answer the following question.
- 



---

### IS THE POWER-ON INDICATOR ON?

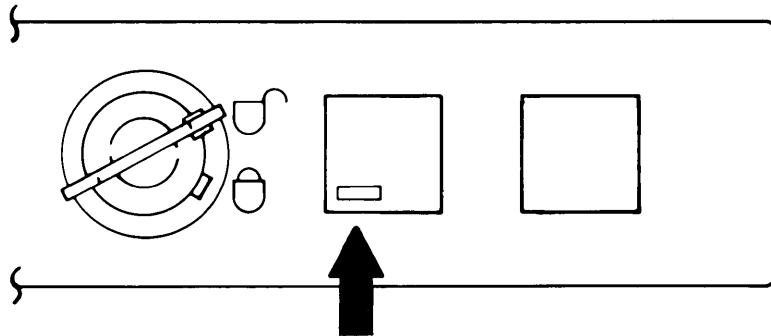
---

- YES** One of the external devices is defective. Do the following:
1. Set the power switch on the system unit to Off.
  2. Connect the cable to an external device.
  3. Set the power switch on the system unit to On.
  4. If the Power-On indicator is on, repeat these Steps. If the Power-On indicator is off, exchange or repair the last device connected. This completes the repair.
- NO** Continue on the next page.

---

## Step 10

1. Set the system unit power switch to Off.
  2. Disconnect all of the internal cables to the adapters.
  3. Be sure the power has been off 30 seconds, then set the power switch on the system unit to On.
  4. Wait 15 seconds, then answer the following question.
- 



---

### **IS THE POWER-ON INDICATOR ON?**

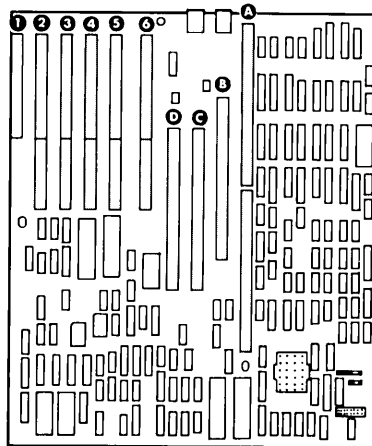
---

- YES** One of the internal devices or cables is defective. Do the following:
1. Set the power switch on the system unit to Off.
  2. Connect one of the internal cables.
  3. Set the power switch on the system unit to On.
  4. If the Power-On indicator is on, repeat these Steps. If the Power-On indicator is off, exchange the last device or cable connected. This completes the repair.
- NO** Continue on the next page.

---

## Step 11

1. Set the power switch on the system unit to Off.
  2. Remove one of the adapters or boards from the system board.
  3. Be sure the power has been off 30 seconds, then set the power switch on the system unit to On.
  4. Wait 15 seconds.
  5. If the Power-On indicator is off, repeat the steps until the Power-On indicator is on, then answer the question below.
- 



---

### **DID YOU FIND A FAILING ADAPTER OR BOARD?**

---

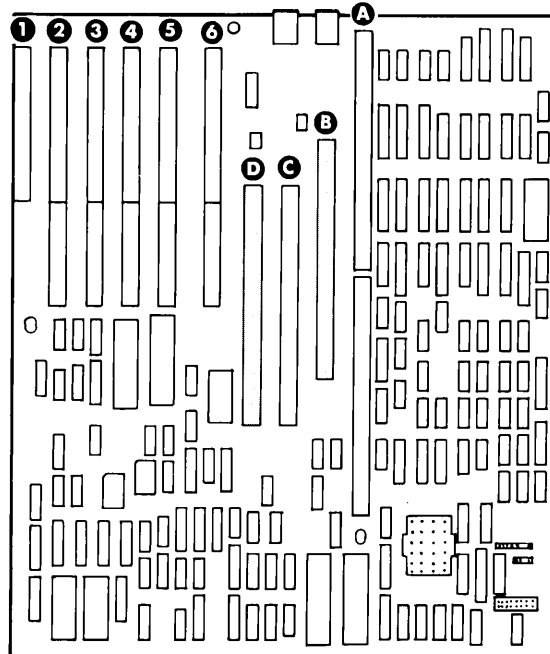
- NO** Exchange the system board, then install all units removed and connect any cables that are disconnected. This completes the repair.
- YES** Exchange the failing board or adapter. This completes the repair.

---

## POST Errors 03 or 05 PIC 9810

### Step 1

1. Do the “Top Cover Removal” on page 4-12.
  2. Plug the external power cable into the outlet.
  3. Remove the fixed-disk and diskette drive adapter from slot 6.
- 



---

**IS THERE A BOARD IN SLOT B OR D?**

**NO**      Go to “Step 5” on page 3-83.

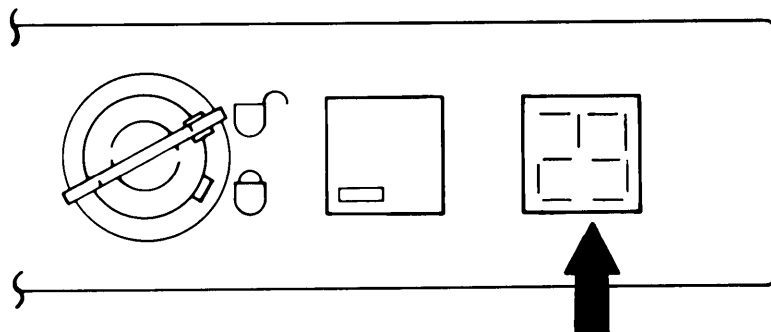
**YES**      Continue on the next page.



---

## Step 2

1. Remove the boards from slots B and D, and record the type and slot position.
  2. Set the power switch on the system unit to On.
  3. Wait two minutes, then answer the following question.
- 



---

**IS "23" DISPLAYED IN THE TWO-DIGIT DISPLAY?**

---

**YES**    Go to "Step 7" on page 3-85.

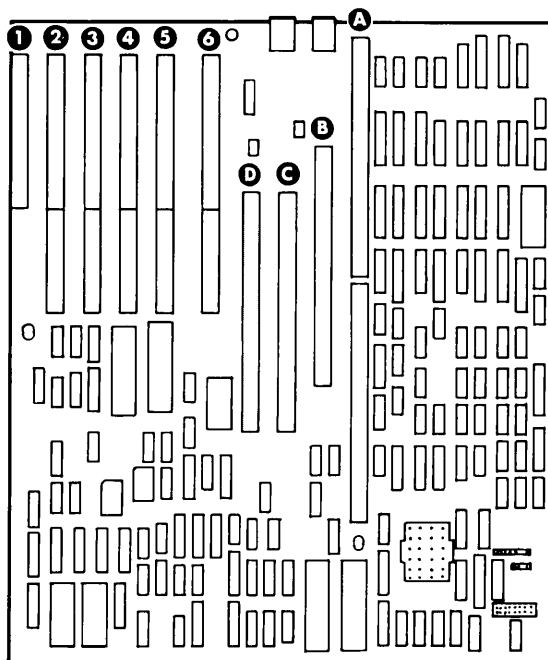
**NO**     Continue on the next page.

---

### Step 3

Look at the slot position you recorded for the boards removed from slots B and D.

---



---

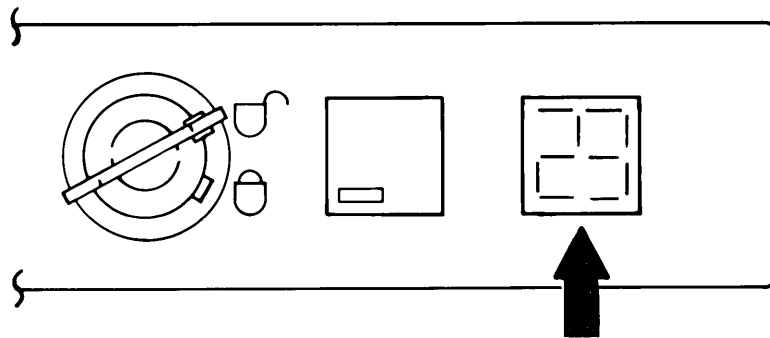
#### **DID YOU REMOVE A BOARD FROM SLOT D?**

- NO** Set the power switch on the system unit to Off, then go to “Step 5” on page 3-83.
- YES** Continue on the next page.

---

## Step 4

1. Set the power switch on the system unit to Off.
2. Remove the memory board in slot C and record the type.
3. Install the memory board you removed from slot D in slot C.
4. Be sure the power has been off 30 seconds, then set the power switch on the system unit to On.
5. Wait two minutes, then answer the following question.



---

### **IS "23" DISPLAYED IN THE TWO-DIGIT DISPLAY?**

**YES** Set the power switch on the system unit to Off.

1. Move the memory board now in slot C to slot D.
2. Exchange the memory board that was in slot D.
3. Go to "Step 8" on page 3-86.

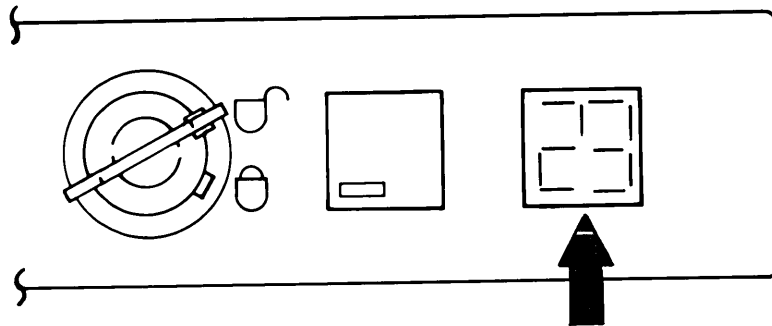
**NO** Set the power switch on the system unit to Off.

1. Remove the memory board from slot C.
2. Look at the memory board type you recorded, then install the original memory board in slot C.
3. Go to "Step 6" on page 3-84.

---

## Step 5

1. Exchange the memory board in slot C.
  2. Be sure the power has been off 30 seconds, then set the power switch on the system unit to On.
  3. Wait two minutes, then answer the following question.
- 



---

### **IS “23” DISPLAYED IN THE TWO-DIGIT DISPLAY?**

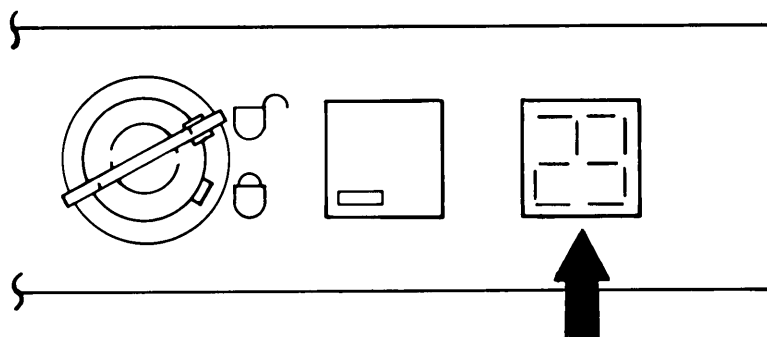
---

- YES** Set the power switch on the system unit to Off, then go to “Step 8” on page 3-86.
- NO** Set the power switch on the system unit to Off.
1. Remove the memory board from slot C.
  2. Look at the memory board type you recorded, then install the original memory board in slot C.
  3. Go the the next page.

---

## Step 6

1. Exchange the processor board in slot A.
  2. Be sure the power has been off 30 seconds, then set the power switch on the system unit to On.
  3. Wait two minutes, then answer the following question.
- 



---

### **IS "23" DISPLAYED IN THE TWO-DIGIT DISPLAY?**

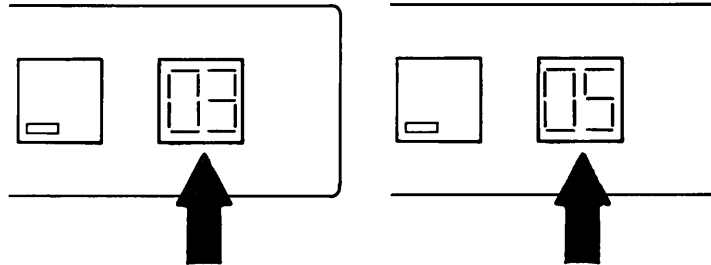
- YES** Set the power switch on the system unit to Off, then go to "Step 8" on page 3-86.
- NO** Set the power switch on the system unit to Off.
1. Remove the processor board from slot A.
  2. Exchange the system board.
  3. Go to "Step 8" on page 3-86.

---

## Step 7

One of the boards removed from slots B or D is failing.

1. Set the power switch on the system unit to Off.
  2. Install one of the boards removed from slots B or D.
  3. Be sure the power has been off 30 seconds, then set the power switch on the system unit to On.
  4. Wait two minutes, then answer the following question.
- 



---

### **IS "03" OR "05" DISPLAYED IN THE TWO-DIGIT DISPLAY?**

---

**NO** Repeat this procedure.

**YES** Set the power switch on the system unit to Off.

1. The last board installed is failing, exchange the failing board.
2. Go to "Step 8" on page 3-86.

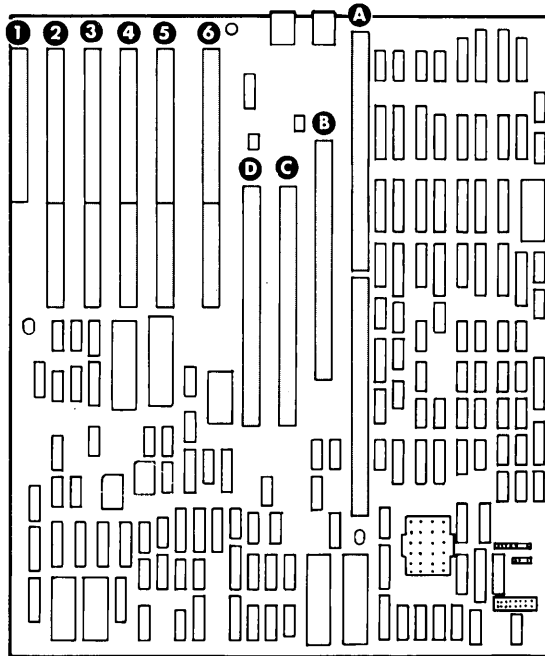
---

## Step 8

1. Look at the type and slot positions you recorded, and install the boards and adapters you removed.
2. Set the power switch on the system unit to Off.
3. Do the “Top Cover Replacement” on page 4-13.
4. Set the power switch on the system unit to On.
5. Follow the instructions on the menus to run the System Checkout. If needed, see page 2-15.

This completes the repair.

---

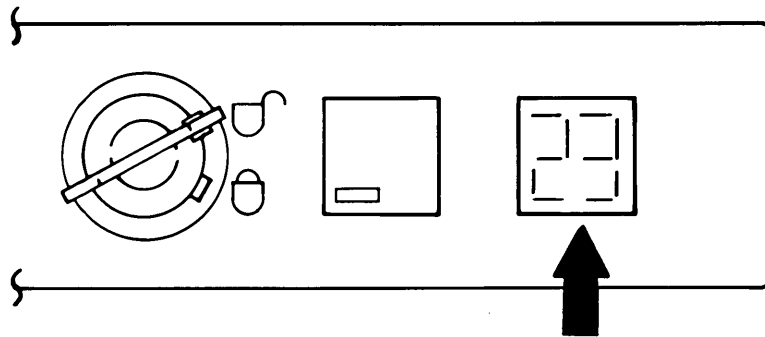


---

## POST Errors 00 or 04 PIC 9820

### Step 1

1. Do the "Top Cover Removal" on page 4-12.
  2. Remove the adapters from slots 1 thru 6 and the boards from slots B and D and record the type and slot position of each.
  3. Plug the external power cable into the outlet.
  4. Set the power switch on the system unit to On.
  5. Wait two minutes, then answer the following question.
- 



---

**IS "23" DISPLAYED IN THE TWO-DIGIT DISPLAY?**

---

**YES**     Go to "Step 4" on page 3-90.

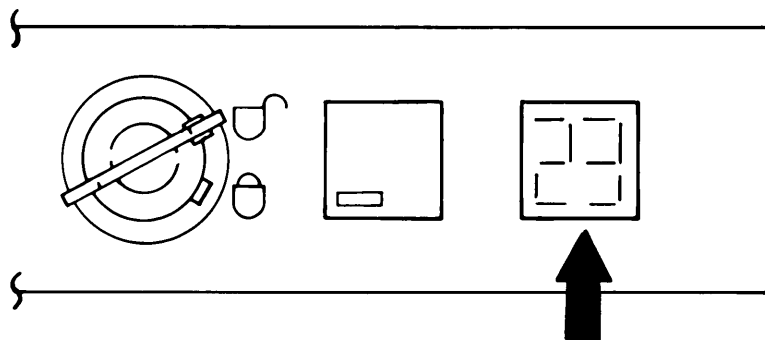
**NO**       Continue on the next page.



---

## Step 2

1. Set the power switch on the system unit to Off.
  2. Exchange the processor board.
  3. Be sure the power has been off 30 seconds, then set the power switch on the system unit to On.
  4. Wait two minutes, then answer the following question.
- 



---

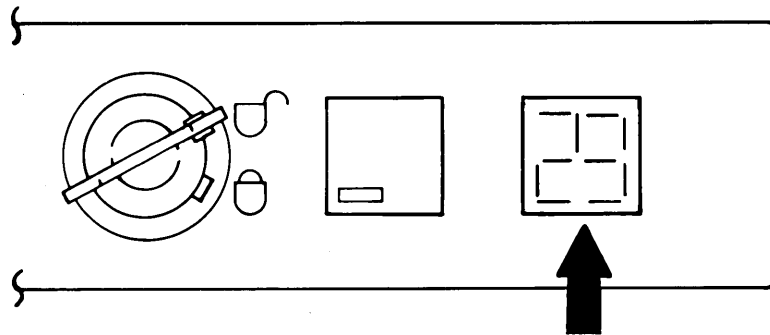
### **IS "23" DISPLAYED IN THE TWO-DIGIT DISPLAY?**

- YES** Set the power switch on the system unit to Off, then go to "Step 5" on page 3-91.
- NO** Continue on the next page.

---

### Step 3

1. Set the power switch on the system unit to Off.
  2. Remove the new processor board now in slot A and the memory board now in slot C and record the type.
  3. Exchange the system board. Install only the original processor board in slot A and the memory board in slot C.
  4. Set the power switch on the system unit to On.
  5. Wait two minutes, then answer the following question.
- 



---

#### **IS "23" DISPLAYED IN THE TWO-DIGIT DISPLAY?**

---

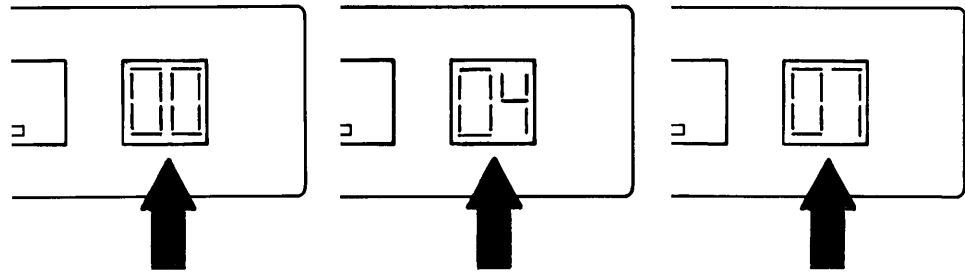
- YES** Set the power switch on the system unit to Off, then go to "Step 5" on page 3-91.
- NO** Set the power switch on the system unit to Off.
1. Remove the new system board and install the original system board.
  2. Exchange the memory board in slot C.
  3. Go to "Step 5" on page 3-91.

---

## Step 4

One of the adapters or boards removed is failing.

1. Set the power switch on the system unit to Off.
  2. Install one of the adapters or boards. Use the following order; the fixed-disk and diskette drive adapter, the display adapter, then any other adapter.
  3. Be sure the power has been off 30 seconds, then set the power switch on the system unit to On.
  4. Wait two minutes, then answer the following question.
- 



### IS "00," "04," OR "07" DISPLAYED IN THE TWO-DIGIT DISPLAY?

**NO** Repeat the above steps.

**YES** Set the power switch on the system unit to Off.

1. The last board installed is failing, exchange the failing board.
2. Continue on the next page.

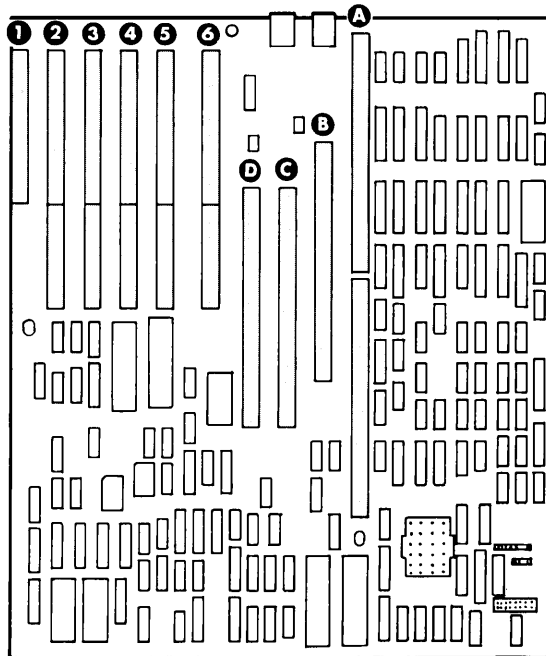
---

## Step 5

1. Look at the type and slot positions you recorded, and install the boards and adapters you removed.
2. Set the power switch on the system unit to Off.
3. Do the “Top Cover Replacement” on page 4-13.
4. Set the power switch on the system unit to On.
5. Follow the instructions on the menus to run the System Checkout. If needed, see page 2-15.

This completes the repair.

---

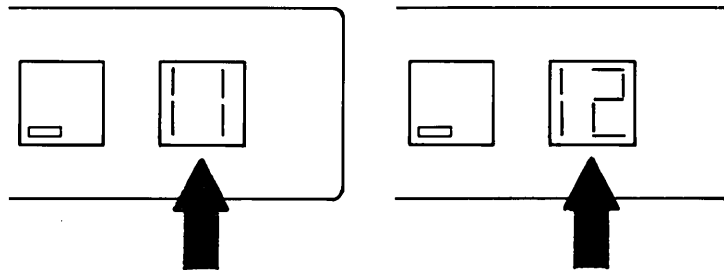


---

## POST Errors 11 or 12 PIC 9830

### Step 1

1. Do the "Top Cover Removal" on page 4-12.
  2. Remove the adapters from slots 1 thru 6 and record the type and slot position of each.
  3. Plug the external power cable into the outlet.
  4. Set the power switch on the system unit to On.
  5. Wait two minutes, then answer the following question.
- 



---

**IS "11" OR "12" DISPLAYED IN THE TWO-DIGIT DISPLAY?**

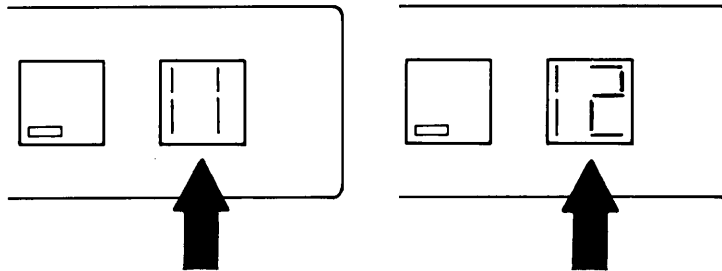
**NO**      Go to "Step 3" on page 3-94.

**YES**      Continue on the next page.

---

## Step 2

1. Set the power switch on the system unit to Off.
  2. Exchange the processor board in slot A.
  3. Be sure the power has been off 30 seconds, then set the power switch on the system unit to On.
  4. Wait two minutes, then answer the following question.
- 



---

### **IS "11" OR "12" DISPLAYED IN THE TWO-DIGIT DISPLAY?**

---

**YES** Set the power switch on the system unit to Off.

1. Exchange the system board.
2. Go to "Step 4" on page 3-95.

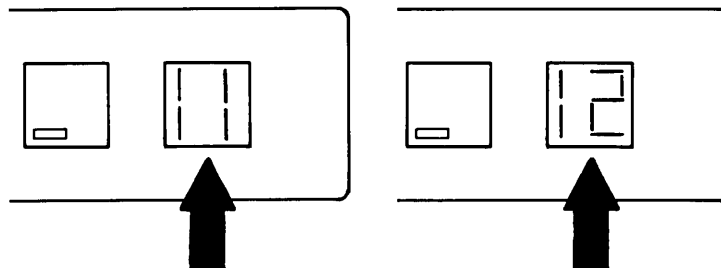
**NO** Go to "Step 4" on page 3-95.

---

### Step 3

One of the removed adapters is failing.

1. Set the power switch on the system unit to Off.
  2. Install one of the adapters. Use the following order; the fixed-disk and diskette adapter, the display adapter, then any other adapter.
  3. Be sure the power has been off 30 seconds, then set the power switch on the system unit to On.
  4. Wait four minutes, then answer the following question.
- 



---

#### IS "11" OR "12" DISPLAYED IN THE TWO-DIGIT DISPLAY?

---

**NO** Repeat the above steps.

**YES** Set the power switch on the system unit to Off.

1. The last adapter installed is failing, exchange the failing adapter.
2. Continue on the next page.

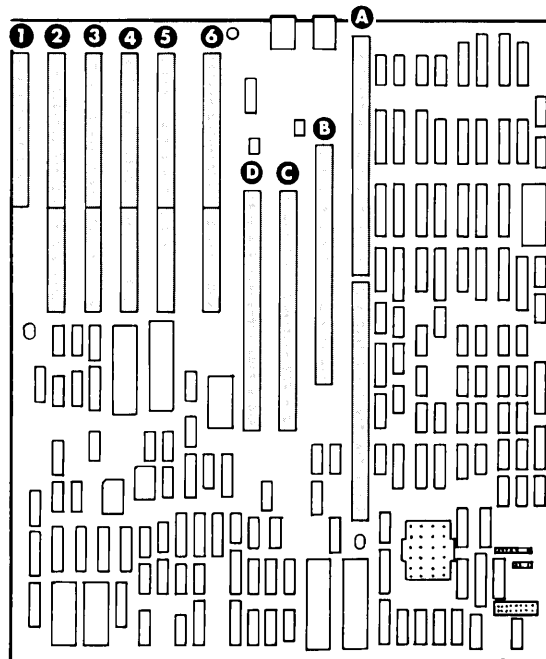
---

## Step 4

1. Look at the type and slot positions you recorded, and install the boards and adapters you removed.
2. Set the power switch on the system unit to Off.
3. Do the “Top Cover Replacement” on page 4-13.
4. Set the power switch on the system unit to On.
5. Follow the instructions on the menus to run the System Checkout. If needed, see page 2-15.

This completes the repair.

---



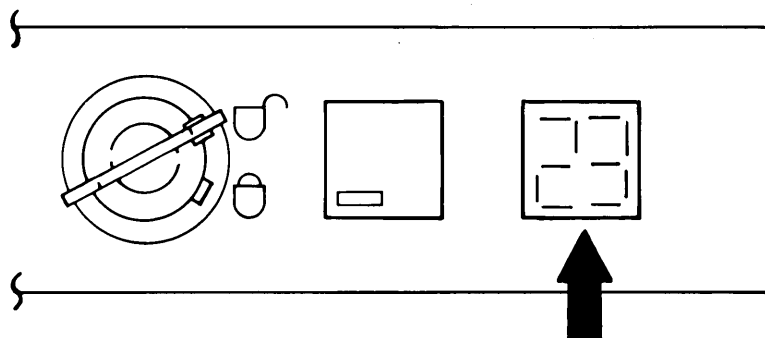


---

## POST Error 23 PIC 9840

### Step 1

1. Do the “Top Cover Removal” on page 4-12.
  2. Remove the adapters from slots 1 thru 5 and record the type and slot position of each.
  3. Plug the external power cable into the outlet.
  4. Set the power switch on the system unit to On.
  5. Wait two minutes, then answer the following question.
- 



---

**IS “23” DISPLAYED IN THE TWO-DIGIT DISPLAY?**

---

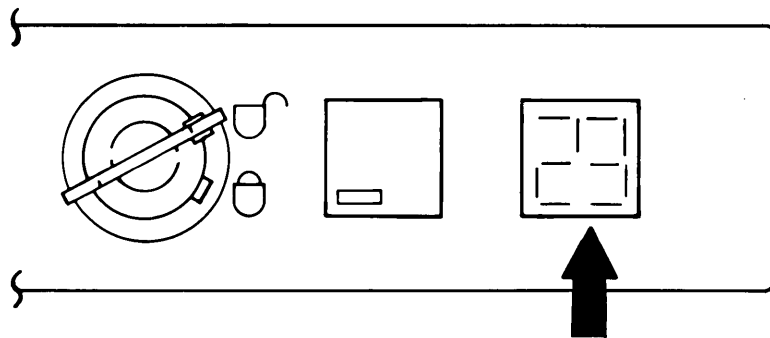
**NO**      Go to “Step 3” on page 3-98.

**YES**      Continue on the next page.

---

## Step 2

1. Set the power switch on the system unit to Off.
  2. Exchange the fixed-disk and diskette adapter.
  3. Be sure the power has been off 30 seconds, then set the power switch on the system unit to On.
  4. Wait two minutes, then answer the following question.
- 



---

### **IS "23" DISPLAYED IN THE TWO-DIGIT DISPLAY?**

---

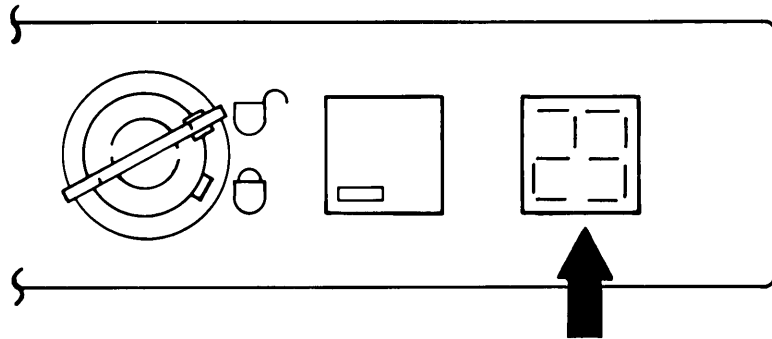
- NO** Set the power switch on the system unit to Off, then go to "Step 4" on page 3-99.
- YES** Set the power switch on the system unit to Off.
1. Exchange the system board.
  2. Go to "Step 4" on page 3-99.

---

### Step 3

One of the removed adapters is failing.

1. Set the power switch on the system unit to Off.
  2. Install one of the adapters. Install the display adapter first, then any other adapter.
  3. Be sure the power has been off 30 seconds, then set the power switch on the system unit to On.
  4. Wait two minutes, then answer the following question.
- 



---

#### **IS "23" DISPLAYED IN THE TWO-DIGIT DISPLAY?**

---

- NO** Repeat the above steps.
- YES** Set the power switch on the system unit to Off.
1. The last adapter installed is failing, exchange the failing adapter.
  2. Continue on the next page.

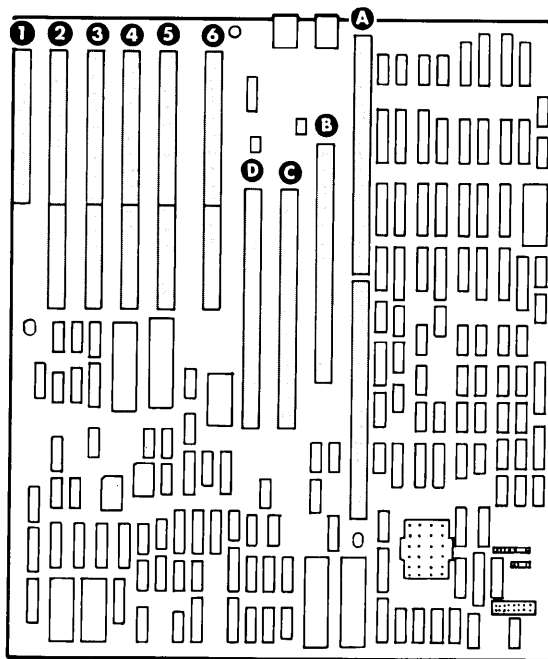
---

## Step 4

1. Look at the type and slot positions you recorded, and install the boards and adapters you removed.
2. Set the power switch on the system unit to Off.
3. Do the “Top Cover Replacement” on page 4-13.
4. Set the power switch on the system unit to On.
5. Follow the instructions on the menus to run the System Checkout. If needed, see page 2-15.

This completes the repair.

---



---

## Invalid Display Data PIC 9850

### Step 1

1. Do the "Top Cover Removal" on page 4-12.
  2. Remove the adapters from slots 1 thru 5, except the display adapter, and record the type and slot position of each.
  3. Plug the external power cable into the outlet.
  4. Insert the Diagnostics 1 (DIAG-1) diskette in the diskette drive.
  5. Set the power switch on the system unit to On.
  6. Turn the Brightness control clockwise.
  7. Wait four minutes, then answer the following question.
- 

DIAGNOSTIC OPERATING INSTRUCTIONS

DIAG-1

This diskette contains diagnostics and utilities for your system. You should use these procedures whenever you are having problems with your system which have not been corrected by any software application procedures available.

In general, the procedures will run automatically. However, sometimes you will be required to select options, tell the system when to continue, do simple tasks, and exchange diskettes.

---

### ARE THE "DIAGNOSTIC OPERATING INSTRUCTIONS" DISPLAYED CORRECTLY?

---

**YES**     Go to "Step 3" on page 3-102.

**NO**     Continue on the next page.

---

## Step 2

1. Set the power switch on the system unit to Off.
  2. Exchange the display adapter.
  3. Be sure the power has been off 30 seconds, then set the power switch on the system unit to On.
  4. Wait four minutes, then answer the following question.
- 

DIAGNOSTIC OPERATING INSTRUCTIONS

DIAG-1

This diskette contains diagnostics and utilities for your system. You should use these procedures whenever you are having problems with your system which have not been corrected by any software application procedures available.

In general, the procedures will run automatically. However, sometimes you will be required to select options, tell the system when to continue, do simple tasks, and exchange diskettes.

---

### ARE THE “DIAGNOSTIC OPERATING INSTRUCTIONS” DISPLAYED CORRECTLY?

---

- YES** Set the power switch on the system unit to Off, then go to “Step 4” on page 3-103.
- NO** Set the power switch on the system unit to Off.
1. Remove the new display adapter.
  2. Exchange the system board.
  3. Install the original display adapter.
  4. Go to “Step 4” on page 3-103.

---

### Step 3

One of the removed adapters is failing.

1. Set the power switch on the system unit to Off.
  2. Install one of the adapters.
  3. Be sure the power has been off 30 seconds, then set the power switch on the system unit to On.
  4. Wait four minutes, then answer the following question.
- 

DIAGNOSTIC OPERATING INSTRUCTIONS

DIAG-1

This diskette contains diagnostics and utilities for your system. You should use these procedures whenever you are having problems with your system which have not been corrected by any software application procedures available.

In general, the procedures will run automatically. However, sometimes you will be required to select options, tell the system when to continue, do simple tasks, and exchange diskettes.

---

#### **ARE THE “DIAGNOSTIC OPERATING INSTRUCTIONS” DISPLAYED CORRECTLY?**

---

**YES**     Repeat the above steps.

**NO**     Set the power switch on the system unit to Off.

1. The last adapter installed is failing, exchange the failing adapter.
2. Continue on the next page.

---

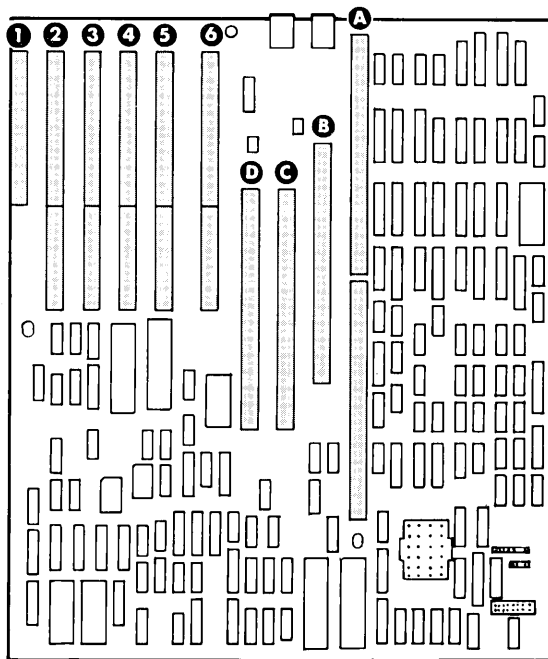
## Step 4

1. Look at the type and slot positions you recorded, and install the boards and adapters you removed.
2. Set the power switch on the system unit to Off.
3. Do the “Top Cover Replacement” on page 4-13.
4. Set the power switch on the system unit to On.
5. Follow the instructions on the menus to run the System Checkout. If needed, see page 2-15.

**Note:** If the problem still occurs, exchange the display.

This completes the repair.

---





---

## Undetermined Problem PIC 9860

### Step 1

#### Notes:

1. Some tests require that a specific adapter be installed before the test is run.
2. If the failing test is not known, run System Checkout.

Look at the test that failed.

---

#### IS A SPECIFIC ADAPTER REQUIRED TO RUN THE FAILING TEST?

**YES** Exchange the adapter that is required to run the failing test.

1. Try the failing test again.
2. If the test still fails, continue on the next page.

**NO** Continue on the next page..

---

## Step 2

1. Do the “Top Cover Removal” on page 4-12.
  2. Remove the boards from system board slots B and D.
  3. Remove the adapters from adapter slots 1 through 5 except the display adapter and any specific adapter required to run the failing test.
  4. Plug the external power cable into the outlet.
  5. Insert Diagnostics 1 (DIAG-1) diskette in the diskette drive.
  6. Set the power switch on the system unit to On.
  7. Try the failing procedure again.
- 

### **DID THE SAME PROBLEM OCCUR?**

---

**NO**      Go to “Step 4” on page 3-107.

**YES**      Continue on the next page.

---

### Step 3

One of the remaining boards or adapters is failing.

1. Set the power switch on the system unit to Off.
  2. Exchange the remaining boards and adapters one at a time in the following order; the processor board, the system board, the fixed-disk and diskette drive adapter, the display adapter, then the memory board in slot C.
  3. Be sure the power has been off 30 seconds, then set the power switch on the system unit to On.
  4. Try the failing procedure.
- 

#### **DID YOU FIND THE PROBLEM?**

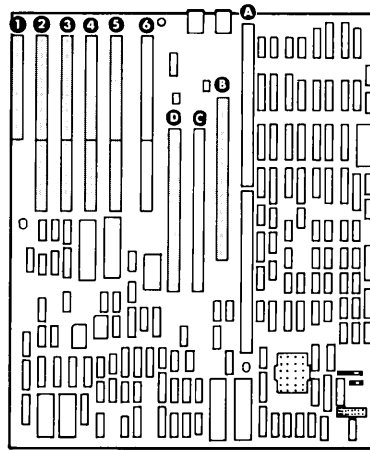
- NO** Try a new set of diagnostic diskettes. If the problem still occurs, contact your service support person.
- YES** Go to “Step 5” on page 3-108.

---

## Step 4

One of the removed boards or adapters is failing.

1. Set the power switch on the system unit to Off.
2. Install one of the boards or adapters.
3. Be sure the power has been off 30 seconds, then set the power switch on the system unit to On.
4. Try the failing procedure.



---

### DID THE SAME PROBLEM OCCUR?

**NO** Repeat the above steps.

**YES** Set the power switch on the system unit to Off.

1. The last adapter installed is failing, exchange the failing adapter.
2. Continue on the next page.

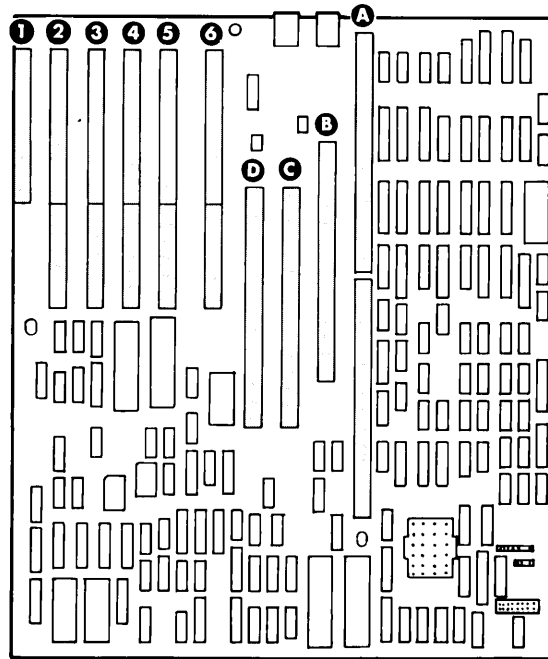
---

## Step 5

1. Look at the type and slot positions you recorded, and install the boards and adapters you removed.
2. Unplug the external power cable from the outlet.
3. Do the “Top Cover Replacement” on page 4-13.
4. Set the power switch on the system unit to On.
5. Follow the instructions on the menus to run the System Checkout. If needed, see page 2-15.

This completes the repair.

---



---

## Service Repair Action Number Chart

The following pages contain reference information. This chart is in numerical sequence followed by alphabetical sequence.

### 10x

**FRU: System Board**

Additional Tests:	None
Removal Procedure:	See "System Board Removal" on page 4-42.
Repair Checkout:	Run the System Checkout.

### 12x

**FRU: 1MB Memory Expansion Option**

Additional Tests:	None
Removal Procedure:	See "Processor, Floating-Point, or System Memory Removal" on page 4-14.
Repair Checkout:	Run the System Checkout.

### 15x

**FRU: 2MB Memory Expansion Option**

Additional Tests:	None
Removal Procedure:	See "Processor, Floating-Point, or System Memory Removal" on page 4-14.
Repair Checkout:	Run the System Checkout.

---

**19x**

**FRU: Floating-Point Board**

Additional Tests: Run the Floating Point Accelerator Checkout.

Removal Procedure: See "Processor, Floating-Point, or System Memory Removal" on page 4-14.

Repair Checkout: Run the Floating Point Accelerator Checkout.

**20x**

**FRU: Personal Computer AT Coprocessor Option**

Additional Tests: None

Removal Procedure: See "Adapter Removal" on page 4-16.

Repair Checkout: Run the Personal Computer AT Coprocessor Option Checkout.

**21x**

**FRU: AT 512 KB Memory Expansion Option**

Do not return to the Start of Call PIC, go to "Memory Expansion Option PIC 2100" on page 3-62.

---

**22x**

**I/O Channel Memory Error**

**Additional Tests:** None

**Removal Procedure:** An error occurred in memory attached to the I/O channel between memory addresses 080000 and 09FFFF. This area of memory is not supported as I/O channel memory in the IBM RT PC System. Check for non-IBM memory installed.

**Repair Checkout:** Run the System Checkout.

**23x**

**FRU: Personal Computer AT Serial/Parallel Adapter**

**Additional Tests:** Run the Personal Computer AT Serial/Parallel Adapter checkout.

**Removal Procedure:** See "Adapter Removal" on page 4-16.

**Repair Checkout:** Run the Personal Computer AT Serial/Parallel Adapter Checkout.



---

**24x**

**FRU: Personal Computer AT Math Co-Processor**

Additional Tests: None

Removal Procedure: See "Adapter Removal" on page 4-16.

Repair Checkout: Run the Personal Computer AT Coprocessor Option Checkout.

**26x**

**I/O Channel Memory Error**

Additional Tests: None

Removal Procedure: An error occurred in memory attached to the I/O channel between memory addresses 0E0000 and 0FFFFFF. This area of memory is not supported as I/O channel memory in the IBM RT PC System. Check for non-IBM memory installed.

Repair Checkout: Run the System Checkout.

**31x**

**FRU: IBM PC Network Adapter**

Additional Tests: None

Removal Procedure: See "Adapter Removal" on page 4-16.

Repair Checkout: Run the PC Network Adapter Checkout.

---

**34x**

**FRU: 3278/79 Emulation Adapter**

Additional Tests: None

Removal Procedure: See “Adapter Removal” on page 4-16.

Repair Checkout: Run the System Checkout.

**35x**

**FRU: 4 Port Asynchronous RS232C Adapter**

Additional Tests: Run the 4 Port Asynchronous RS232C Adapter Checkout.

Removal Procedure: See “Adapter Removal” on page 4-16.

Repair Checkout: Run the 4 Port Asynchronous RS232C Adapter Checkout.

**37x**

**FRU: AT 512 KB Memory Expansion Option Module**

Do not return to the Start of Call PIC, go to “Memory Expansion Option PIC 2100” on page 3-62.

---

**39x**

**FRU: 4 Port Asynchronous RS422 Adapter**

**Additional Tests:** Run the 4 Port Asynchronous RS422 Adapter Checkout.

**Removal Procedure:** See “Adapter Removal” on page 4-16.

**Repair Checkout:** Run the 4 Port Asynchronous RS422 Adapter Checkout.

**41x**

**FRU: Enhanced Graphics Adapter**

**Additional Tests:** Run the Display Checkout.

**Removal Procedure:** See “Adapter Removal” on page 4-16.

**Repair Checkout:** Run the Display Checkout.

**42x**

**FRU: Graphics Memory Expansion Card**

**Additional Tests:** Run the Display Checkout.

**Removal Procedure:** See “Adapter Removal” on page 4-16.

**Repair Checkout:** Run the Display Checkout.

---

**43x**

**FRU: Advanced Monochrome Graphics Display Adapter**

Additional Tests: Run the Display Checkout.

Removal Procedure: See "Adapter Removal" on page 4-16.

Repair Checkout: Run the Display Checkout.

**44x**

**FRU: Graphics Memory Expansion Kit**

Additional Tests: Run the Display Checkout.

Removal Procedure: See "Adapter Removal" on page 4-16.

Repair Checkout: Run the Display Checkout.

**49x**

**FRU: IBM Monochrome Display and Printer Adapter**

Additional Tests: Run the IBM Monochrome Display and Printer Adapter Checkout.

Removal Procedure: See "Adapter Removal" on page 4-16.

Repair Checkout: Run the IBM Monochrome Display and Printer Adapter Checkout.

---

**52x**

**FRU: AT Fixed-Disk and Diskette Drive Adapter**

Additional Tests: None

Removal Procedure: See "Adapter Removal" on page 4-16.

Repair Checkout: Run the Fixed-disk Drive(s) Checkout and the Diskette Drive(s) Checkout.

**53x**

**FRU: Battery**

Additional Tests: None

Removal Procedure: See "Battery Removal" on page 4-22.

Repair Checkout: Run the System Checkout.

**54x**

**FRU: IBM Personal Computer Display**

Additional Tests: Run the Display Checkout.

Removal Procedure: See "Attached Device Removal" on page 4-20.

Repair Checkout: Run the Display Checkout.

---

**58x**

**FRU: Enhanced Color Display**

Additional Tests: Run the Display Checkout.

Removal Procedure: See "Attached Device Removal" on page 4-20.

Repair Checkout: Run the Display Checkout.

**60x**

**FRU: Advanced Monochrome Graphics Display**

Additional Tests: Run the Display Checkout.

Removal Procedure: See "Attached Device Removal" on page 4-20.

Repair Checkout: Run the Display Checkout.

**63x**

**FRU: Operator Panel Board**

Additional Tests: None

Removal Procedure: See "Operator Panel Board Removal" on page 4-34.

Repair Checkout: Run the System Checkout. The two-digit display displays "88" immediately after the power switch is set to On for a lamp test. In normal operation, the two-digit display is blank when the POST programs complete.

---

**64x**

**FRU: Personal Computer AT High Capacity Diskette Drive**

Additional Tests: Run the Diskette Drive(s) Checkout.

Removal Procedure: See "Diskette Drive Removal" on page 4-24.

Repair Checkout: Run the Diskette Drive(s) Checkout.

**74x**

**FRU: 40MB Fixed-Disk Drive**

Additional Tests: None

Removal Procedure: See "Fixed-disk Drive Removal" on page 4-28.

Repair Checkout: Run the Fixed-disk Drive(s) Checkout.

**78x**

**FRU: Keyboard**

Additional Tests: None

Removal Procedure: See Section 10.

Repair Checkout: Run the Keyboard Checkout.

---

**79x**

**FRU: Mouse**

Additional Tests:	None
Removal Procedure:	See Section 10.
Repair Checkout:	Run the Mouse Checkout.

**81x**

**FRU: Streaming Tape Drive**

Additional Tests:	None
Removal Procedure:	See "Attached Device Removal" on page 4-20.
Repair Checkout:	Run the Streaming Tape Drive Adapter Checkout

**84x**

**FRU: Processor Board**

Additional Tests:	None
Removal Procedure:	See "Processor, Floating-Point, or System Memory Removal" on page 4-14.
Repair Checkout:	Run the System Checkout.



---

**85x**

**FRU: Streaming Tape Drive Adapter**

Additional Tests: None

Removal Procedure: See “Adapter Removal” on page 4-16.

Repair Checkout: Run the Streaming Tape Drive Adapter Checkout.

**87x**

**FRU: Keylock**

Additional Tests: None

Removal Procedure: See “Keylock Removal” on page 4-32.

Repair Checkout: Run the System Checkout.

**88x**

**FRU: Power Supply**

Do not return to the Start of Call PIC, go to “Power Supply PIC 8800” on page 3-68.

---

**91x**

**Attached Devices**

Run the Advanced Diagnostic Routines checkout on the adapter for the failing device.

If the checkout ends with the message “No trouble was found,” go to the maintenance package for the attached device.

If the checkout ends with an SRN, use the right-most digit of the SRA to determine the adapter slot position. If needed, see page 2-19.

**95x**

**FRU: IBM PC Network Components**

Additional Tests:       None

Removal Procedure:       See the *Setup Instructions for the IBM PC Network Transformer and Translator Unit*. Exchange either the translator, power transformer, power cord, or the connection hardware. See Section 9 for parts reference.

Repair Checkout:       Run the PC Network Adapter Checkout.

**981**

**POST Error 03 or 05**

Do not return to the Start of Call PIC, go to “POST Errors 03 or 05 PIC 9810” on page 3-79.

---

**982**

**POST Error 00 or 04**

Do not return to the Start of Call PIC, go to “POST Errors 00 or 04 PIC 9820” on page 3-87.

**983**

**POST Error 11 or 12**

Do not return to the Start of Call PIC, go to “POST Errors 11 or 12 PIC 9830” on page 3-92.

**984**

**POST Error 23**

Do not return to the Start of Call PIC, go to “POST Error 23 PIC 9840” on page 3-96.

**985**

**Invalid Display Data**

Do not return to the Start of Call PIC, go to “Invalid Display Data PIC 9850” on page 3-100.

**991**

**Obvious System Unit Problem**

Find the correct removal procedure in Section 4, then exchange the FRU. Run System Checkout after exchanging the FRU.

---

## A1x

### FRU: Fixed-disk and Diskette Drive Cables

- Additional Tests: Run the Diskette Drive(s) Checkout.
- Removal Procedure: See "Adapter Removal" on page 4-16.
- Repair Checkout: Run the Fixed-disk Drive(s) Checkout and the Diskette Drive(s) Checkout.

## A6x

### FRU: IBM PC Network Cable

- Additional Tests: None
- Removal Procedure: See the *Setup Instructions for the IBM PC Network Short, Medium, and Long Distance Kits*. Exchange either an expander or a cable. See Section 9 for parts reference.
- Repair Checkout: Run the PC Network Adapter Checkout.

## A7x

### FRU: Modem Cable - RS232C (10 Pin)

- Additional Tests: Run the 4 Port Asynchronous RS232C Adapter Checkout.
- Removal Procedure: See "Adapter Removal" on page 4-16.
- Repair Checkout: Run the 4 Port Asynchronous RS232C Adapter Checkout.

---

**B2x**

**FRU: Parallel Printer Cable**

Additional Tests: None

Removal Procedure: See “Adapter Removal” on page 4-16.

Repair Checkout: Run a customer print job.

**B3x**

**FRU: Serial Printer Cable (9 Pin)**

Additional Tests: None

Removal Procedure: See “Adapter Removal” on page 4-16.

Repair Checkout: Run a customer print job.

**B4x**

**FRU: ASCII Terminal Cable - RS232C (10 Pin)**

Additional Tests: None

Removal Procedure: See “Adapter Removal” on page 4-16.

Repair Checkout: Run a normal customer program.

---

### **B5x**

#### **FRU: ASCII Terminal Cable - RS422A**

Additional Tests:       None

Removal Procedure:   See “Adapter Removal” on page 4-16.

Repair Checkout:      Run a normal customer program.

### **B6x**

#### **FRU: Serial Printer Cable (10 Pin)**

Additional Tests:       None

Removal Procedure:   See “Adapter Removal” on page 4-16.

Repair Checkout:      Run a normal customer program.

### **CCx**

#### **Software Problem**

This SRA number indicates that a software problem exists. The Advanced Diagnostic Routines can be used to ensure that no hardware problem exists.

---

## **D1x**

### **Data Link Problem**

This SRA number indicates a communication link problem. Use the Communications Utilities to test the communication link.

## **D2x**

### **Modem Problem**

Run the checkout for the adapter attached to the failing modem. If needed, use the Communications Utilities to analyze the problem.

If the checkout ends with the message “No trouble was found,” go to the maintenance package for the modem.

If the checkout ends with an SRN, use the right-most digit of the SRA to determine the adapter slot position. If needed, see page 2-19.

## **D6x**

### **Electrostatic Discharge Problem**

This SRA number indicates that an electrostatic discharge problem may exist.

---

## Section 4. Removal and Replacement Procedures



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---

## About this Section

This section contains removal and replacement procedures that are not specific to one adapter, diskette drive, fixed-disk drive, system memory board, or processor board. Follow these procedures for the type of device you are removing or installing. Use the contents list on the preceding page to select the procedure for your device.

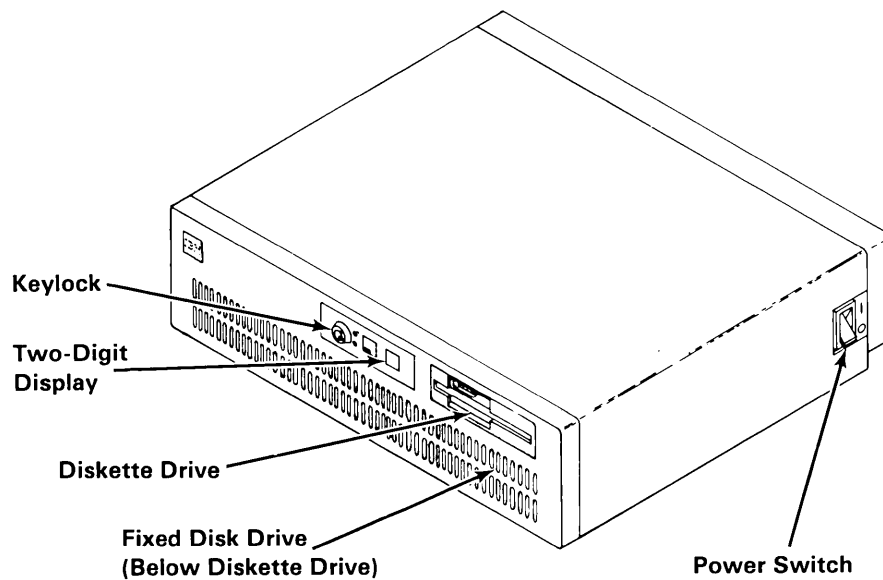
The removal or replacement procedure may direct you to the section for your type device for detailed information about switch settings, jumper settings, or terminator resistor settings.

---

## System Unit Locations

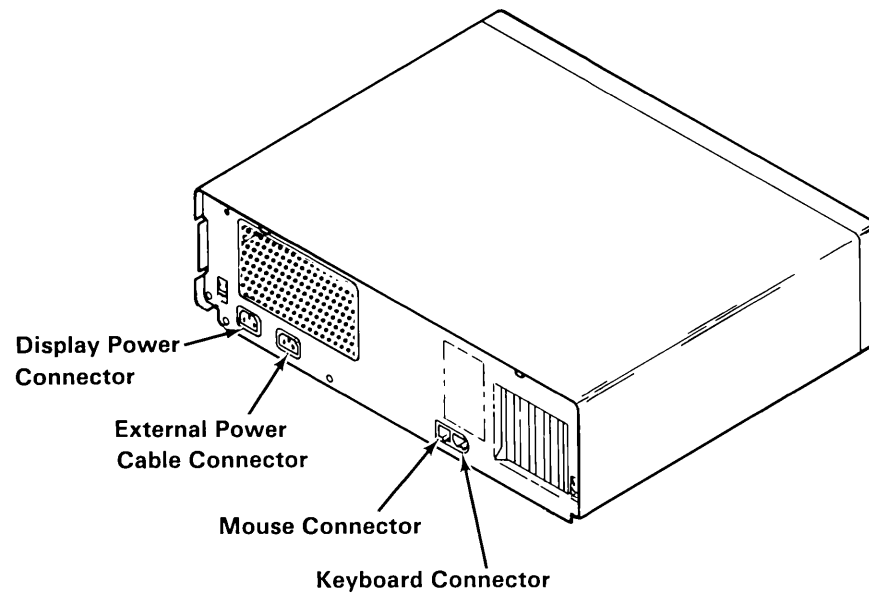
Use the following views of the system unit to locate the diskette drive, fixed-disk drive, connectors, and system board slot positions.

### Front View With Covers

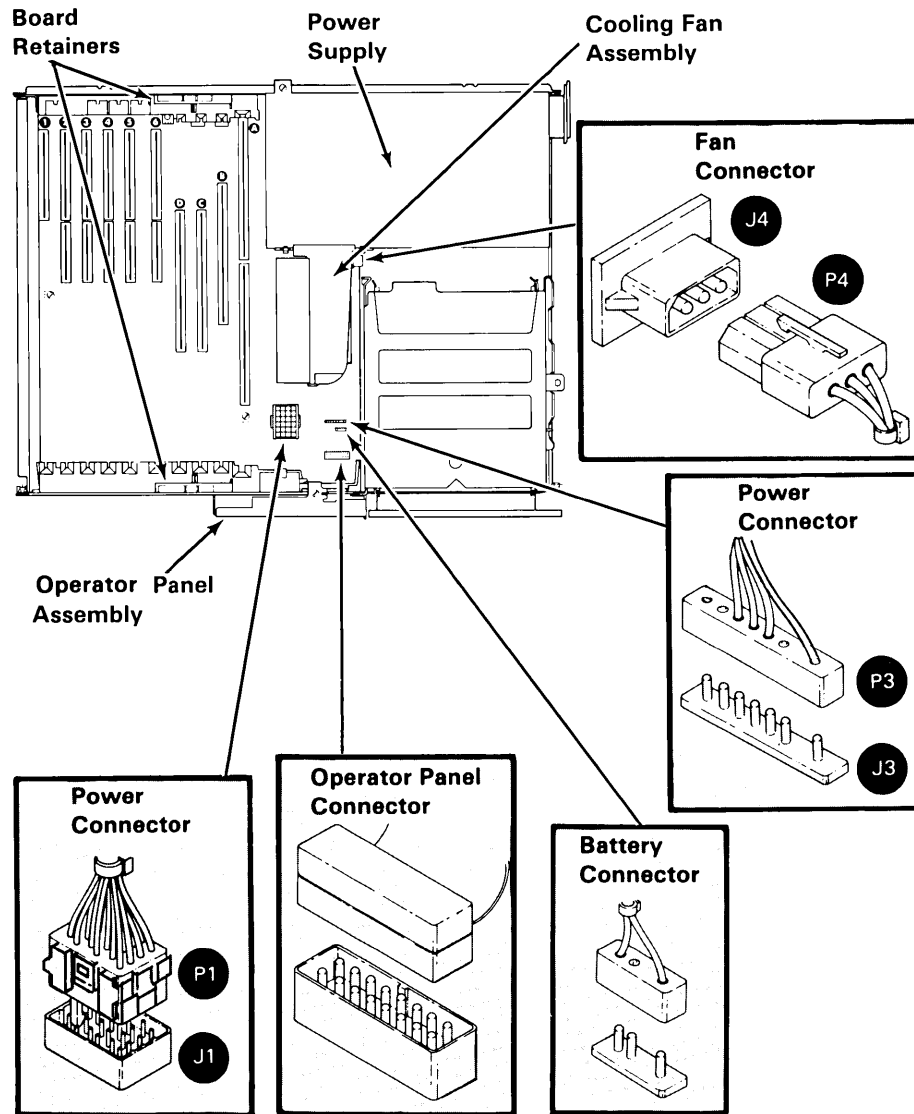


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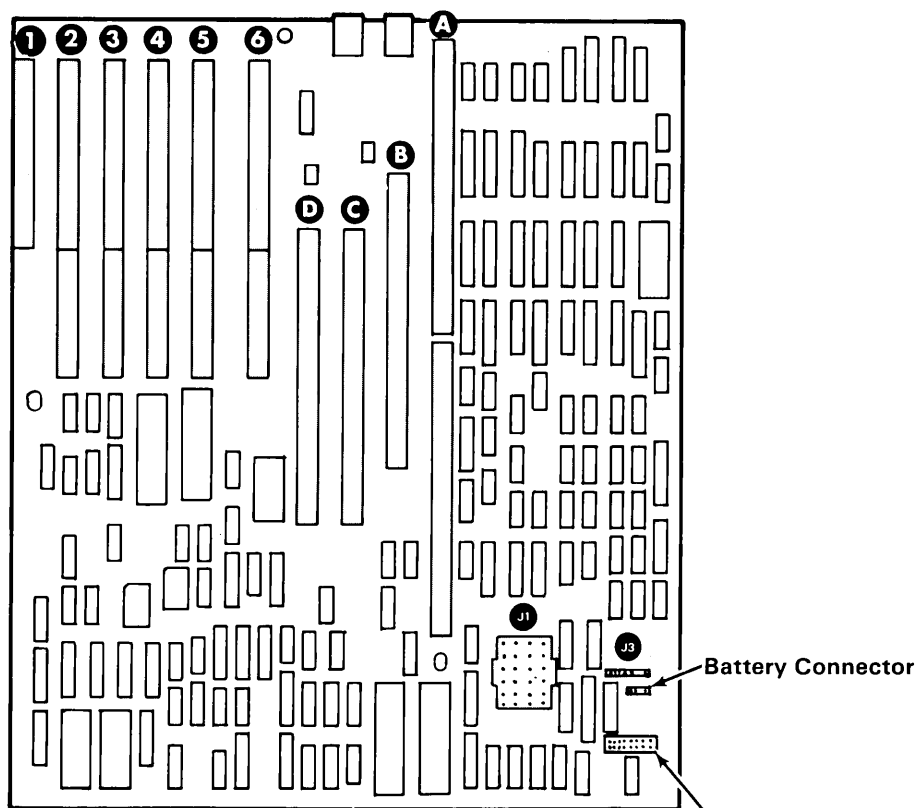
## Rear View Without Rear Cover



## Top View Without Covers



## System board



Adapter Slot Number and Assigned Adapter

- A** Processor Board
- B** Floating-Point Board
- C** First Memory Option
- D** Second Memory Option
- 6** Fixed-Disk And Diskette Drive Adapter
- 5** Coprocessor

Operator Panel Connector

Battery Connector

---

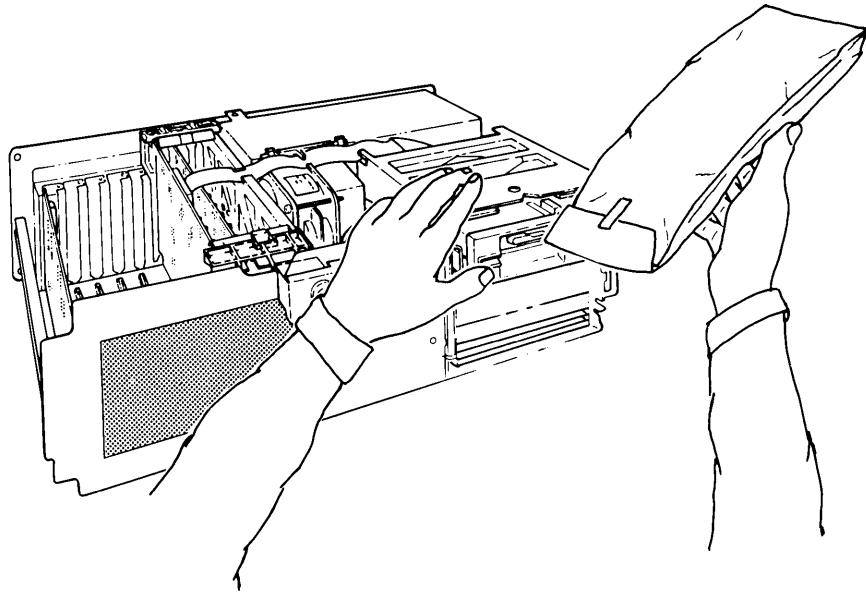
## Handling Static-Sensitive Devices

Some devices that make up your IBM RT PC Model 10 can be damaged by electrostatic discharges. To prevent this damage, the options are wrapped in a conductive, antistatic bag. Certain precautions must be taken before removing an option from its bag.

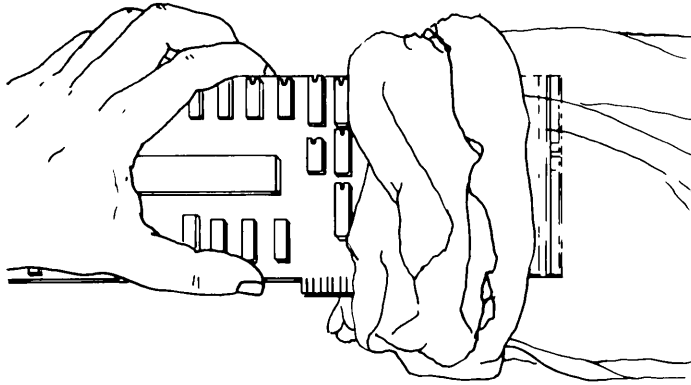
**Note:** The adapters, processor board, floating-point board, system memory boards, diskette drive, and the fixed-disk drive are static-sensitive devices.

Use the following steps to prevent damage to a static-sensitive device.

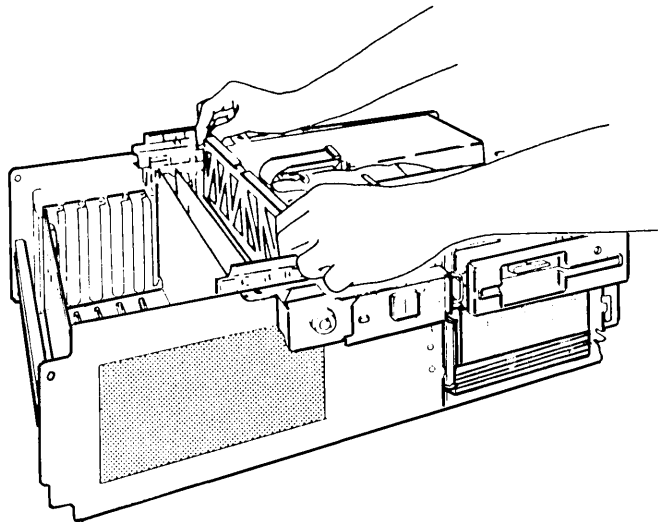
1. Hold the option (still wrapped in its antistatic bag) in one hand and touch a metal part of your system unit with the other hand. This will place your body, the option, and the system unit at the same ground potential, thus preventing an accidental static discharge.



- 
2. Carefully remove the option from its antistatic bag. Be sure to grasp circuit boards by the edges only; do not touch the component pins or solder joints. Grasp diskette drives by their frames to avoid touching the electronics board.



3. When inserting an option adapter into the system board, hold the adapter by its top edge or upper corners.





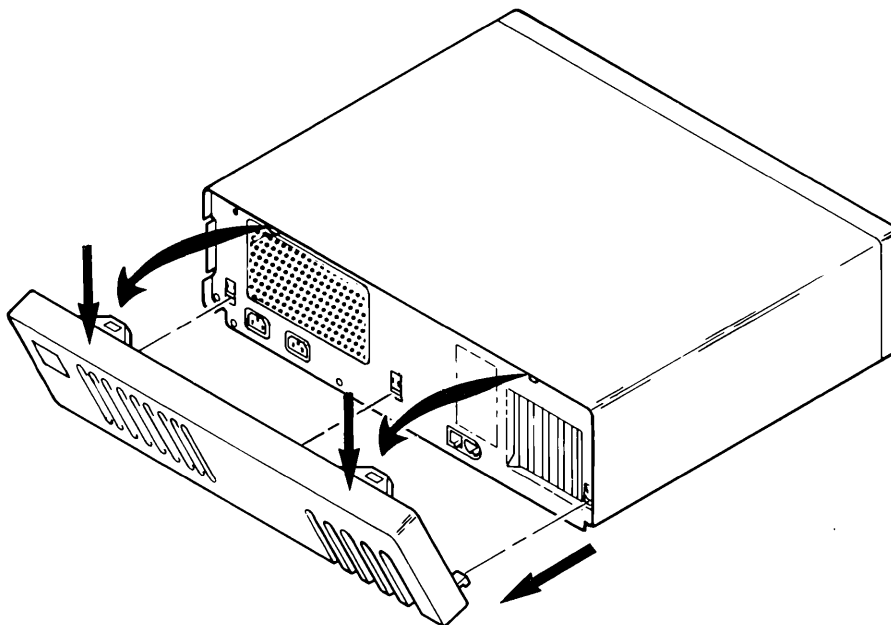
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## Removal and Replacement Procedures

The removal and replacement procedures on the following pages are for the components of the system unit and devices installed within or attached to the system unit.

### Rear Cover Removal

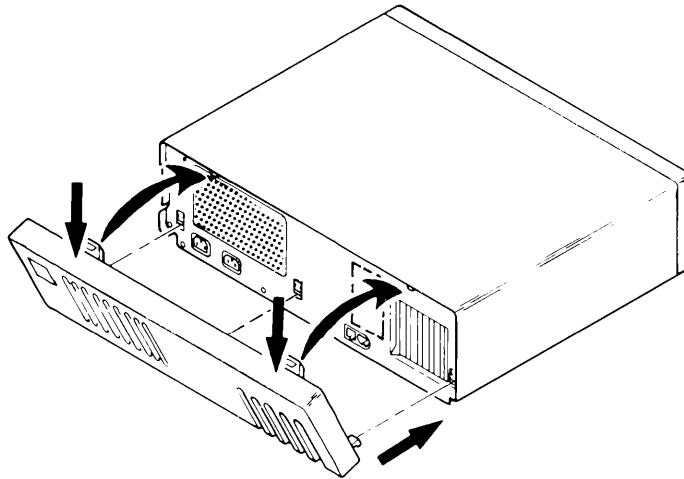
1. Set the power switches of the attached devices to Off.
2. Set the power switch of the system unit to Off.
3. Press down on the rear cover to unhook it, then pivot the top of the cover out from the system unit to remove it.



---

## Rear Cover Replacement

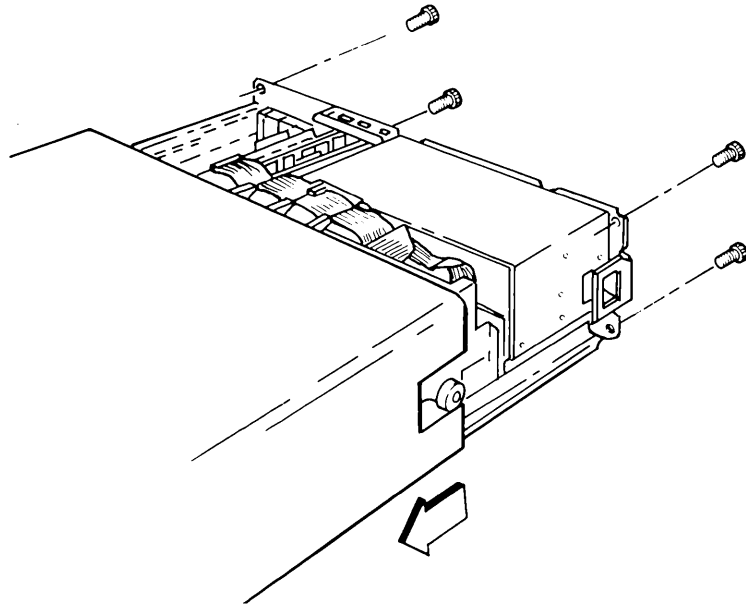
1. Insert the lower cover latch arms into the latch brackets. Push down on the rear cover while you move it into position, then let up on the cover to hook it.
  2. Set the power switches of the attached devices to On.
  3. Set the power switch of the system unit to On.
- 



---

## Top Cover Removal

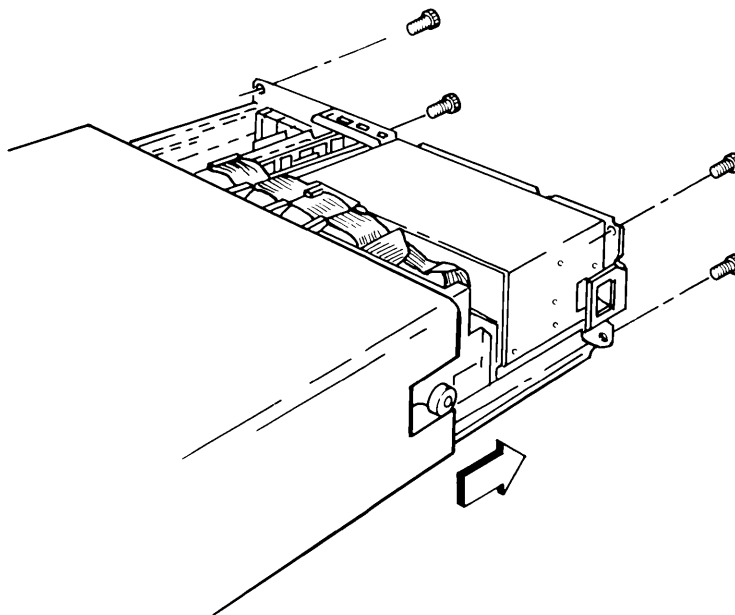
1. Do the “Rear Cover Removal” on page 4-10.
  2. Unplug the external power cables to the attached devices at the outlet.
  3. Unplug the external power cable to the system unit at the outlet.
  4. Set the keylock to Unlock, then remove the key.
  5. Remove the four cover screws.
  6. Slide the top cover off the front of the system unit.
- 



---

## Top Cover Replacement

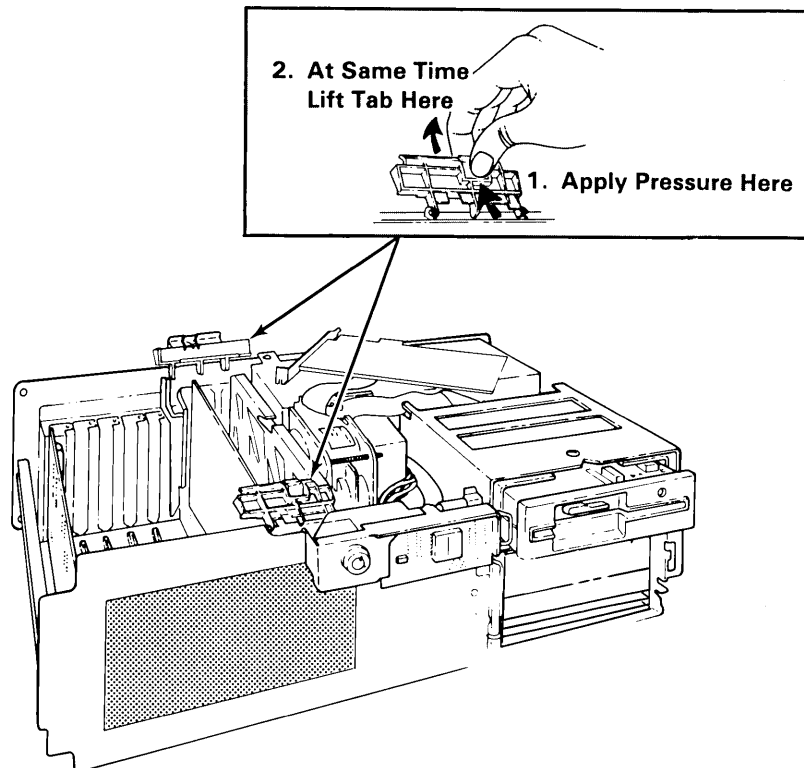
1. Slide the top cover on the system unit from the front. Use care not to damage the cables to the fixed-disk and diskette drives.
  2. Install the four cover screws.
  3. Do the “Rear Cover Replacement” on page 4-11.
  4. Plug in the external power cables of the attached devices to the outlet.
  5. Plug in the external power cable of the system unit to the outlet.
- 



---

## Processor, Floating-Point, or System Memory Removal

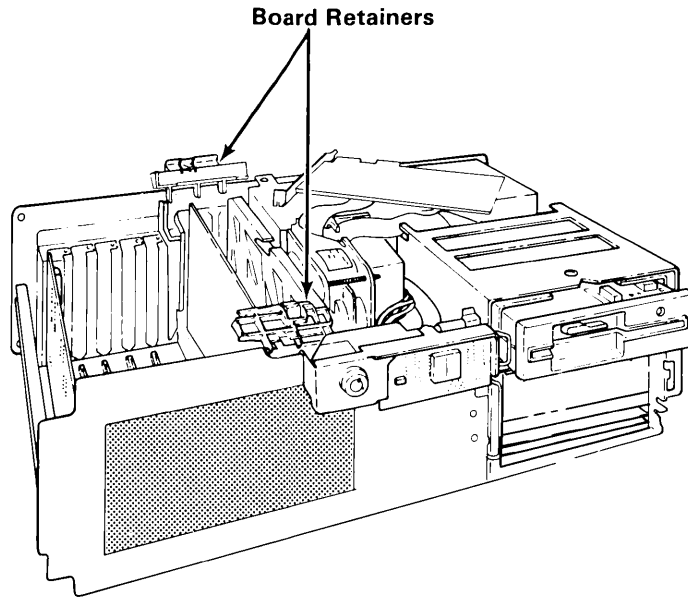
1. Do the "Top Cover Removal" on page 4-12.
  2. Open the two board retainers.
  3. Remove the fixed-disk and diskette adapter from slot 6 and place it on top of the system unit with the cables attached.
  4. Remove the desired board.
  5. Record the type and slot position.
- 



---

## Processor, Floating-Point, or System Memory Replacement

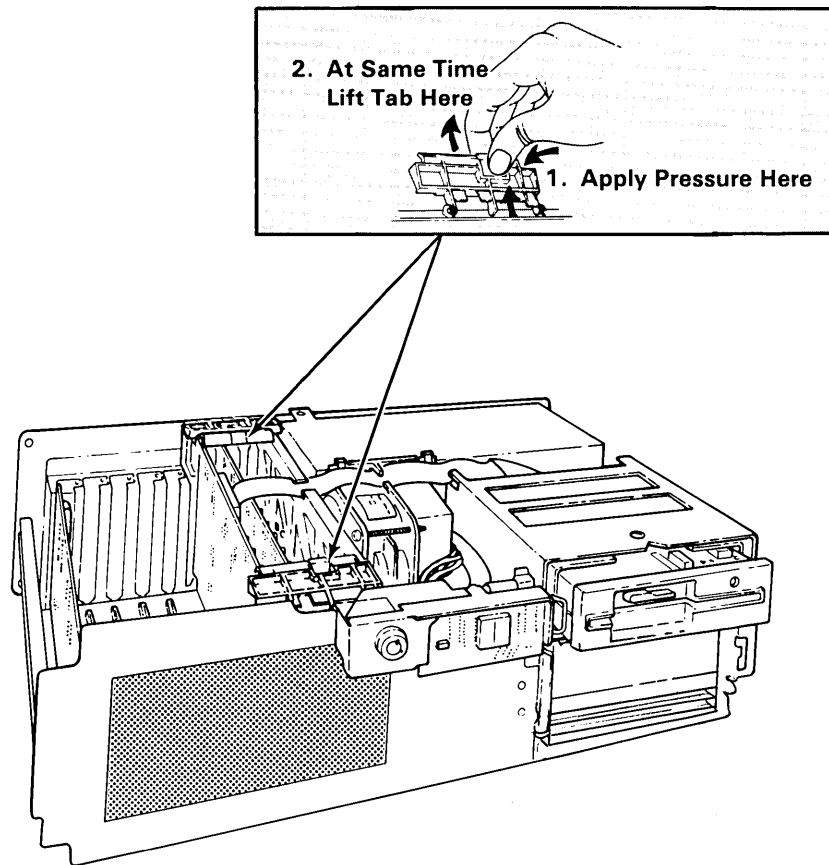
1. Look at the slot number you recorded, then align the board with the slot and press into position.
  2. Install the fixed-disk and diskette adapter in slot 6.
  3. Close the two board retainers.
  4. Do the “Top Cover Replacement” on page 4-13.
- 



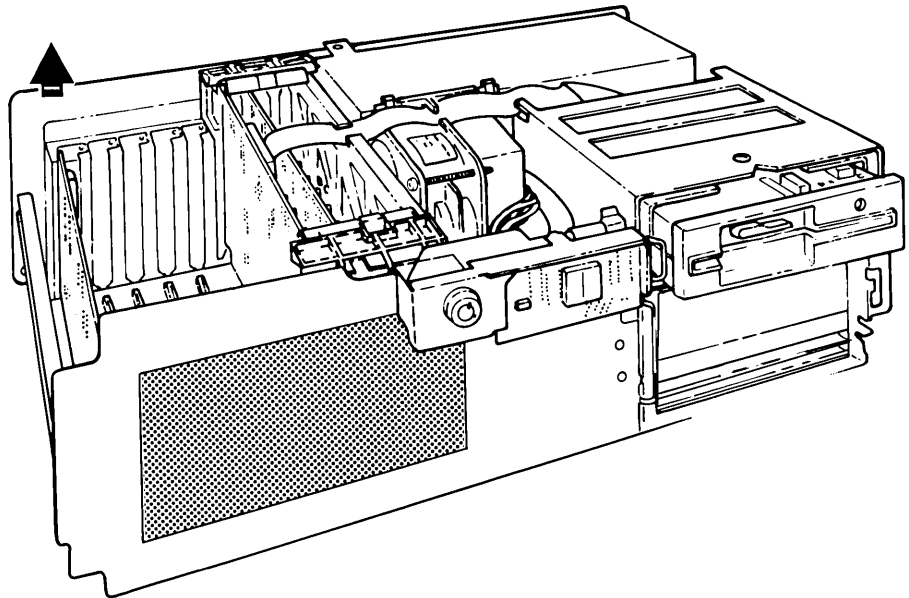
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## Adapter Removal

1. Do the “Top Cover Removal” on page 4-12.
  2. If present, disconnect the external cables.
  3. Remove the adapter mounting screw or open the two board retainers.
- 



- 
4. Remove the adapter.
  5. If present, disconnect the internal cables.
  6. Record the adapter slot position.
  7. If the adapter has jumpers or switches, record their settings. If needed, refer to the jumper or switch settings information for the adapter in Section 9.
- 

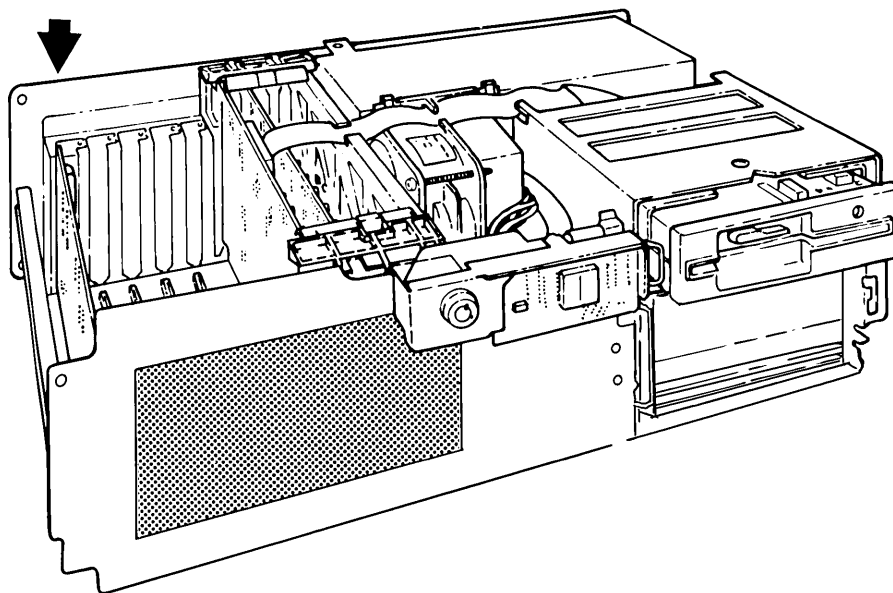




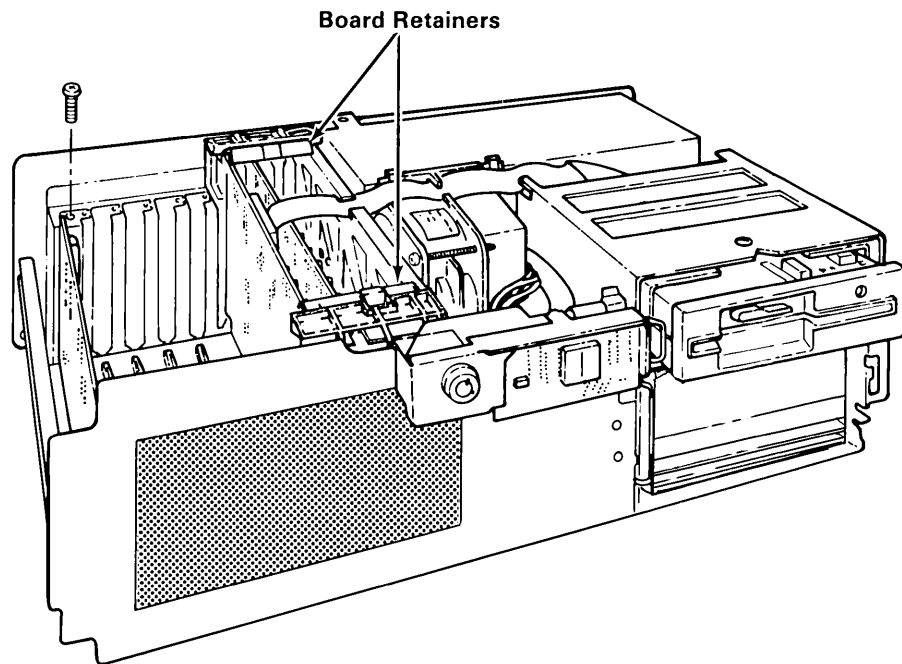
---

## Adapter Replacement

1. Look at the jumper or switch settings you recorded, then set the jumpers or switches. If needed, refer to Section 9.
  2. If present, connect the internal cables.
  3. Look at the adapter slot number you recorded, then align the adapter with the slot and press into position.
- 



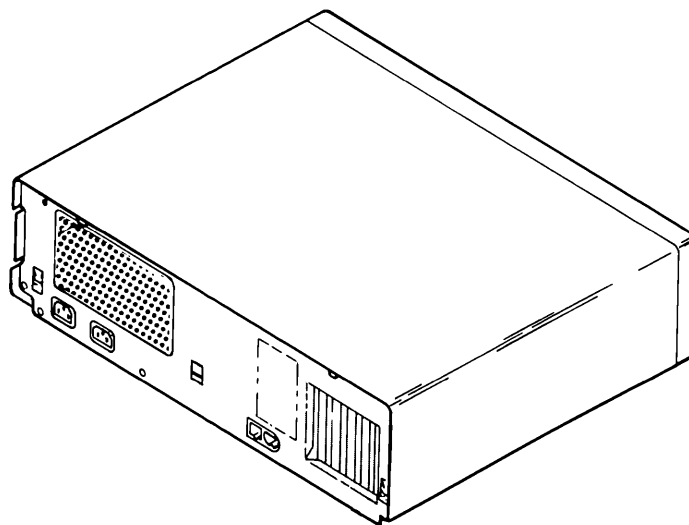
- 
4. Install the adapter mounting screw or close the two board retainers.
  5. If present, connect the external cables.
  6. Do the “Top Cover Replacement” on page 4-13.
- 



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## Attached Device Removal

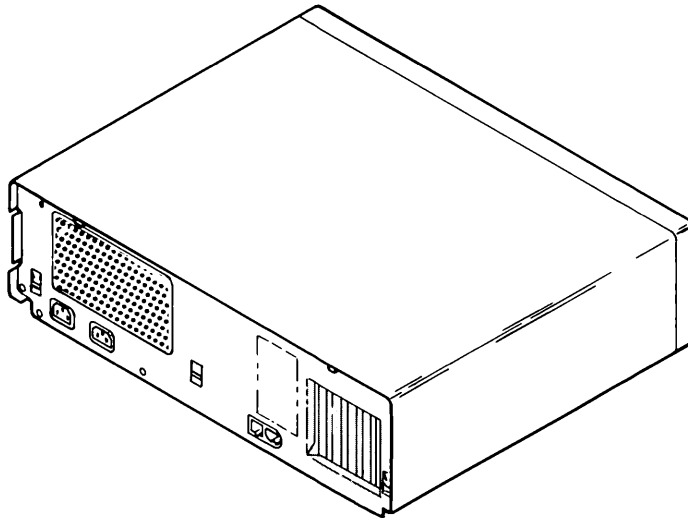
1. Do the “Rear Cover Removal” on page 4-10.
  2. Unplug the external power cable to the attached device.
  3. Disconnect the signal cable to the device from the adapter.
- 



---

## Attached Device Replacement

1. Connect the signal cable for the device to the adapter.
  2. Plug in the external power cable to the attached device.
  3. Do the “Rear Cover Replacement” on page 4-11.
- 



---

## Battery Removal

### DANGER

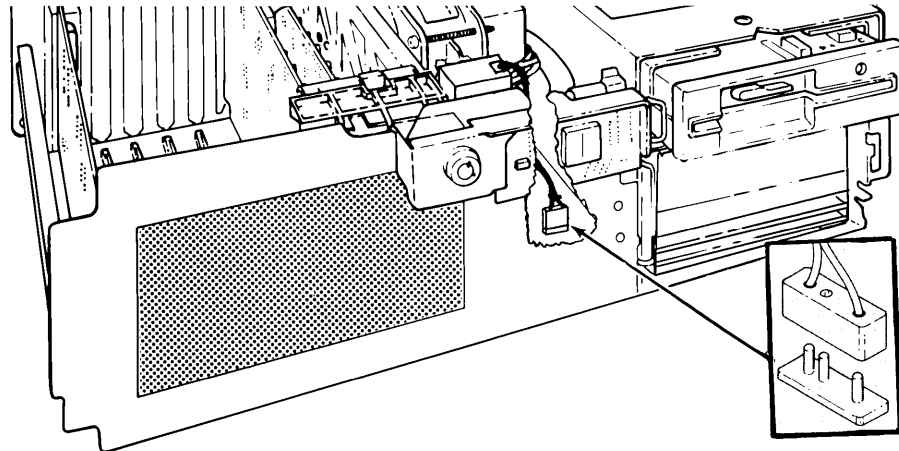
Fire, explosion, and severe burn hazard. Do not recharge, disassemble, heat above 100° C, solder directly to the cell, incinerate, or expose cell contents to water. Keep away from children. Replace with IBM part number 6299201 only or a battery that has been specifically classified by Underwriters Laboratories for use with the IBM 6151 System Unit and is so marked to indicate such classification. Use of another may present risk of fire or explosion.

.....

.....

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1. Do the "Top Cover Removal" on page 4-12.
2. Disconnect the battery cable from the system board.
3. Slide the battery up out of the holder.



---

## Battery Replacement

### DANGER

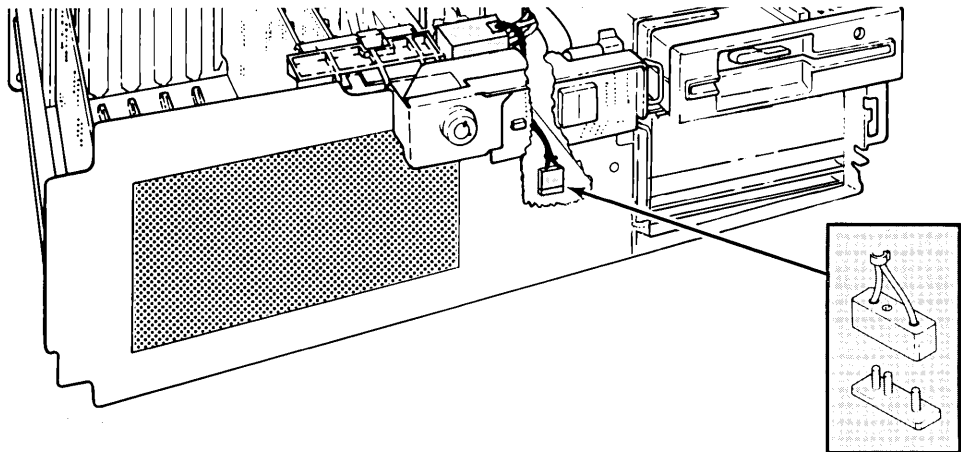
Fire, explosion, and severe burn hazard. Do not recharge, disassemble, heat above 100° C, solder directly to the cell, incinerate, or expose cell contents to water. Keep away from children. Replace with IBM part number 6299201 only or a battery that has been specifically classified by Underwriters Laboratories for use with the IBM 6151 System Unit and is so marked to indicate such classification. Use of another may present risk of fire or explosion.

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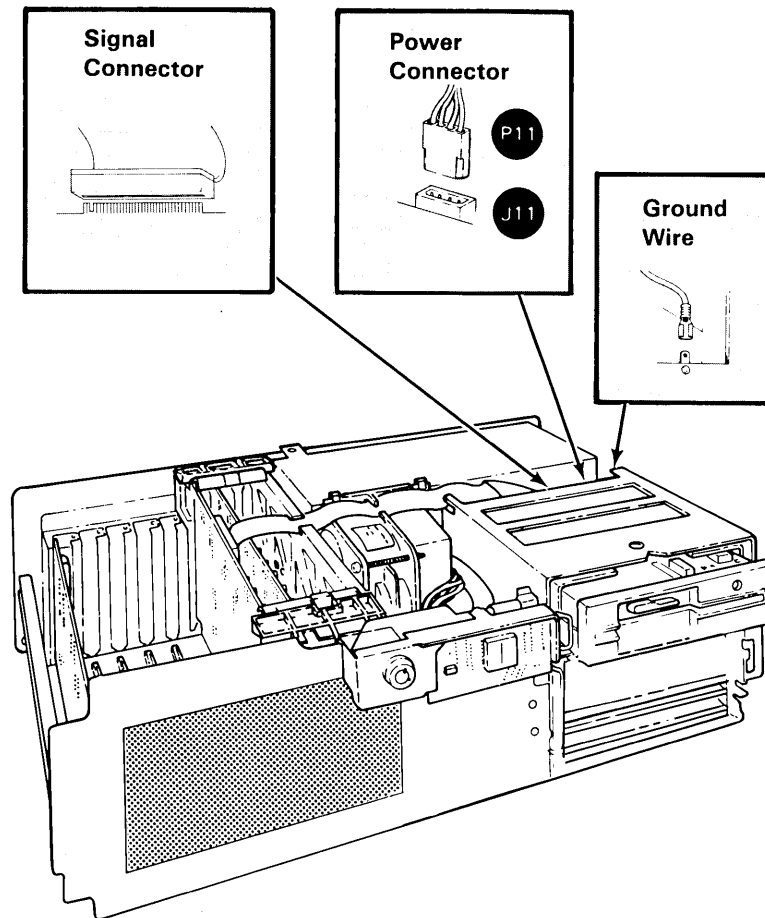
1. Align the battery with the holder and slide it down into position.
2. Connect the battery cable to the system board.
3. Do the "Top Cover Replacement" on page 4-13.



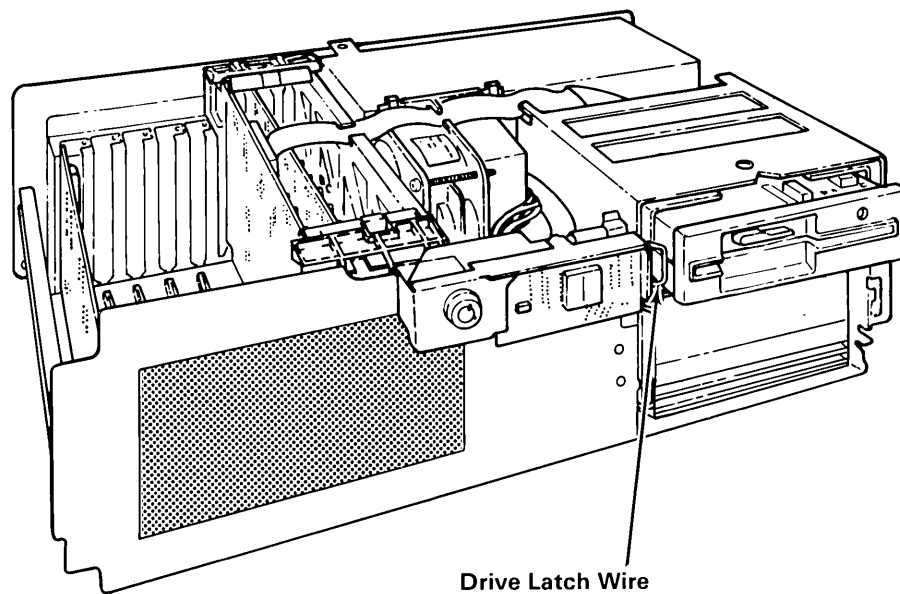
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## Diskette Drive Removal

1. Do the “Top Cover Removal” on page 4-12.
  2. Disconnect the ground wire.
  3. Disconnect the power connector.
  4. Disconnect the signal connector.
- 



- 
5. Pull on the latch wire to release the drive, then slide the drive out of the system unit.
- 

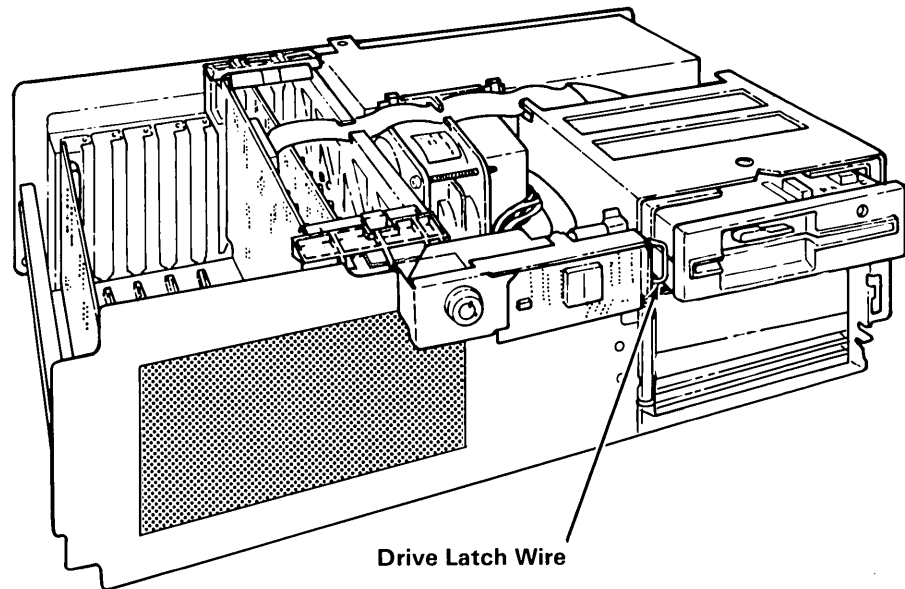




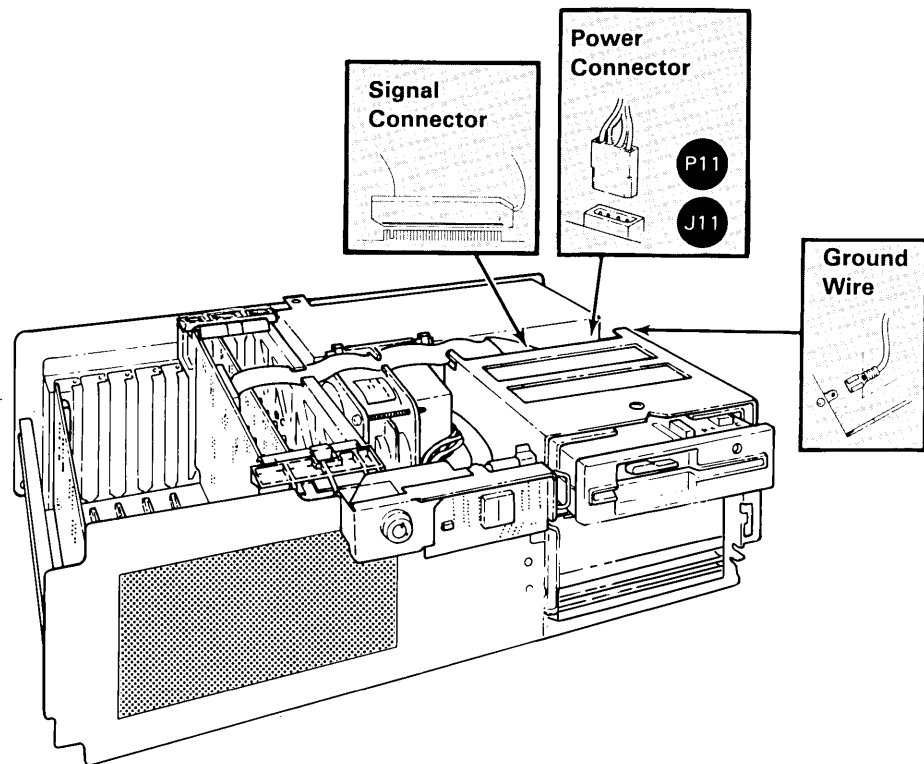
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## Diskette Drive Replacement

1. Be sure the terminator resistor is installed. If needed, refer to Section 7.
  2. Align the drive and push it into the system unit until the latch wire clicks.
- 



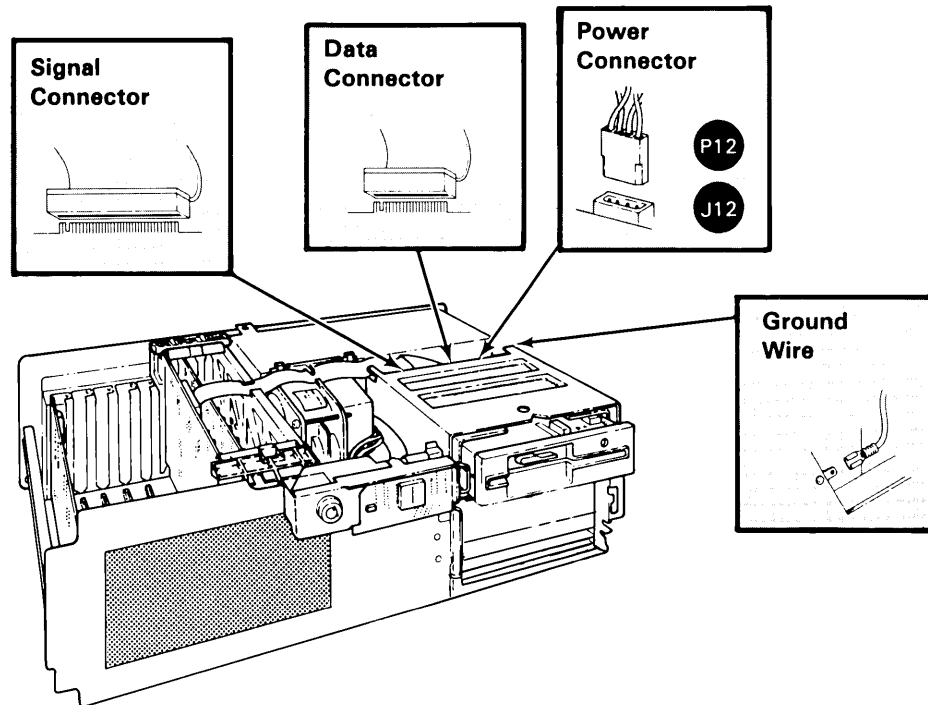
- 
3. Connect the signal connector
  4. Connect the power connector
  5. Connect the ground wire.
  6. Do the “Top Cover Replacement” on page 4-13.
- 



---

## Fixed-disk Drive Removal

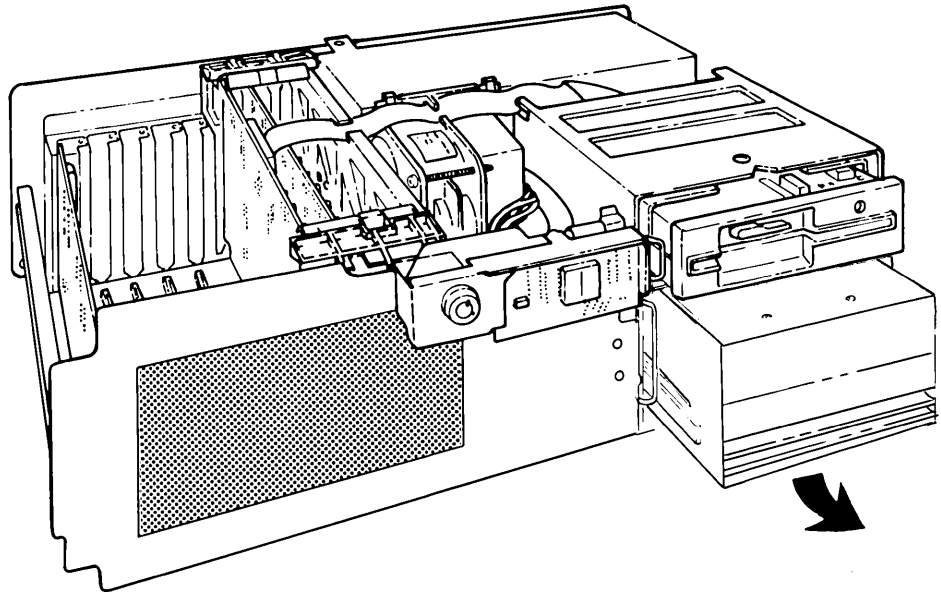
1. Do the “Top Cover Removal” on page 4-12.
  2. Pull on the latch wire to release the diskette drive, then slide the drive part way out of the system unit.
  3. Pull on the latch wire to release the fixed-disk drive, then slide the drive part way out of the system unit.
  4. Disconnect the ground wire.
  5. Disconnect the power cable.
  6. Disconnect the signal cable.
  7. Disconnect the data cable.
- 



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8. Slide the drive out of the system unit.

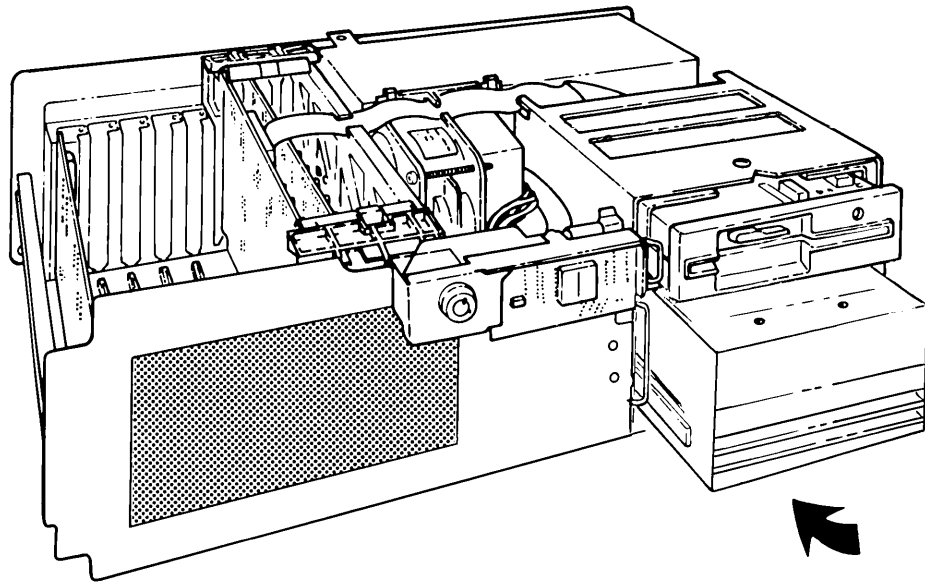
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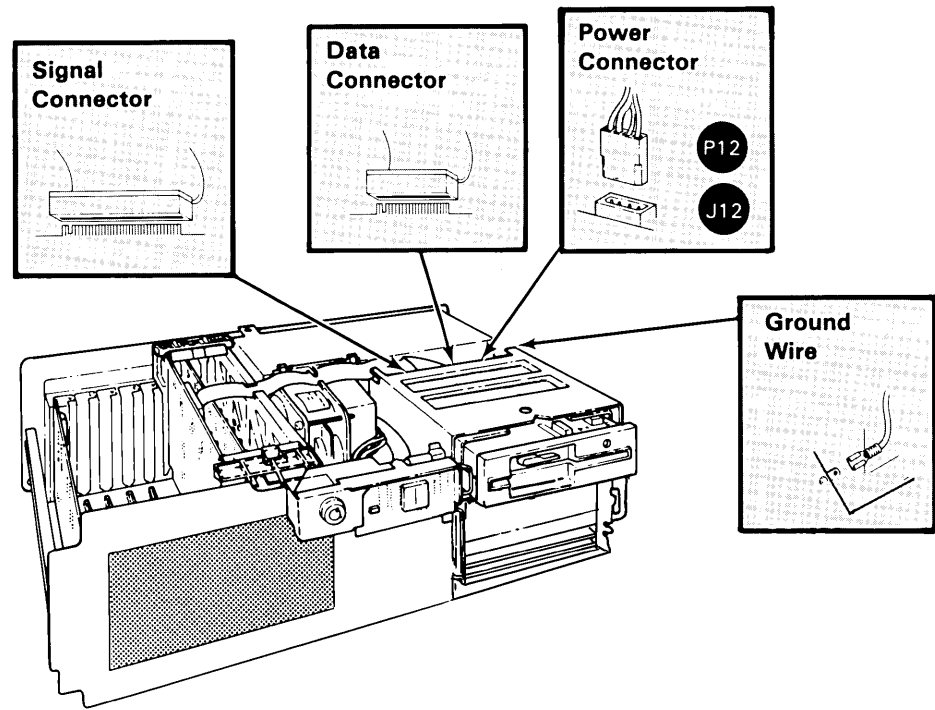
---

## Fixed-Disk Drive Replacement

1. Be sure the terminator resistor and the drive selection jumper are properly installed. If needed, refer to Section 8.
  2. Slide the fixed-disk drive part way into the system unit.
- 



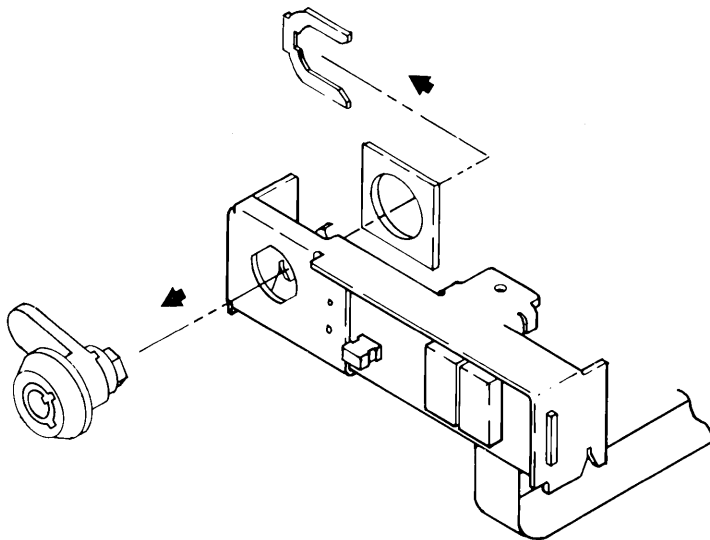
- 
3. Connect the signal cable.
  4. Connect the data cable.
  5. Connect the power cable.
  6. Connect the ground wire.
  7. Slide the fixed-disk drive into the system unit until the latch wire clicks.
  8. Slide the diskette drive into the system unit until the latch wire clicks.
  9. Do the "Top Cover Replacement" on page 4-13.
- 



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## Keylock Removal

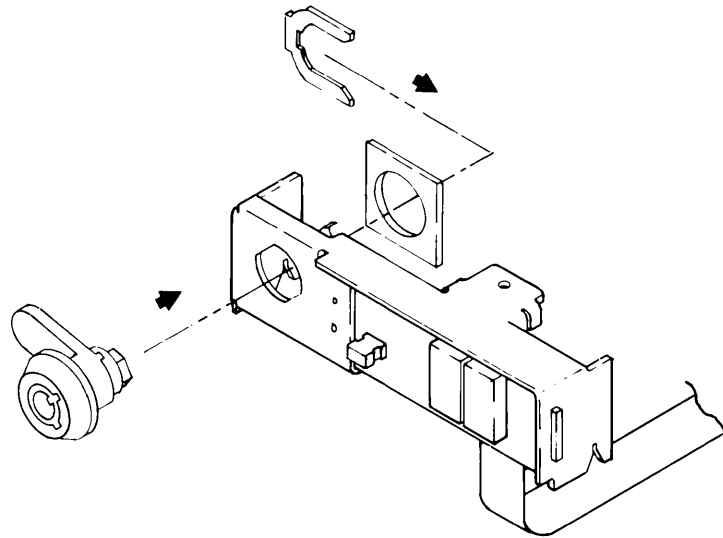
1. Do the “Operator Panel Board Removal” on page 4-34.
  2. Be sure the keylock is in the Unlocked position.
  3. Remove the mounting clip.
  4. Remove the keylock and spacer.
- 



---

## Keylock Replacement

1. Be sure the keylock is in the Unlocked position.
  2. Install the keylock and spacer, then install the mounting clip.
  3. Do the “Operator Panel Board Replacement” on page 4-35.
- 

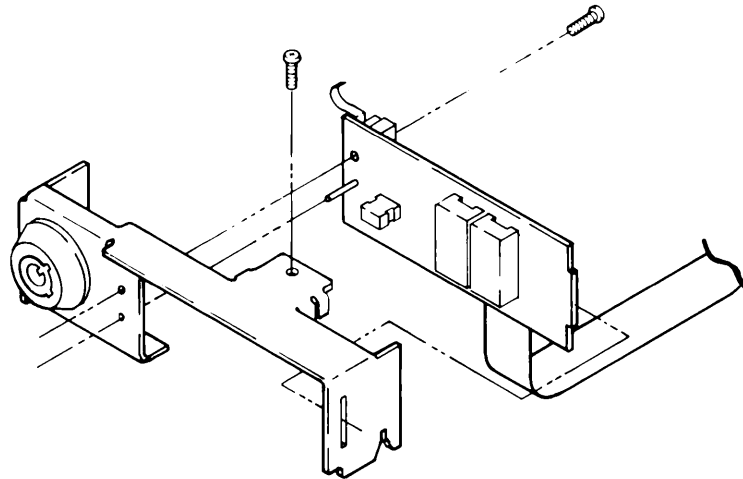




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## Operator Panel Board Removal

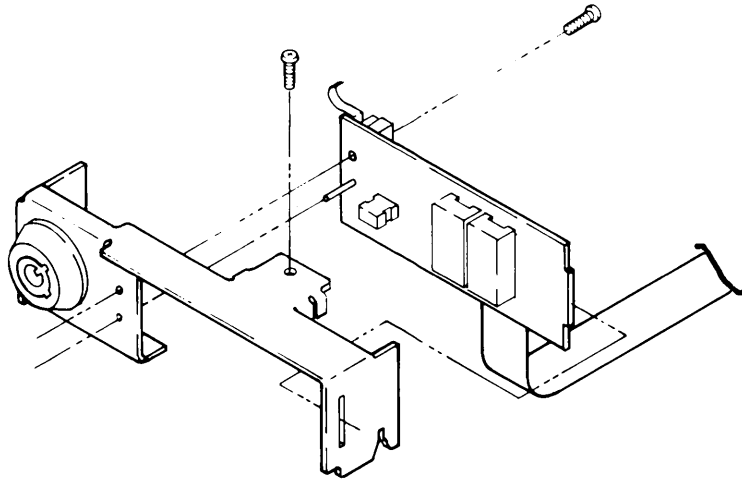
1. Do the “Top Cover Removal” on page 4-12.
  2. Be sure the keylock is in the Unlocked position.
  3. Disconnect the operator panel cable from the system board.
  4. Remove the mounting screw and the operator panel assembly.
  5. Remove the mounting screw and the operator panel board.
- 



---

## Operator Panel Board Replacement

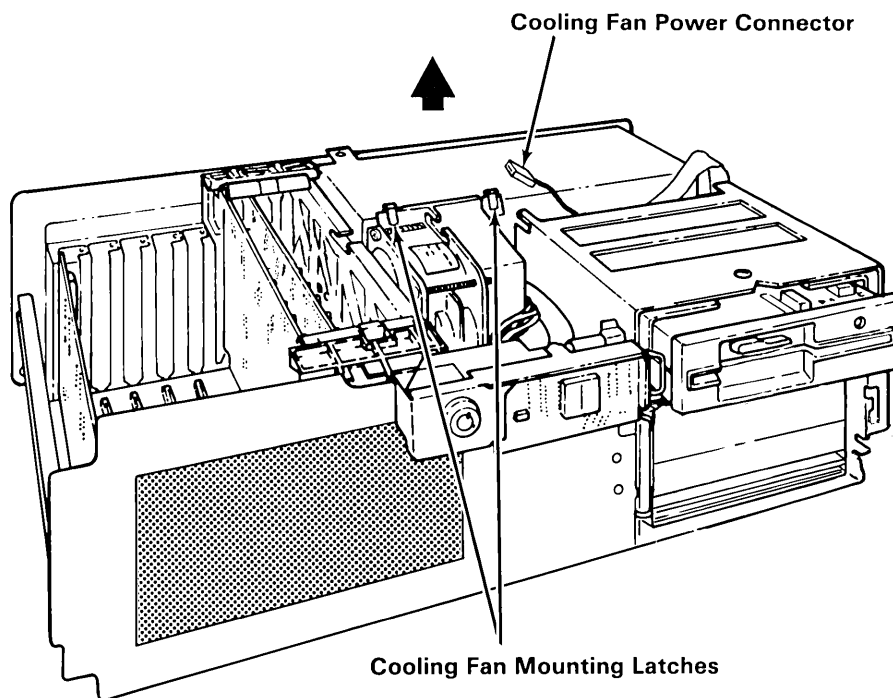
1. Be sure the keylock is in the Unlocked position.
  2. Install the operator panel board and mounting screw.
  3. Install the operator panel assembly and mounting screw.
  4. Connect the operator panel cable to the system board.
  5. Do the “Top Cover Replacement” on page 4-13.
- 



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## Cooling Fan Assembly Removal

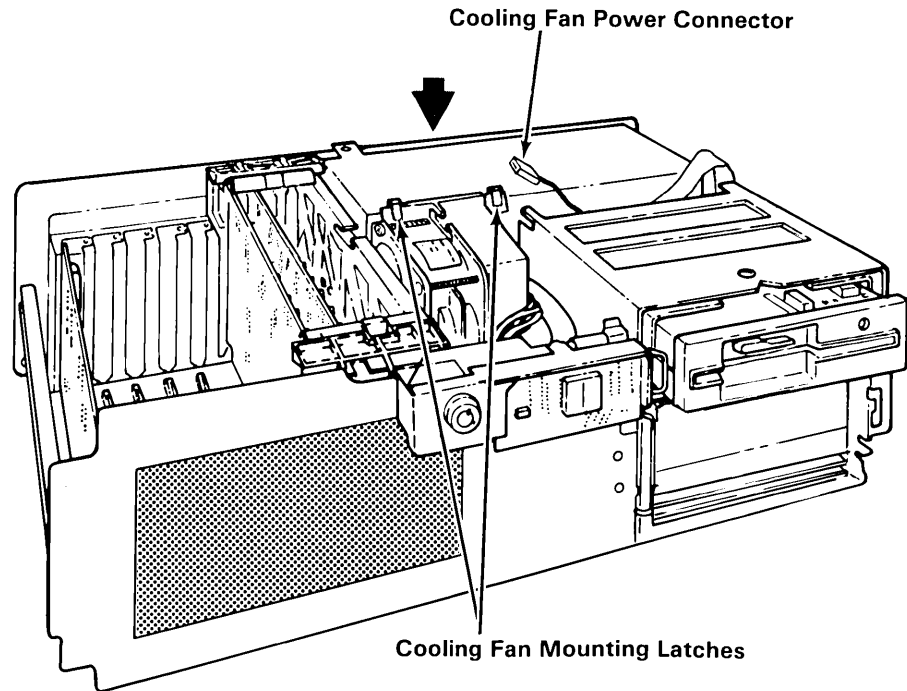
1. Do the “Top Cover Removal” on page 4-12.
  2. Remove the fixed-disk and diskette adapter from slot 6 and place it on top of the system unit with the cables attached.
  3. Disconnect the cooling fan power cable.
  4. Pull the fan mounting latches toward the front, then lift up on the cooling fan assembly.
- 



---

## Cooling Fan Assembly Replacement

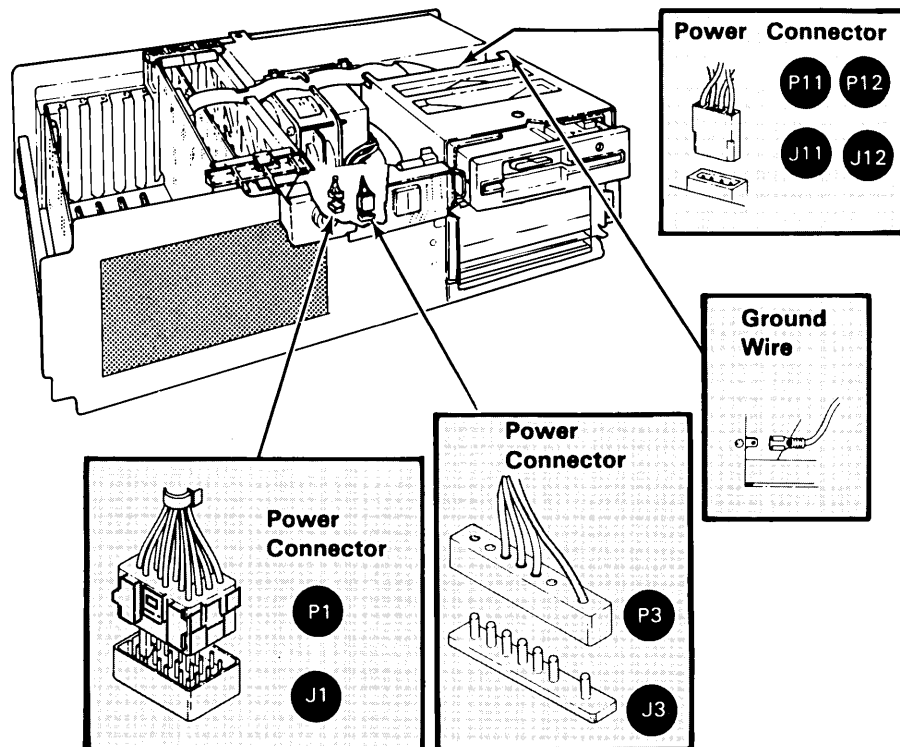
1. Align the cooling fan assembly and press into position.
  2. Connect the cooling fan assembly power cable.
  3. Install the fixed-disk and diskette adapter in slot 6.
  4. Do the “Top Cover Replacement” on page 4-13.
- 



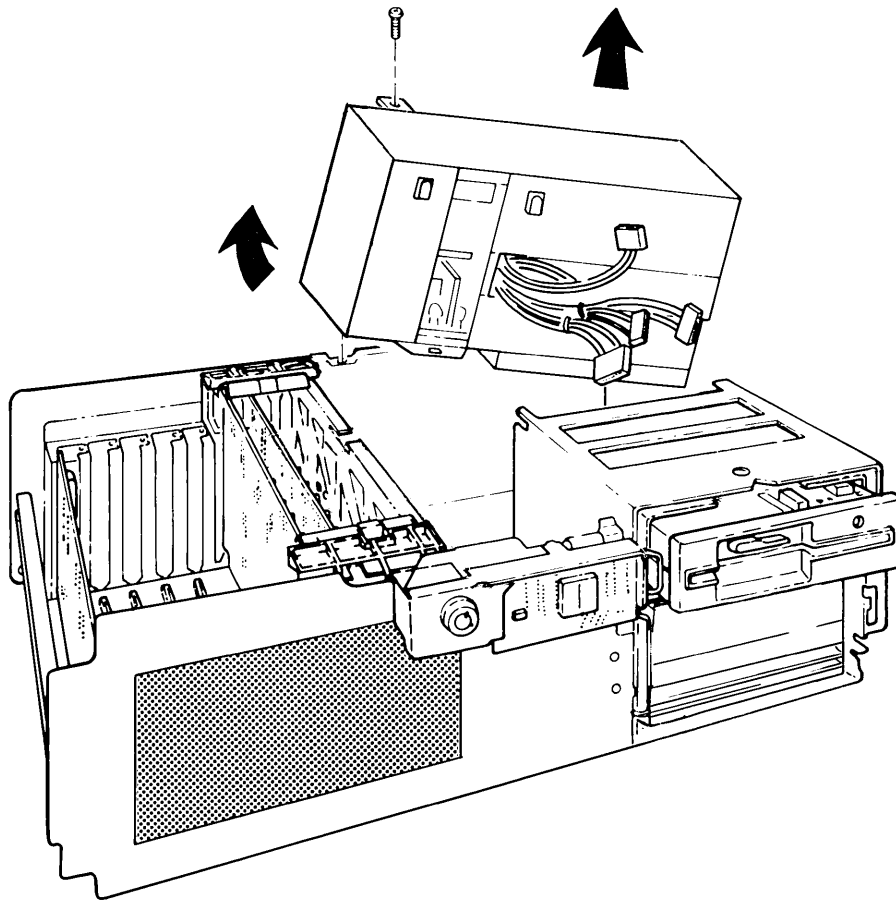
---

## Power Supply Removal

1. Do the “Top Cover Removal” on page 4-12.
  2. Disconnect the external power cable at the power supply.
  3. If present, disconnect the display power cable at the power supply.
  4. Remove the cooling fan assembly (page 4-36).
  5. Disconnect the power cables from the system board (2), fixed-disk, and diskette drive. If needed, slide the fixed-disk and diskette drives part way out.
  6. Disconnect the signal cables and ground wire from the fixed-disk and diskette drives.
- 



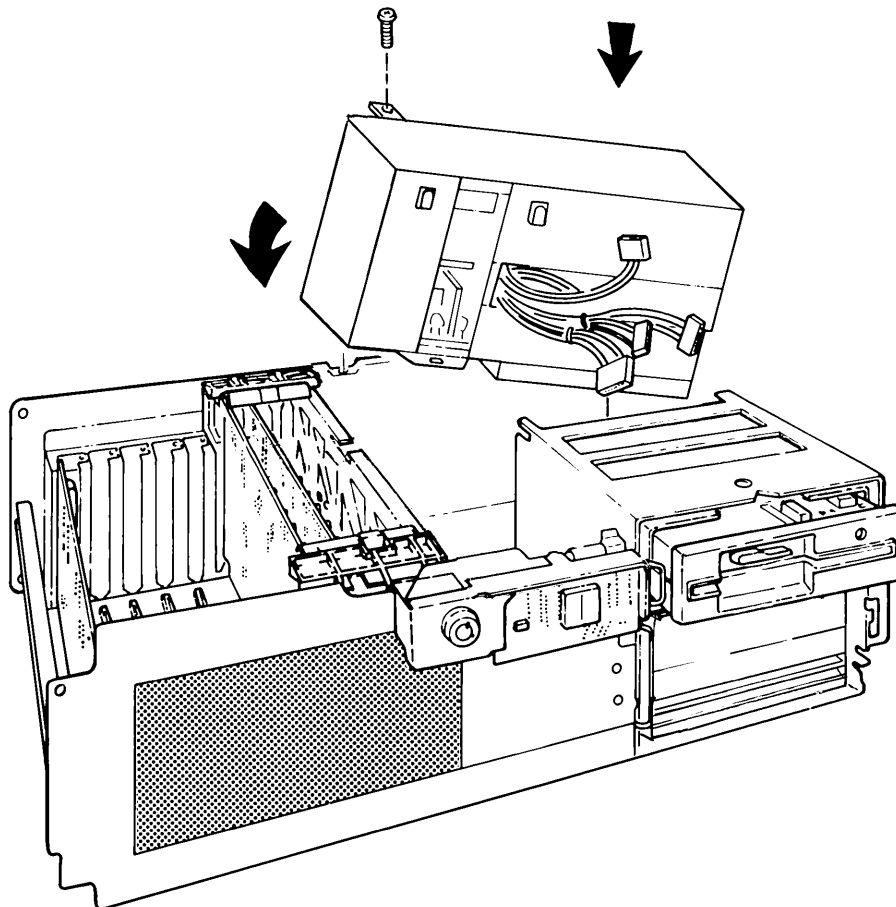
- 
7. Remove the power supply mounting screw.
  8. Raise the end of the power supply next to the mounting screw, then lift the power supply up out of the system unit.
- 



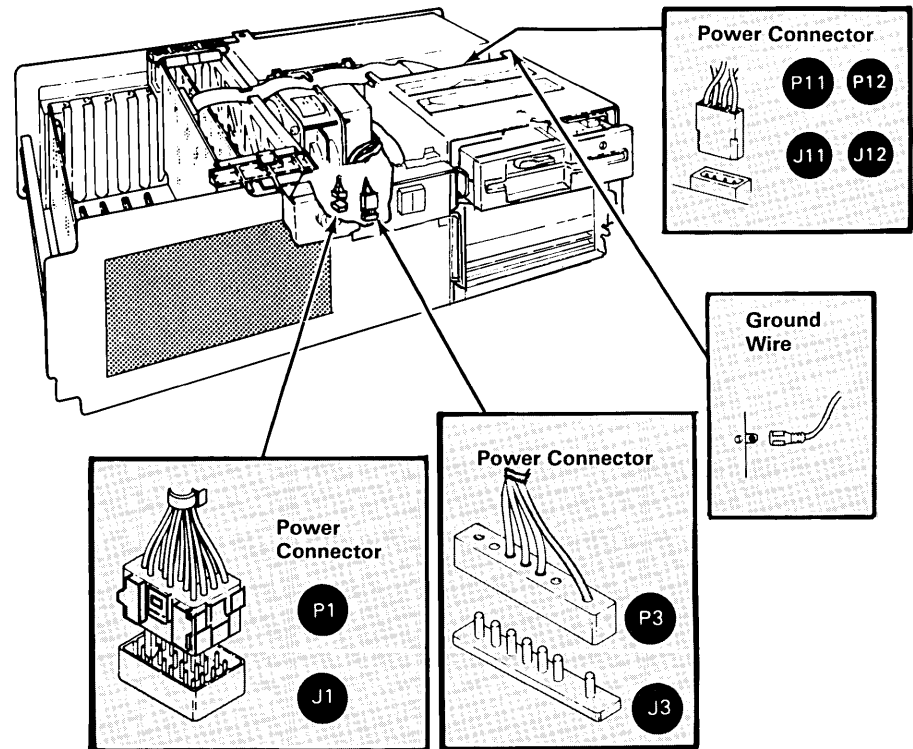
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## Power Supply Replacement

1. Lower the power switch end of the power supply into the system unit until the step contacts the base, then lower the other end into position.
  2. Install the power supply mounting screw.
- 



- 
3. Connect the power cables to the system board (2), fixed-disk, and diskette drive.
  4. Connect the signal cables and ground wire to the fixed-disk and diskette drives.
  5. Install the cooling fan assembly (page 4-37).
  6. If present, connect the display power cable to the power supply.
  7. Connect the external power cable to the power supply.
  8. Do the "Top Cover Replacement" on page 4-13.
- 

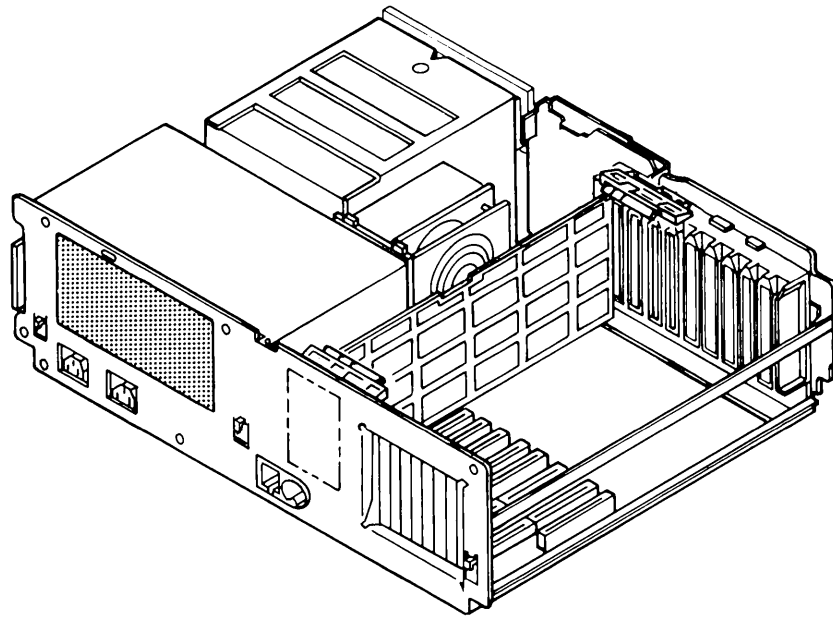




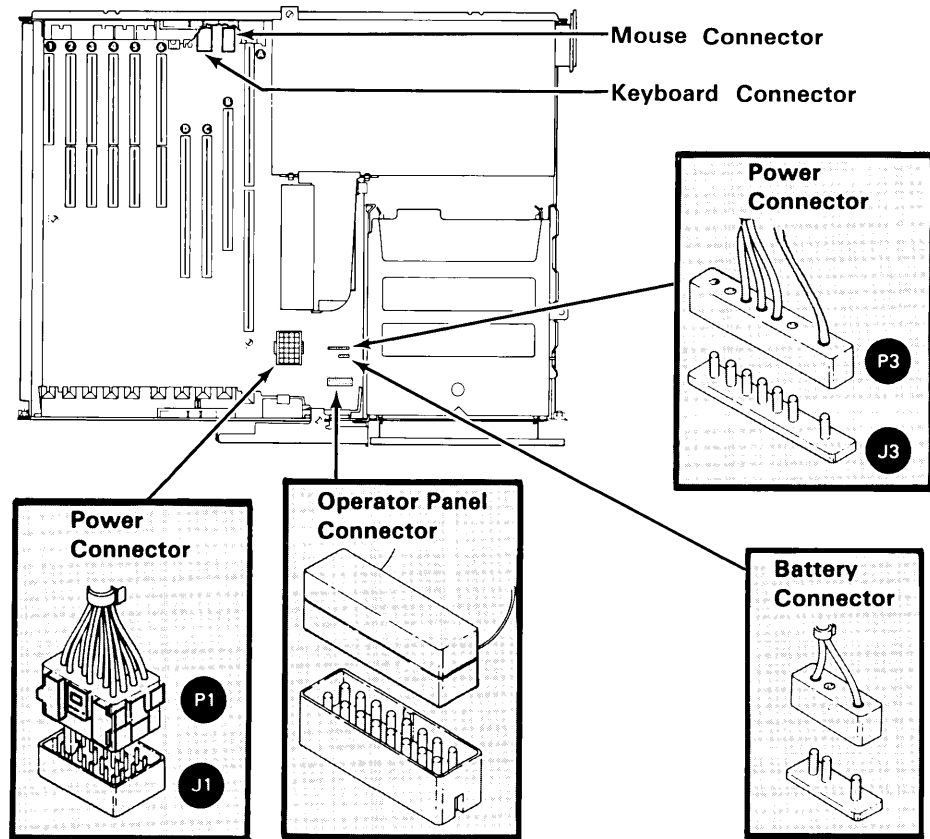
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## System Board Removal

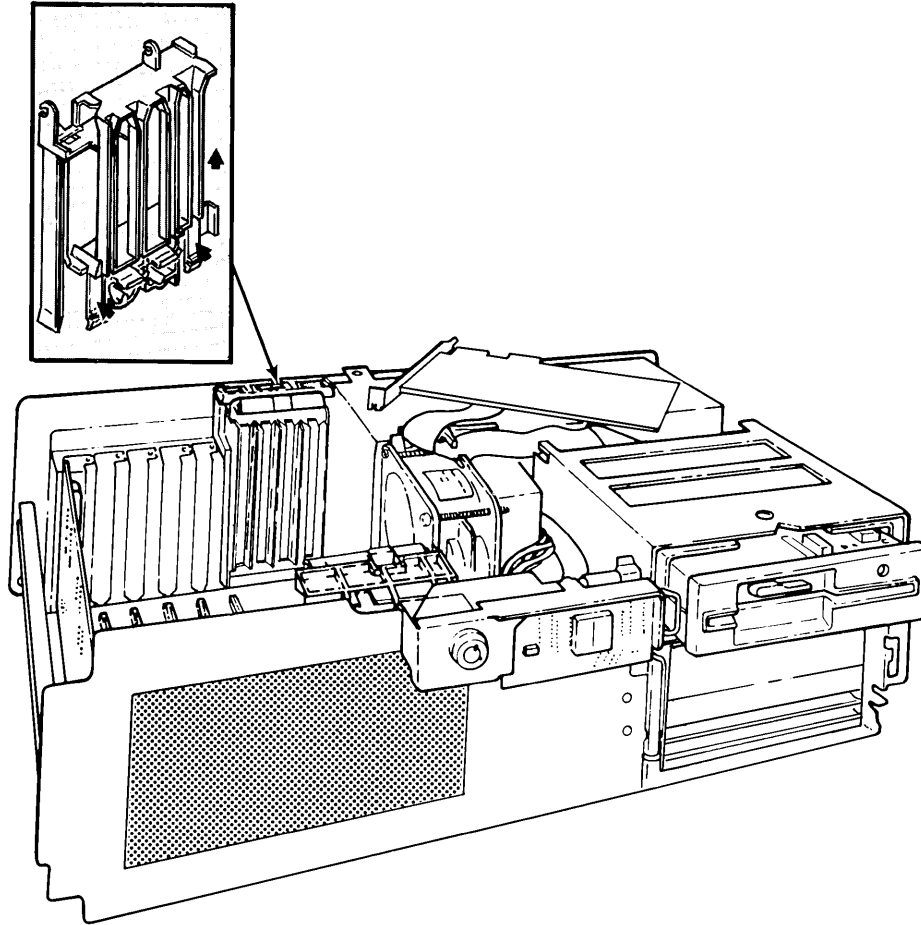
1. Do the “Top Cover Removal” on page 4-12.
  2. Remove the external power cable at the power supply.
  3. Remove all of the external cables attached to the system board or the adapters.
- 



4. Remove the fixed disk and diskette drive adapter from slot 6 and place it on top of the system unit with the cables attached.
5. Remove all of the remaining adapters and boards. Record the type and slot position of each (pages 4-16 or 4-14).
6. Disconnect the power connectors from the system board.
7. Disconnect the operator panel cable from the system board.
8. Disconnect the battery cable from the system board.



- 
9. Press back on the two rear guide latches and lift the guide up out of the system unit.
- 

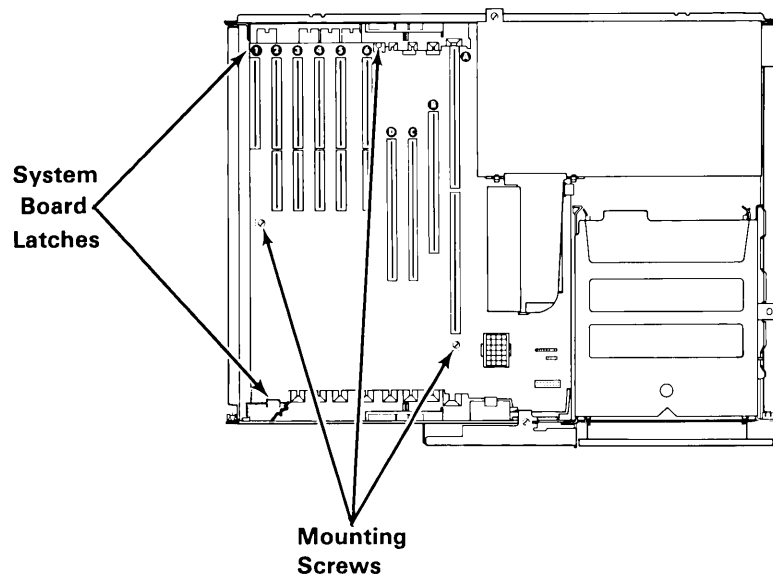


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10. Remove the three system board mounting screws.

11. Press on the latches, then remove the system board by lifting it up and sliding it out the end of the system unit.

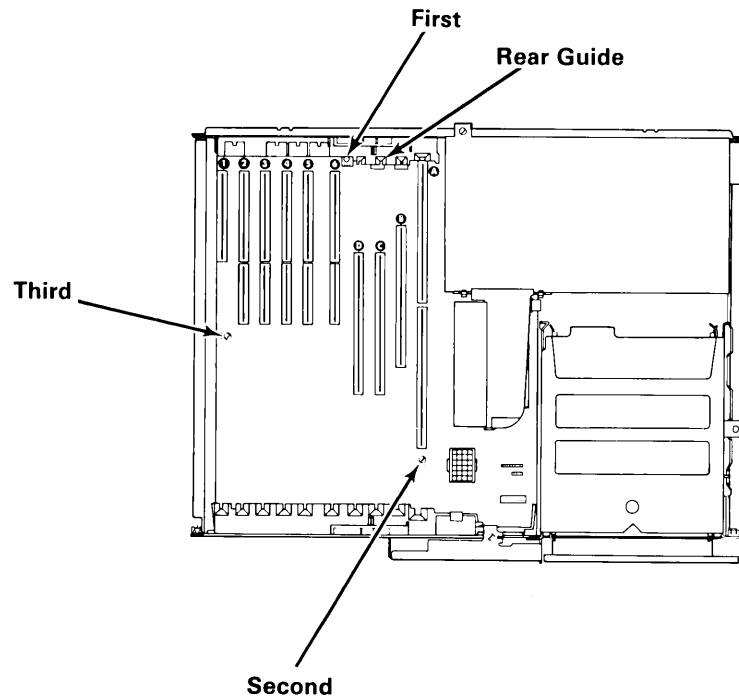
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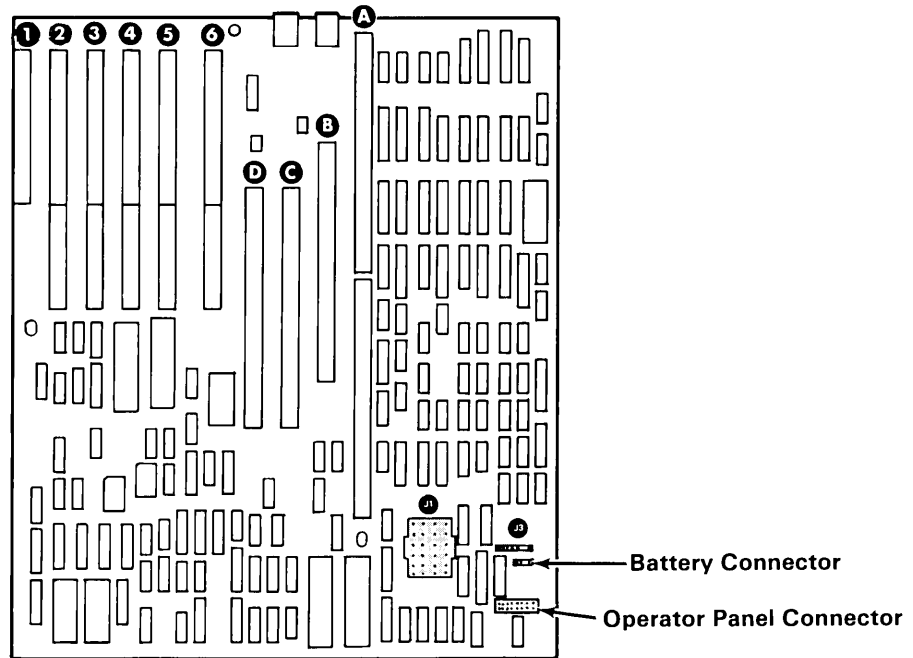
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## System Board Replacement

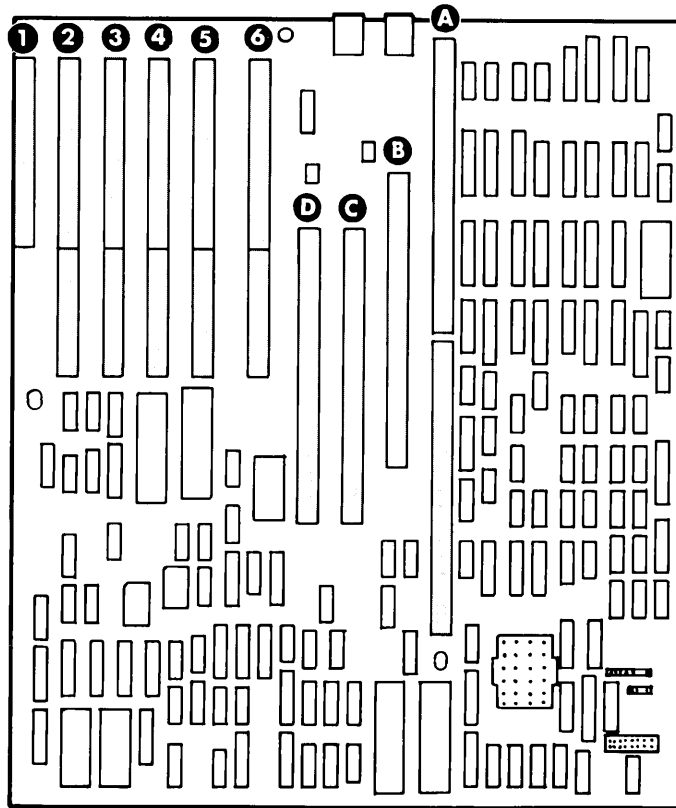
1. Slide the system board in the end of the system unit and press down into position.
  2. Install the three system board mounting screws in the sequence indicated below.
  3. Align the rear guide and press it down into position.
- 



- 
4. Connect the operator panel cable to the system board.
  5. Connect the battery cable to the system board.
  6. Connect the power cable connectors to the system board.
- 



- 
7. Look at the types and positions you recorded, then install each adapter and board.
  8. Install the fixed-disk and diskette adapter in slot 6.
  9. Connect each of the external cables to the system board and adapters.
  10. Connect the external power cable to the power supply.
  11. Do the "Top Cover Replacement" on page 4-13.
- 



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## Section 5. Base System Unit



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System Board .....	5-6
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Power Distribution Diagram .....	5-8
Internal Signal Cabling Diagram .....	5-9
Parts Information .....	5-10

---

## About this Section

This section contains the description, specifications, locations, and parts list for the base system unit components.

The floating-point board is an optional feature and may not be present on your system. The floating-point board is included in this section.

---

## Base System Unit (6151)

The Base System Unit (6151) consists of the system board, processor board, floating-point board, power supply, operator panel, covers, and hardware.

The floating-point board is an optional feature but is included in the Base System Unit (6151) because it improves the numerical processing ability of the 32-bit processor during floating point operations.

## Specifications

Height	160 mm (6 1/4 inches)
Width	540 mm (21 1/4 inches)
Depth	465 mm (18 1/4 inches)
Weight	25 kg (56 pounds)
Temperature	15.6 to 32.2°C (60 to 90°F)
Humidity	8 - 80 percent, noncondensing
Input voltages	U.S., 90 - 137 V ac WT low, 90 - 137 V ac WT high, 180 - 259 V ac
Power	U.S., 0.8 kVA WT low voltage, 0.8 kVA WT high voltage, 0.9 kVA
Hertz	48 to 62
Heat output	Low voltage, 800 W (2750 BTU/hr) High voltage, 900 W (3100 BTU/hr)
Altitude	0 to 2135 m (0 to 7000 feet)

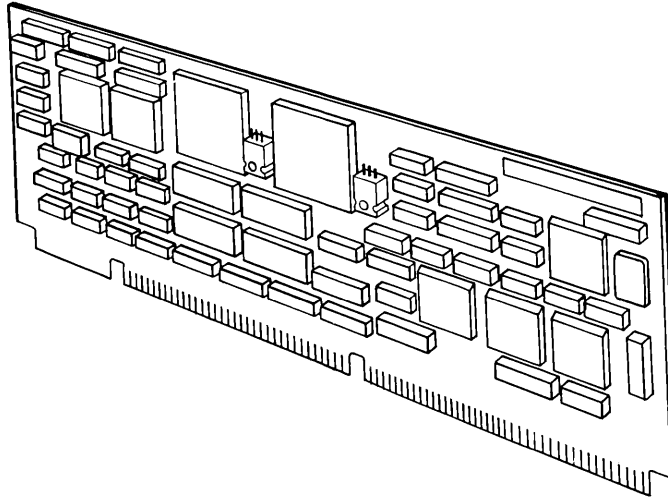
## Removal and Replacement Procedures

See Section 4 for your type unit or device.

---

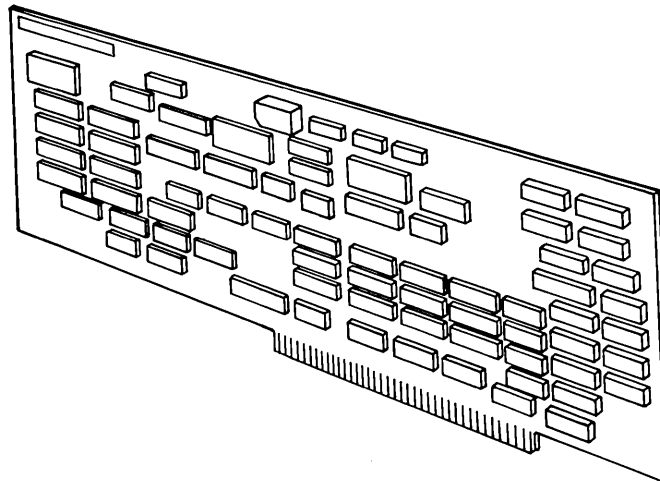
## Processor Board

The Processor Board contains the 32-bit processor and the system memory controller.



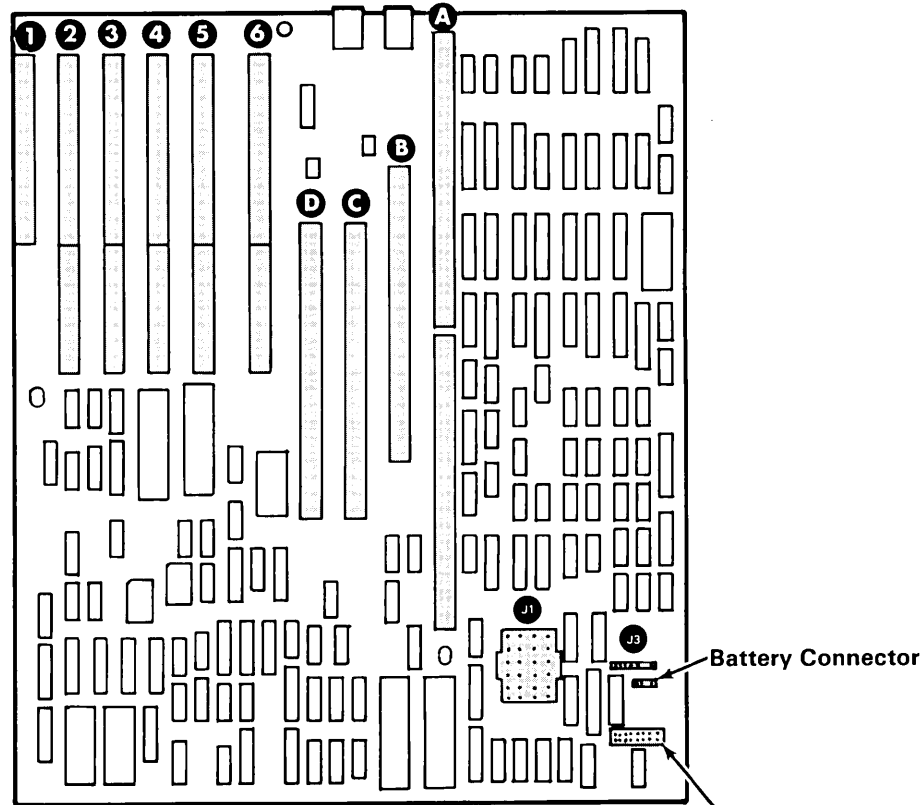
## Floating-Point Board

The Floating-Point Board improves the numerical processing ability of the 32-bit processor.



## System Board

The System Board contains the keyboard adapter, mouse adapter, and slots for the processor board, floating-point board, system memory boards, and I/O adapters.



Adapter Slot Number and Assigned Adapter

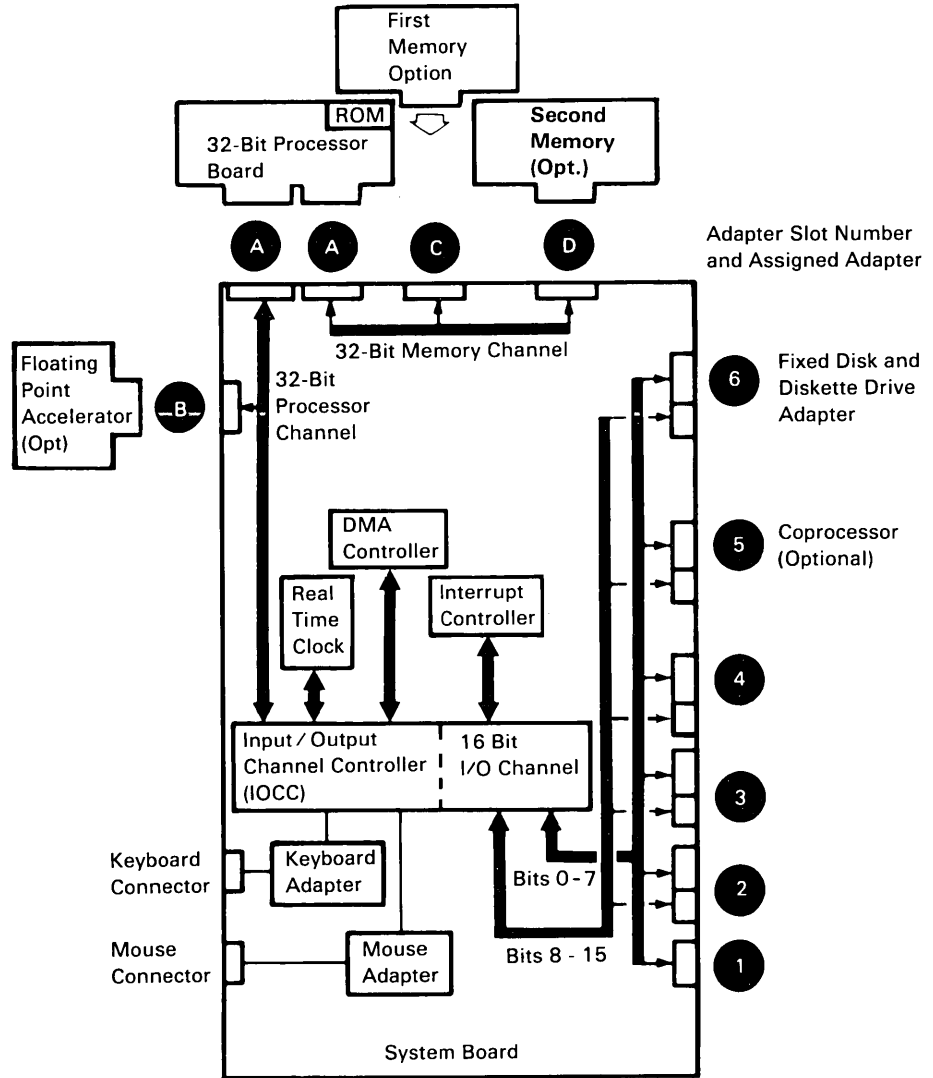
- A** Processor Board
- B** Floating-Point Board
- C** First Memory Option
- D** Second Memory Option
- 6** Fixed-Disk And Diskette Drive Adapter
- 5** Coprocessor

Operator Panel Connector

Battery Connector

# Data Flow Diagram

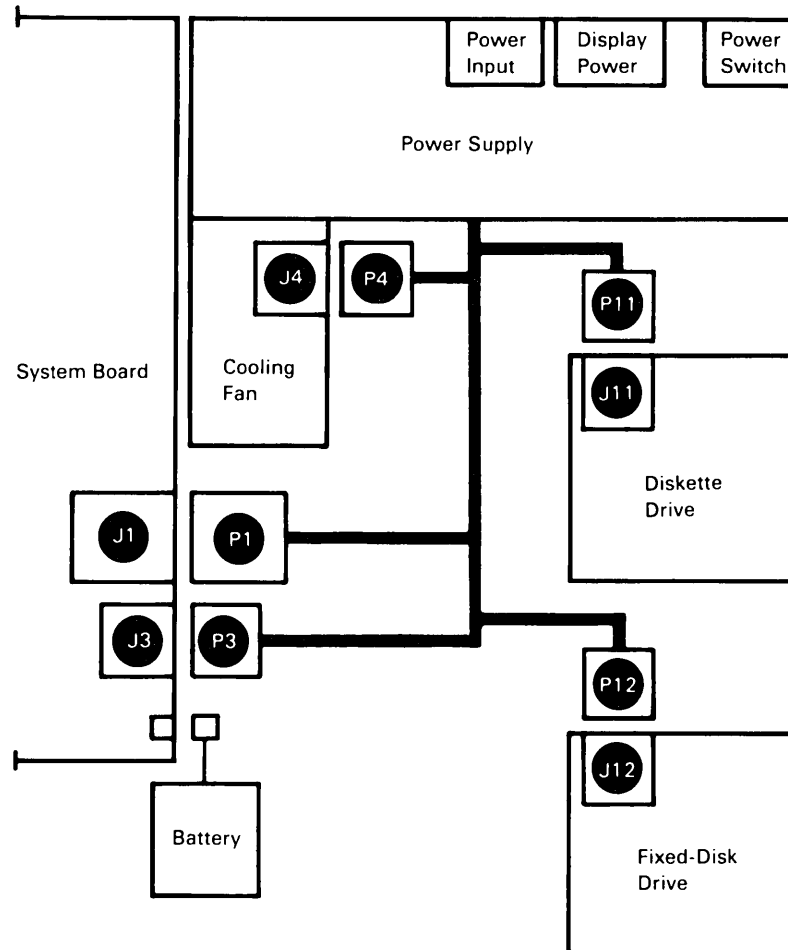
Use the Data Flow Diagram to identify data flow paths between system devices.



---

## Power Distribution Diagram

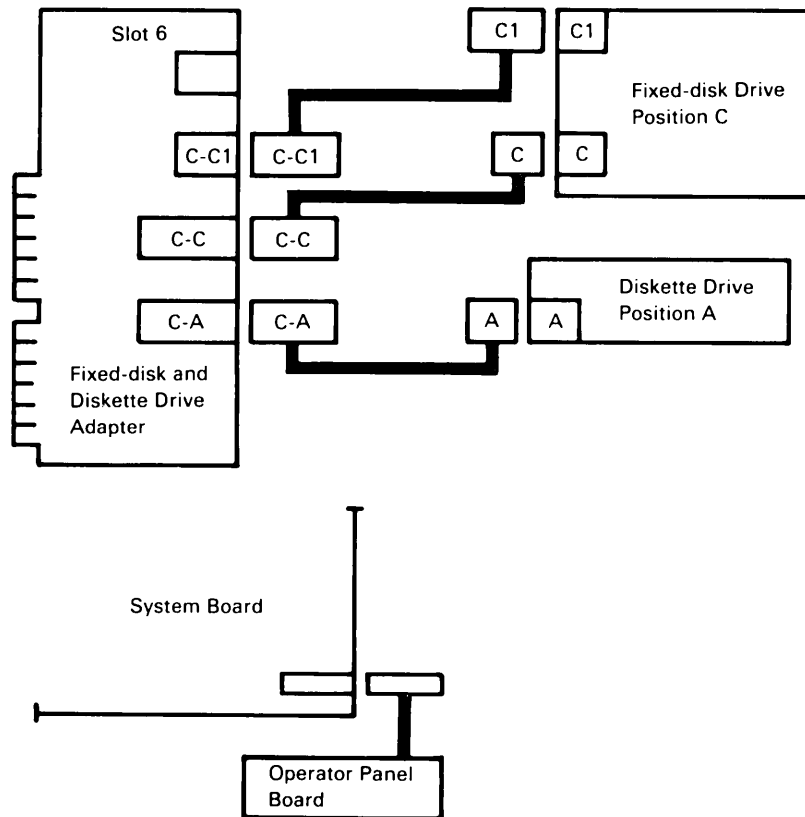
Use the Power Distribution Diagram to identify the power connectors.



---

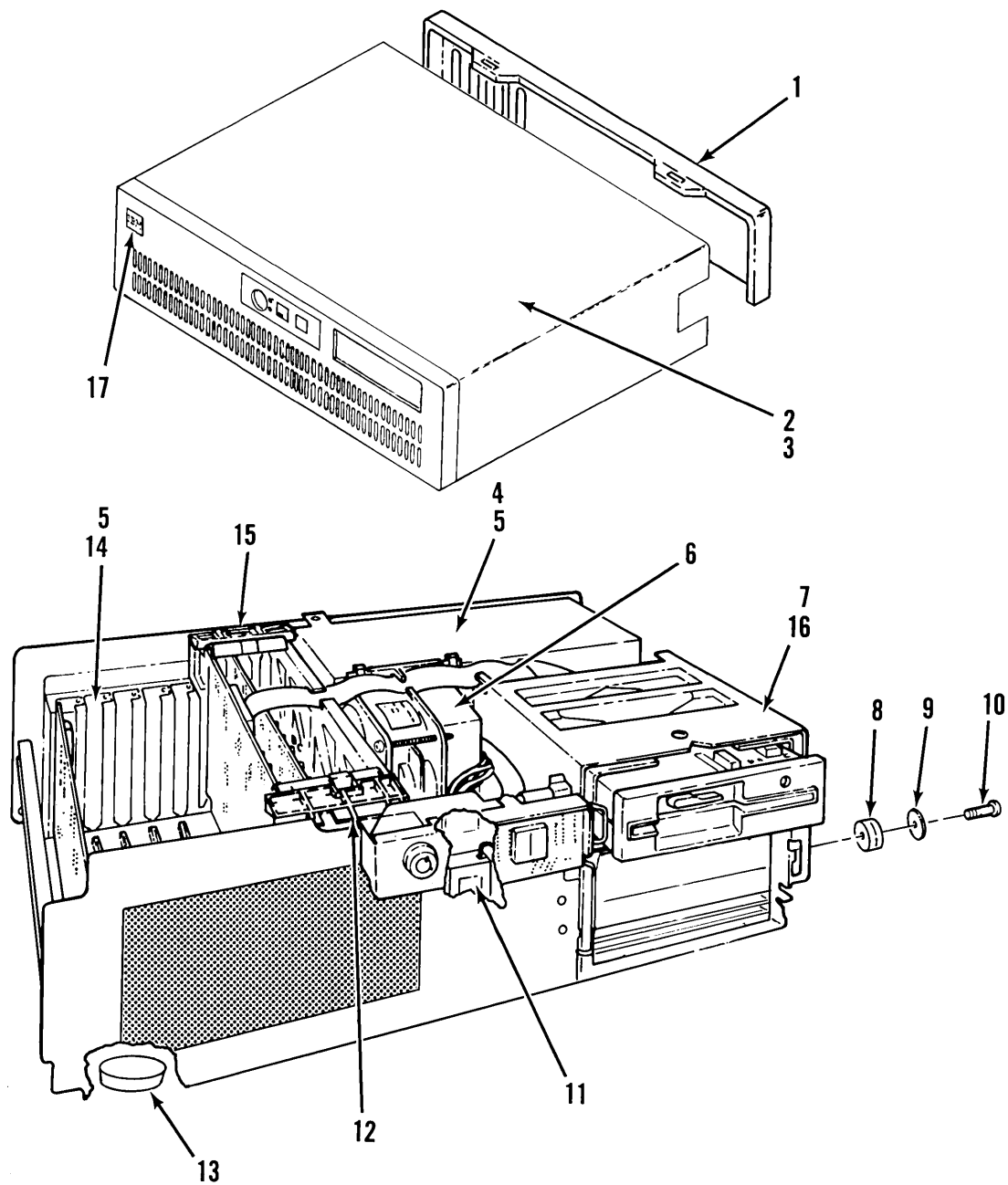
## Internal Signal Cabling Diagram

Use the Internal Signal Cabling diagram to identify the signal connectors.

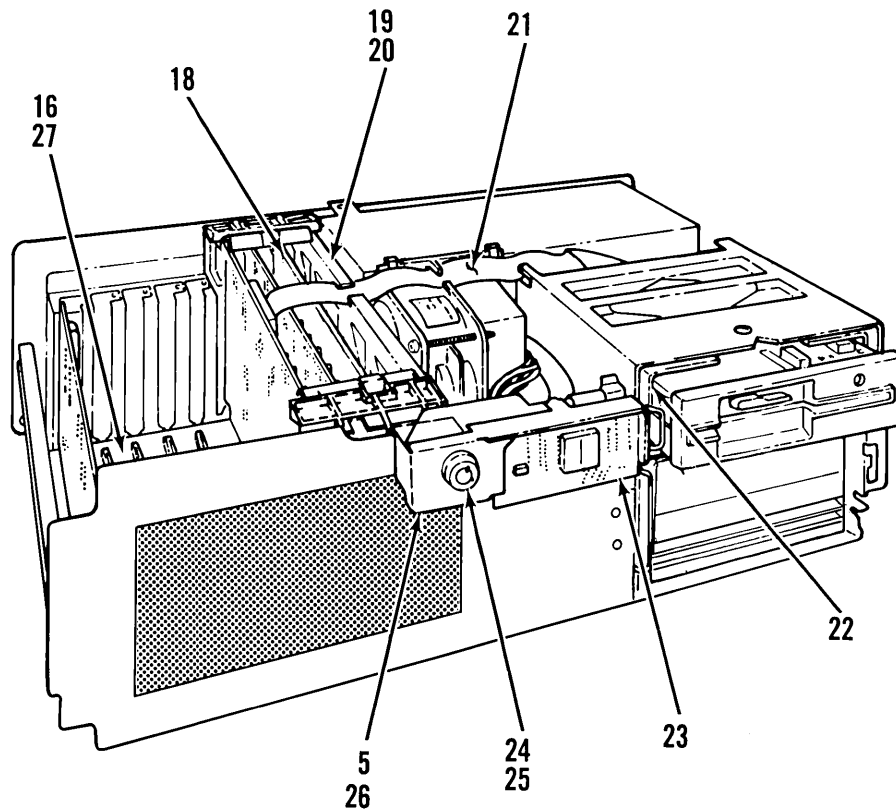




## Parts Information

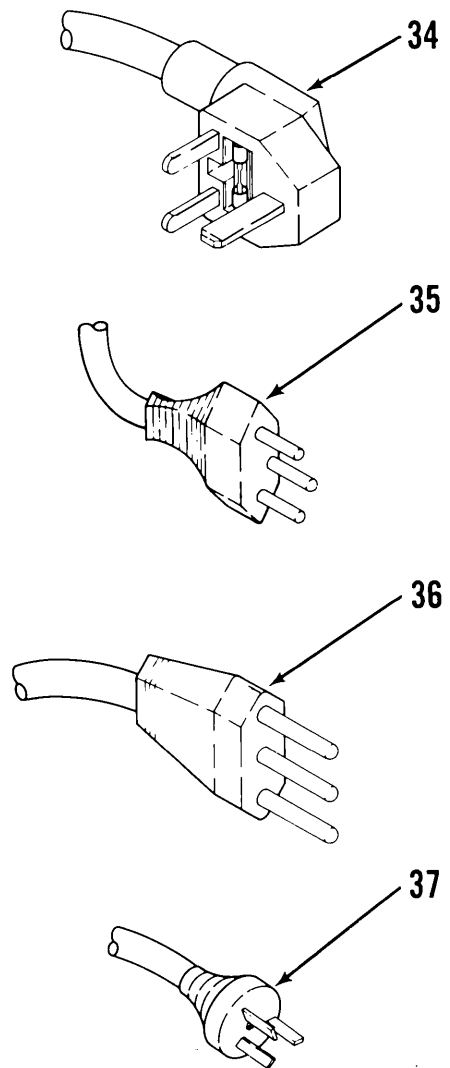
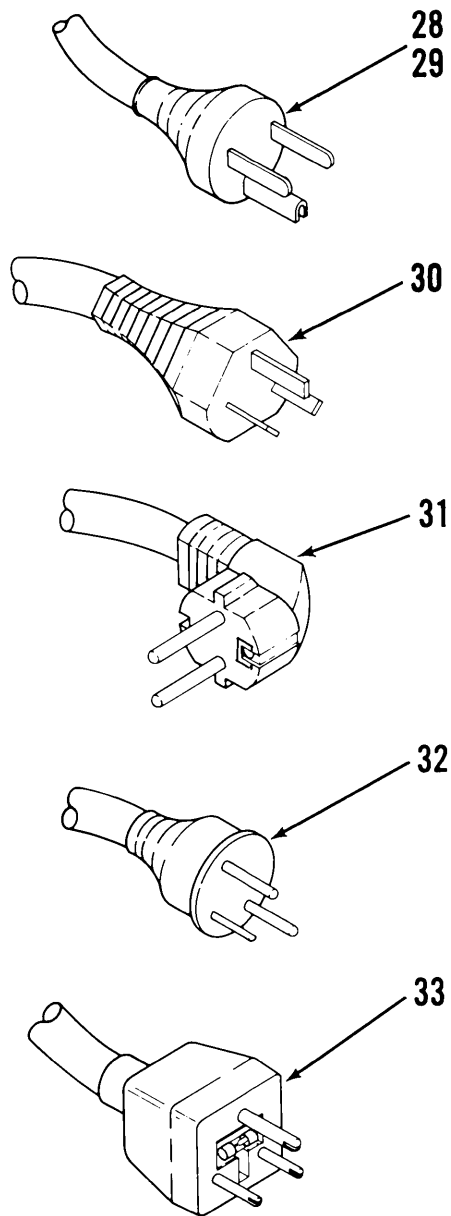


Index Number	Part Number	Description
1	6298356	Rear cover
2	6298378	Top cover
3	6080460	Screw, top cover
4	6298452	Power supply, U.S.
4	6298454	Power supply, WT low voltage
4	6298453	Power supply, WT high voltage
5	6080443	Screw, power supply mounting
6	6298355	Cooling fan assembly
7	6298997	Shock mount retainer
8	6294696	Rubber bushing, rack mounting
9	6294819	Washer, rack mounting
10	6298395	Stud, rack mounting
11	6299201	Battery
12	6080458	Front guide assembly
13	6360965	Pad, foot
14	1501437	Blank bracket
15	6080459	Rear guide assembly
16	6299014	Screw, system board mounting, retainer
17	6080401	Logo



---

<b>Index Number</b>	<b>Part Number</b>	<b>Description</b>
18	6299220	Floating-point board
19	6299230	Processor board with holder
20	6298223	Holder, processor board
21	6298379	Cable, fixed-disk and diskette
22	6298410	Rack
23	6453886	Operator panel board
24	6299485	Keylock assembly
25	6299523	Spacer, keylock
26	6298181	Operator panel bracket
27	6299231	System board



---

<b>Index Number</b>	<b>Part Number</b>	<b>Description</b>
28	6952300	Power cable, U.S., Venezuela, Canada
29	6952301	Power cable, Cook County, Illinois
30	6952311	Power cable, Australia, New Zealand
31	6952320	Power cable, Europe
32	6952329	Power cable, Denmark
33	6952347	Power cable, South Africa
34	6952356	Power cable, U.K.
35	6952365	Power cable, Swiss
36	6952374	Power cable, Italian
37	6952383	Power cable, Israel



## Section 6. System Memory Options



---

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2MB Memory Expansion Option .....	6-7
Specifications .....	6-7
Removal and Replacement Procedures .....	6-7
Parts Information .....	6-8

---

## About this Section

This section contains the service information for the system memory options. These memory boards are directly addressed by the processor board.

See Section 9, "Adapters" for memory options that install in adapter slots 1 through 4 and attach to the I/O channel.

---

## System Memory Option Chart

Use the chart below to determine the system memory options for slots C and D.

Total bytes of system memory	Option In slot C	Option In slot D
1.0M	1.0M	none
2.0M	1.0M	1.0M
2.0M	2.0M	none
3.0M	2.0M	1.0M
4.0M	2.0M	2.0M

---

## 1MB Memory Expansion Option

The 1MB Memory Expansion Option provides direct-addressable memory for the 32-bit processor.

### Specifications

Slot positions	C, D
Bytes of memory	1.0M bytes
Memory type	ECC

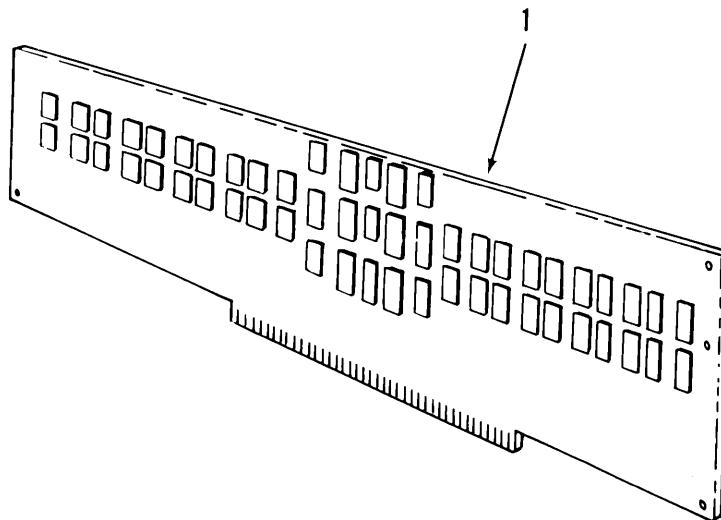
### Removal and Replacement Procedures

Use the “Processor, Floating-Point, or System Memory Removal” on page 4-14 procedure for removal.

Use the “Processor, Floating-Point, or System Memory Replacement” on page 4-15 procedure for replacement.

---

## Parts Information



Index Number	Part Number	Description
1	6848223	1MB Memory Expansion Option

---

## 2MB Memory Expansion Option

The 2MB Memory Expansion Option provides direct-addressable memory for the 32-bit processor.

### Specifications

Slot positions	C, D
Bytes of memory	2.0M bytes
Memory type	ECC

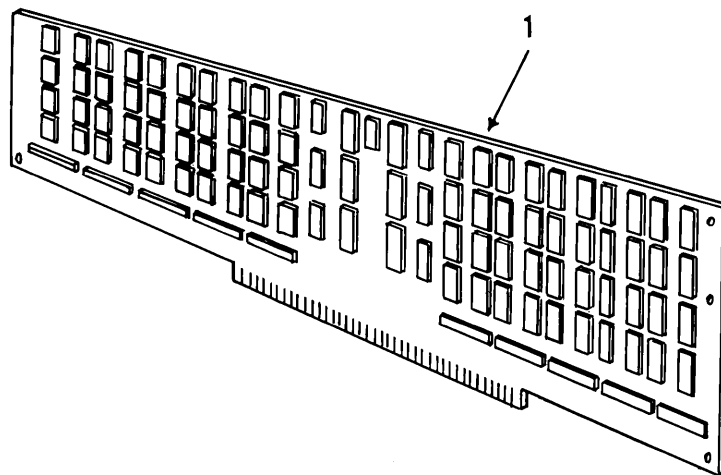
### Removal and Replacement Procedures

Use the “Processor, Floating-Point, or System Memory Removal” on page 4-14 procedure for removal.

Use the “Processor, Floating-Point, or System Memory Replacement” on page 4-15 procedure for replacement.

---

## Parts Information



Index Number	Part Number	Description
1	6299228	2MB Memory Expansion Option

---

## Section 7. Diskette Drive



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Specifications .....	7-4
Removal and Replacement Procedures .....	7-4
Terminator Resistor .....	7-5
Parts Information .....	7-6

---

## About this Section

This section contains information about the diskette drive used in the IBM RT PC Model 10.

The IBM RT PC Model 10 System Unit can only have one diskette drive installed. The diskette drive is the Personal Computer AT High Capacity Diskette Drive.

---

## Personal Computer AT High Capacity Diskette Drive

The Personal Computer AT High Capacity Diskette Drive can store up to 1.2M bytes of formatted data on a Double-Sided, Cobalt-Enhanced Oxide-Coated Diskette. This drive is a single field replaceable unit.

### Specifications

Diskette type	5.25 inch, double-sided, cobalt-enhanced oxide-coating
Total tracks	160 (80 tracks per side)
Sectors per track	15
Bytes per sector	512
Tracks per inch	96
Maximum number	1
Adapter	Personal Computer AT Fixed-Disk and Diskette Drive Adapter

### Removal and Replacement Procedures

Use the “Diskette Drive Removal” on page 4-24 procedure for removal.

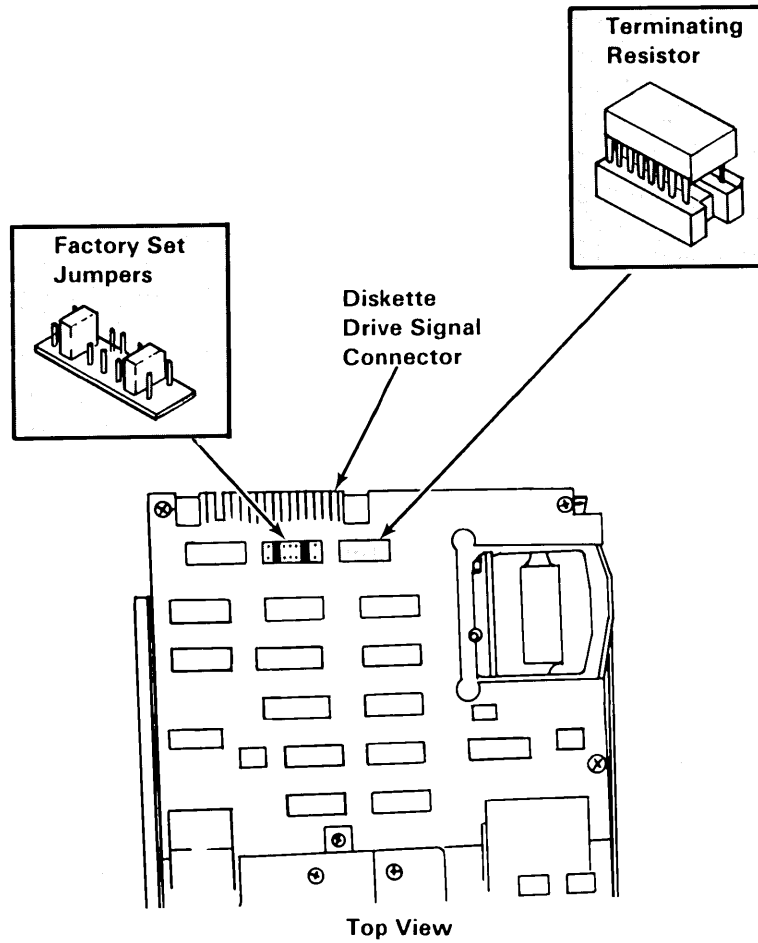
Use the “Diskette Drive Replacement” on page 4-26 procedure for replacement.

---

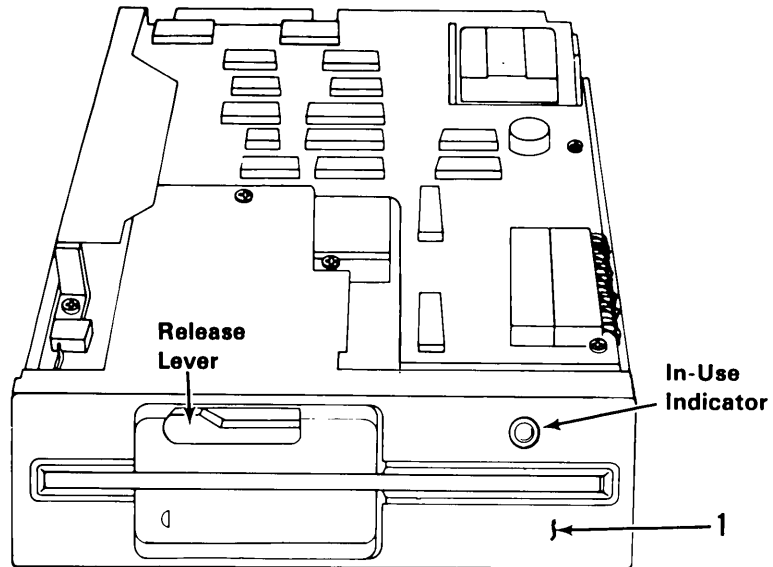
## Terminator Resistor

Use the diagram below to identify and install the terminator resistor.

---



## Parts Information



Index Number	Part Number	Description
1	8286130 6298379	Personal Computer AT High Capacity Diskette Drive Cable, fixed-disk and diskette drive

---

## Section 8. Fixed-Disk Drive

---

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Fixed-Disk Drive Type R40 .....	8-4
Specifications .....	8-4
Removal and Replacement Procedures .....	8-4
Terminator Resistor .....	8-5
Parts Information .....	8-6

---

## About this Section

This section provides information about the fixed-disk drive used on the IBM RT PC Model 10. The system unit has only one fixed-disk drive.

The fixed-disk drive and diskette drive share a fixed-disk and diskette drive adapter.



---

## Fixed-Disk Drive Type R40

The Fixed-Disk Drive Type R40 has a storage capacity of at least 40M bytes of formatted data.

There are no adjustments or individually field-replaceable parts on this drive.

### Specifications

Disk Size	5.25 inch fixed disk
Maximum number	1
Adapter	Personal Computer AT Fixed-Disk and Diskette Drive Adapter

### Removal and Replacement Procedures

Use the “Fixed-Disk Drive Removal” on page 4-28 procedure for removal.

Use the “Fixed-Disk Drive Replacement” on page 4-30 procedure for replacement.

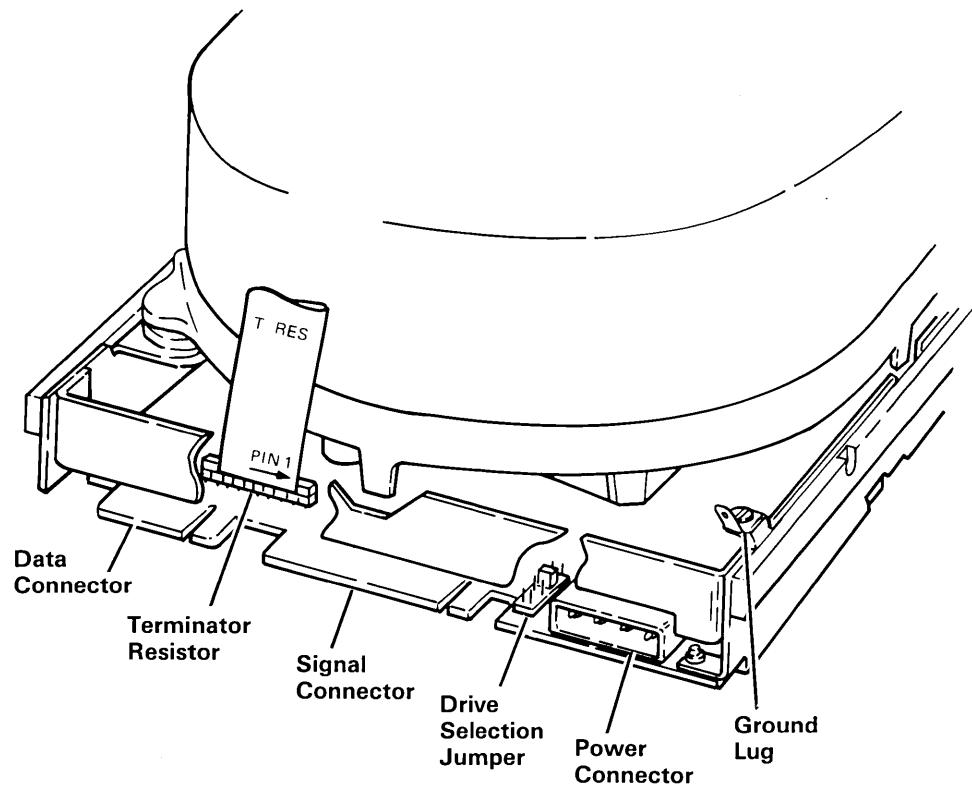
---

## Terminator Resistor

Use the diagram below to identify, install, or remove terminator resistor on the type R40 drive.

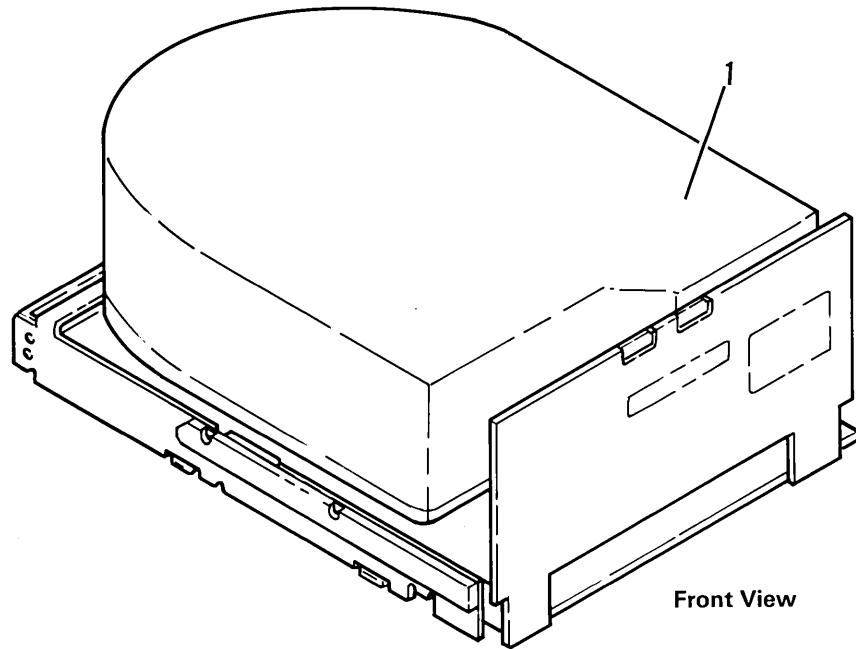
Set the drive selection jumper as shown.

---



---

## Parts Information



Index Number	Part Number	Description
1	6299235 6298379	40MB Fixed-Disk Drive Cable, fixed-disk and diskette drive

---

## Section 9. Adapters

---

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---

## About this Section

This section contains detail information about adapters used by the IBM RT PC Model 10. Use the contents list on the preceding pages to find the information about your adapter. The removal and replacement procedures for adapters are in Section 4.

---

## Personal Computer AT Coprocessor Option

The Personal Computer AT Coprocessor Option runs programs designed for the IBM Personal Computer. The coprocessor uses the I/O channel to communicate with the 32-bit processor, system memory, adapters, or the AT 512 KB Memory Expansion Option.

The Personal Computer AT Math Co-Processor attaches to the Personal Computer AT Coprocessor Option to improve the numerical capability of the coprocessor.

### Specifications

Slot position	5
Interrupt level	15 (shared)
Maximum number	1

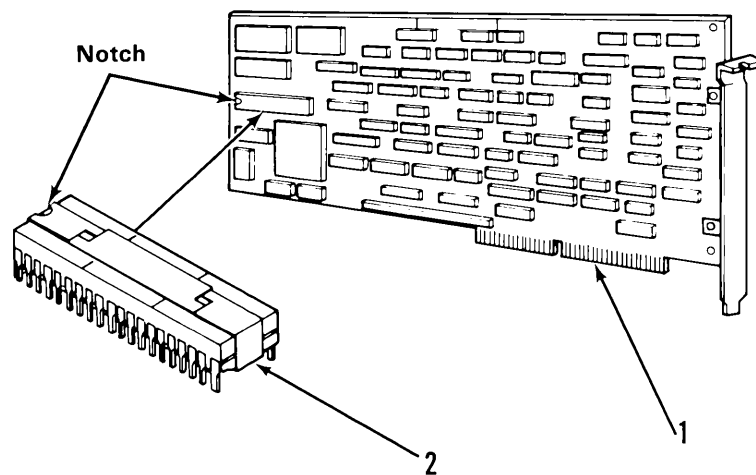
### Removal and Replacement Procedures

Use the “Adapter Removal” on page 4-16 procedure for removal of the coprocessor. If the Personal Computer AT Math Co-Processor is present, pry up on the ends of the module to remove it.

Use the “Adapter Replacement” on page 4-18 procedure for replacement of the coprocessor. If the Personal Computer AT Math Co-Processor is present, align the notched end of the module with notched end of the socket and push down.



## Parts Information



Index Number	Part Number	Description
1	6299226	Personal Computer AT Coprocessor Option
2	8286127	Personal Computer AT Math Co-Processor

---

## AT 512 KB Memory Expansion Option

The AT 512 KB Memory Expansion Option plugs into a system board adapter slot and uses the I/O channel to communicate with the Personal Computer AT Coprocessor Option or the 32-bit processor.

### Specifications

Slot positions	2 - 4
Maximum number	1

### Removal and Replacement Procedures

Use the “Adapter Removal” on page 4-16 procedure for removal.

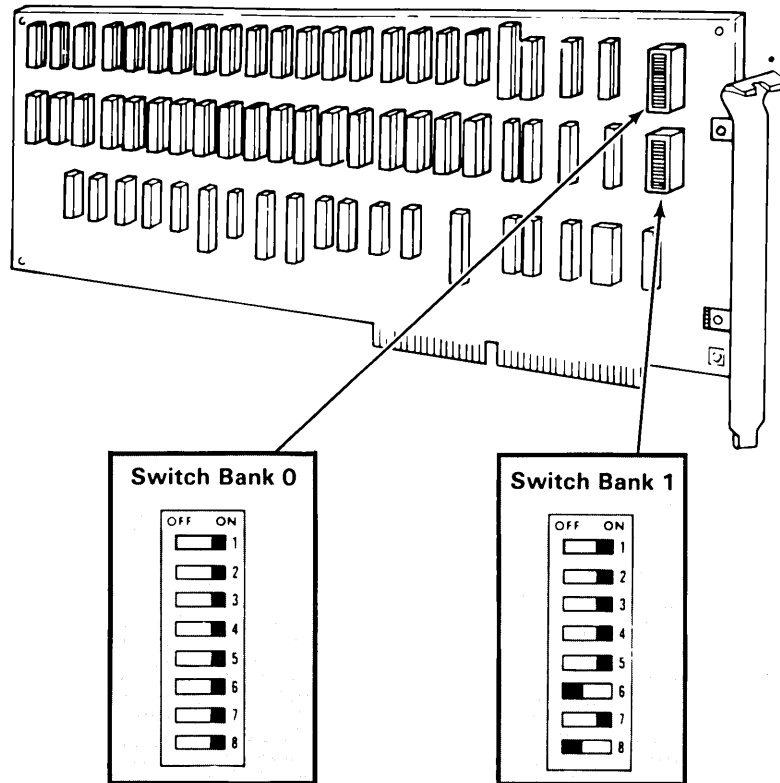
Use the “Adapter Replacement” on page 4-18 procedure for replacement.

---

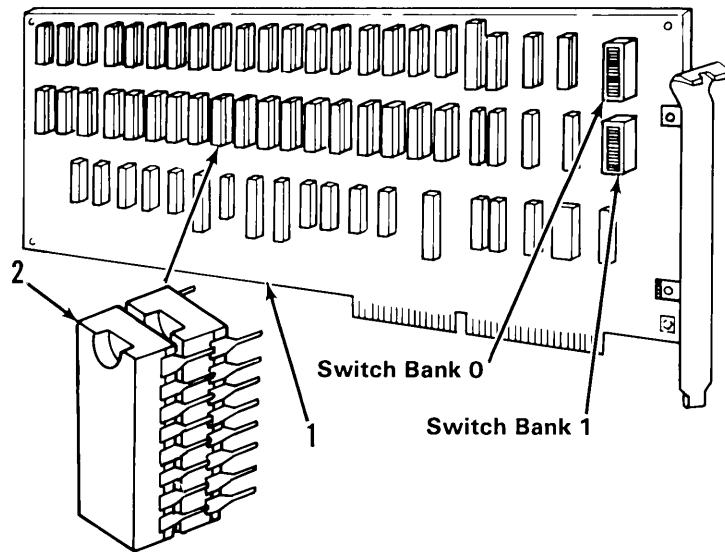
## Switch Settings

Use the diagram below to set the switches for the AT 512 KB Memory Expansion Option installed in your system unit.

---



## Parts Information



Index Number	Part Number	Description
1	8286115	AT 512 KB Memory Expansion Option
2	8286139	Module, 128K bits (1 each)

---

## Personal Computer AT Fixed-Disk and Diskette Drive Adapter

The Personal Computer AT Fixed-Disk and Diskette Drive Adapter contains adapters for two diskette drives and two fixed-disk drives.

### Specifications

Slot position	6
I/O addresses	Diskette, 03F0 - 03F7 Fixed-disk, 01F0 - 01F7
DMA channel	Diskette drive, 2
Interrupt levels	Diskette drive, 6 Fixed-disk drive, 14
Maximum number	1

### Removal and Replacement Procedures

Use the “Adapter Removal” on page 4-16 procedure for removal.

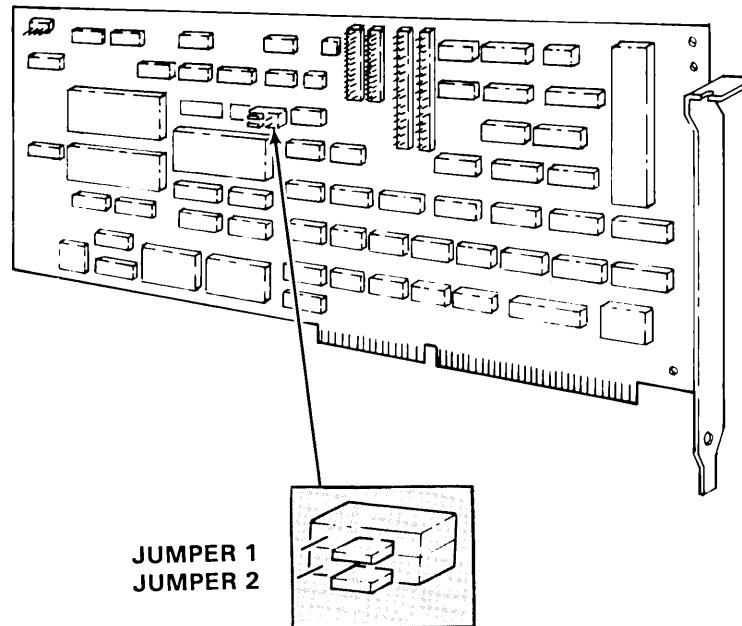
Use the “Adapter Replacement” on page 4-18 procedure for replacement.

---

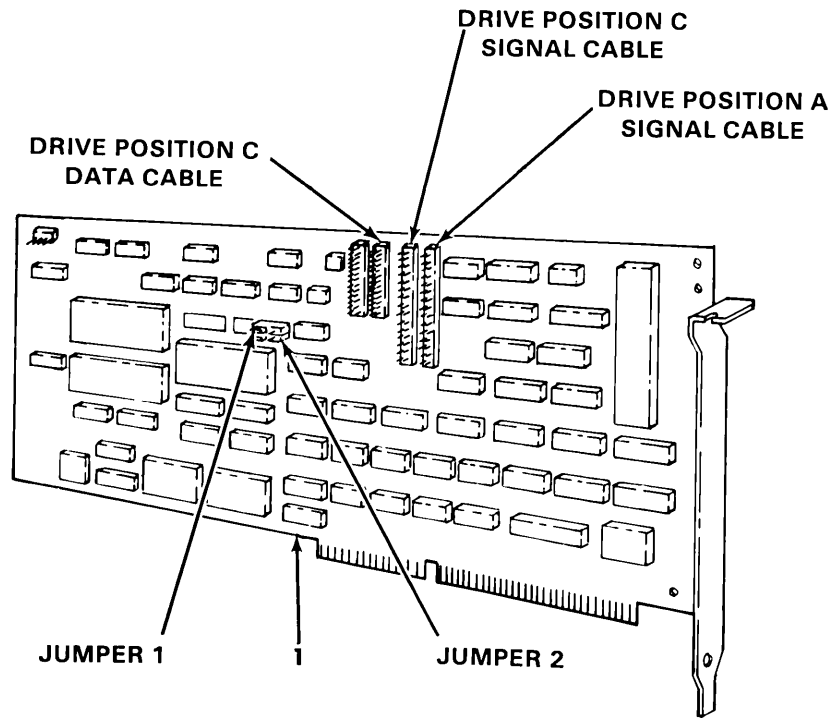
## Jumper Settings

Use the diagram below to set the jumpers for the adapter.

---



## Parts Information



Index Number	Part Number	Description
1	8286125 6298379	Personal Computer AT Fixed-Disk and Diskette Drive Adapter Cable, fixed-disk and diskette drive

---

## IBM Monochrome Display and Printer Adapter

The IBM Monochrome Display and Printer Adapter is the adapter used in the IBM Personal Computer system units to attach the IBM Personal Computer Display.

### Specifications

Slot positions	1
I/O addresses	Display adapter, 03B0 - 03BA Printer adapter, 03BB - 03BF
Memory addresses	Display, 0B0000 - 0B7FFF
Interrupt level	Printer adapter, 7
Maximum number	1

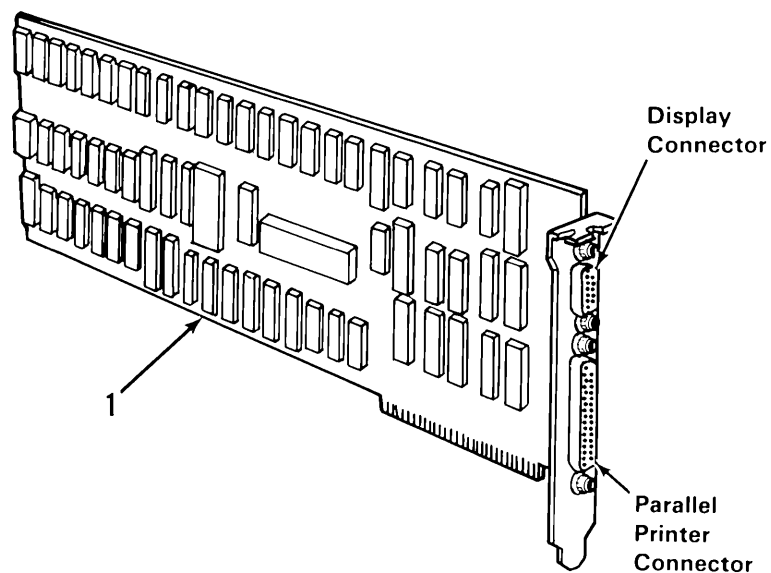
### Removal and Replacement Procedures

Use the “Adapter Removal” on page 4-16 procedure for removal.

Use the “Adapter Replacement” on page 4-18 procedure for replacement.



## Parts Information



Index Number	Part Number	Description
1	8529148 8529214	IBM Monochrome Display and Printer Adapter Cable, parallel printer

---

## Advanced Monochrome Graphics Display Adapter

The Advanced Monochrome Graphics Display Adapter attaches the Advanced Monochrome Graphics Display to the system unit.

### Specifications

Slot positions	2 - 5
I/O addresses	0160 - 016F
Memory addresses	D00000 - D1FFFF
Interrupt level	11
Maximum number	1

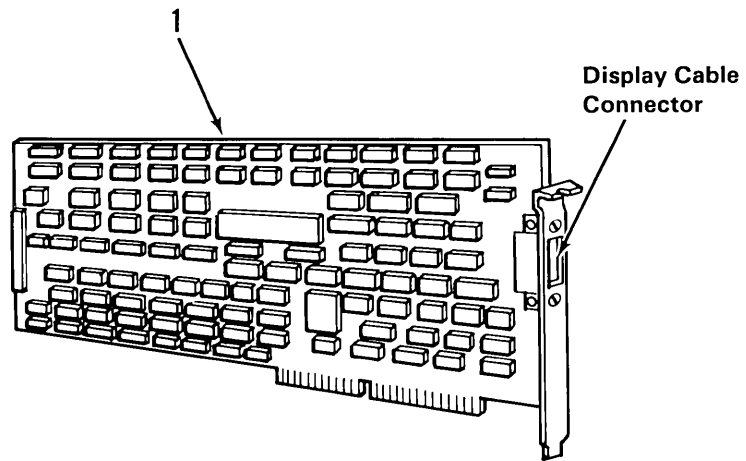
### Removal and Replacement Procedures

Use the “Adapter Removal” on page 4-16 procedure for removal.

Use the “Adapter Replacement” on page 4-18 procedure for replacement.

---

## Parts Information



Index Number	Part Number	Description
1	6299223	Advanced Monochrome Graphics Display Adapter

---

## Enhanced Graphics Adapter

The Enhanced Graphics Adapter attaches the Enhanced Color Display to the system unit. The Enhanced Graphics Adapter contains 64K-bytes of display memory. The display memory size can be expanded to 256K bytes by adding the Graphics Memory Expansion Card (64K bytes) and Graphics Memory Expansion Kit (128K bytes) to the adapter.

### Specifications

Slot positions	1
I/O addresses	03C0 - 03DF
Memory addresses	0A0000 - 0BFFFF
BIOS addresses	0C0000 - 0CFFFF
Interrupt level	9
Maximum number	1

### Removal and Replacement Procedures

Use the “Adapter Removal” on page 4-16 procedures for removal.

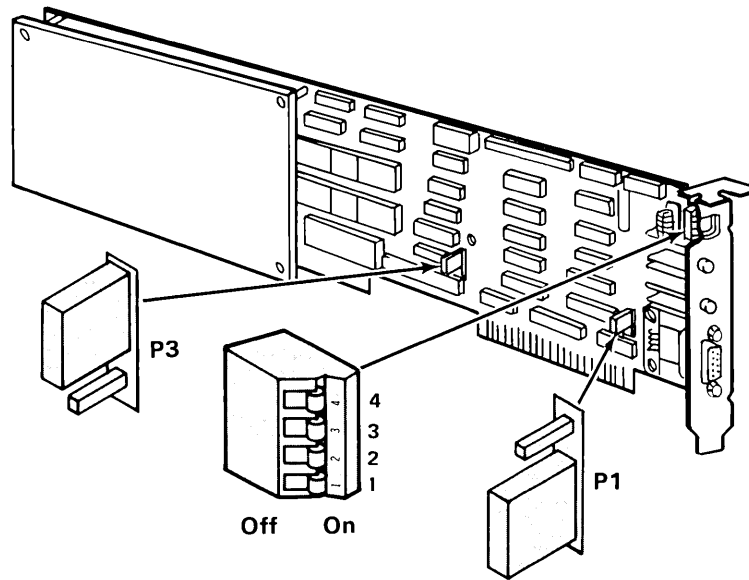
Use the “Adapter Replacement” on page 4-18 procedures for replacement.

---

## Switch and Jumper Settings

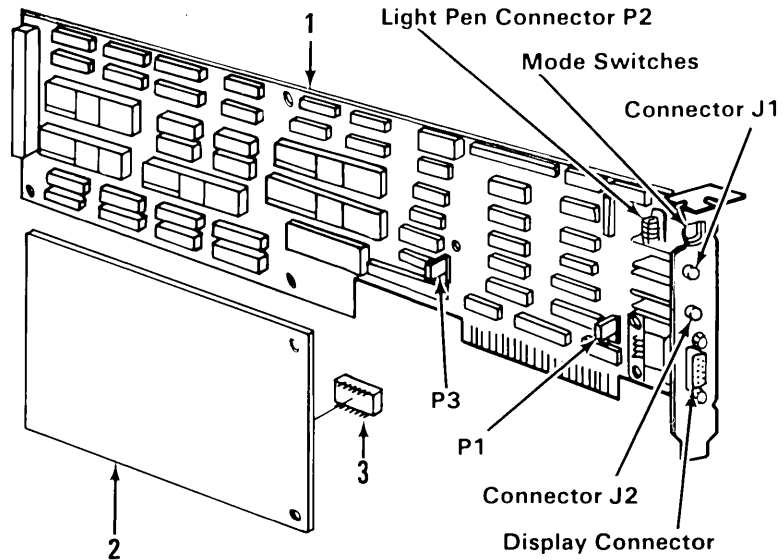
Use the diagram below to set the mode switch and jumpers.

---



Sw1	Sw2	Sw3	Sw4	IBM Display Type
On	Off	On	Off	Personal Computer
Off	Off	On	Off	Personal Computer
On	On	Off	On	Personal Computer
Off	On	Off	On	Personal Computer
On	On	On	Off	Enhanced Color
Off	On	On	Off	Enhanced Color
On	Off	On	On	Enhanced Color
Off	Off	On	On	Enhanced Color

## Parts Information



Index Number	Part Number	Description
1	8654215	Enhanced Graphics Adapter
2	6323468	Graphics Memory Expansion Card
3	8654219	Module (1 each)

---

## 4 Port Asynchronous RS232C Adapter

The 4 Port Asynchronous RS232C Adapter contains four asynchronous adapters. The 4 Port Asynchronous RS232C Adapter uses the I/O channel to communicate with the 32-bit processor or coprocessor.

### Specifications

Slot positions	2 - 5
I/O addresses	Address range 1, 1230 - 124F Address range 2, 2230 - 224F Address range 3, 3230 - 324F Address range 4, 4230 - 424F
Interrupt levels	9, 10, 11 (all shared)
Bit rates	50 - 19200 (set by program)
Bits per character	5, 6, 7, 8 (set by program)
Maximum number	3

### Removal and Replacement Procedures

Use the “Adapter Removal” on page 4-16 procedure for removal.

Use the “Adapter Replacement” on page 4-18 procedure for replacement.

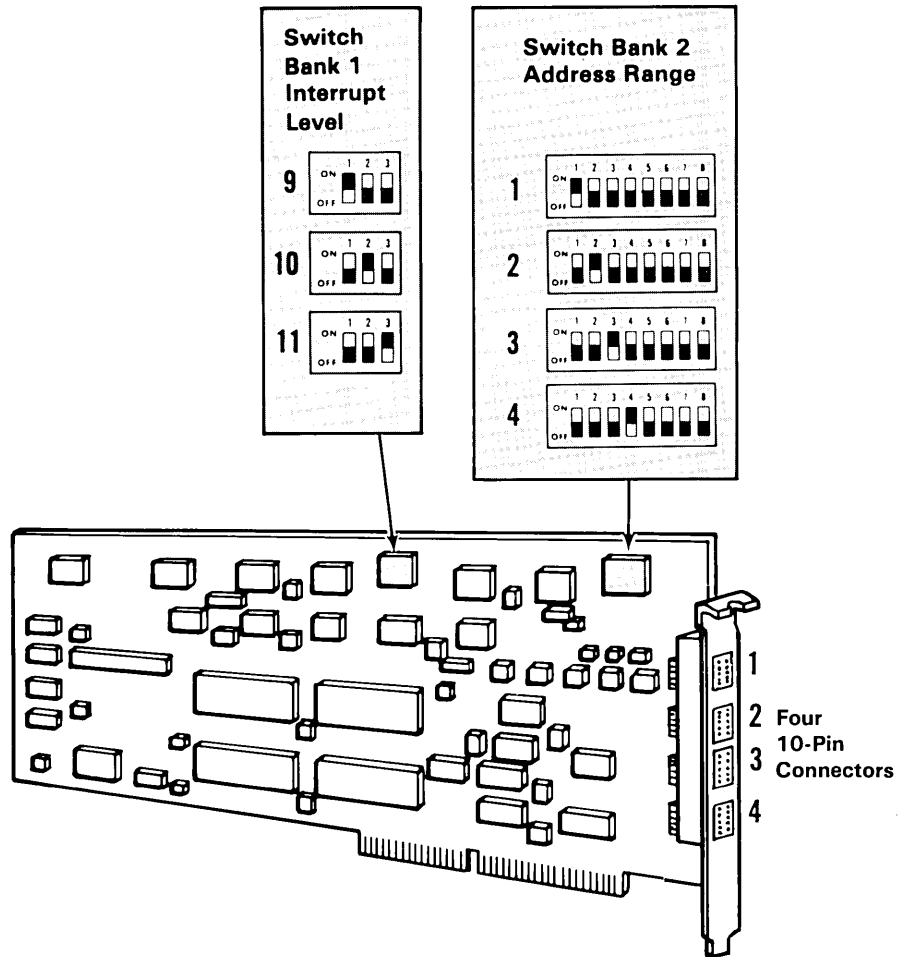
---

## Switch Settings

Use the diagram below to set the switches on your adapter.

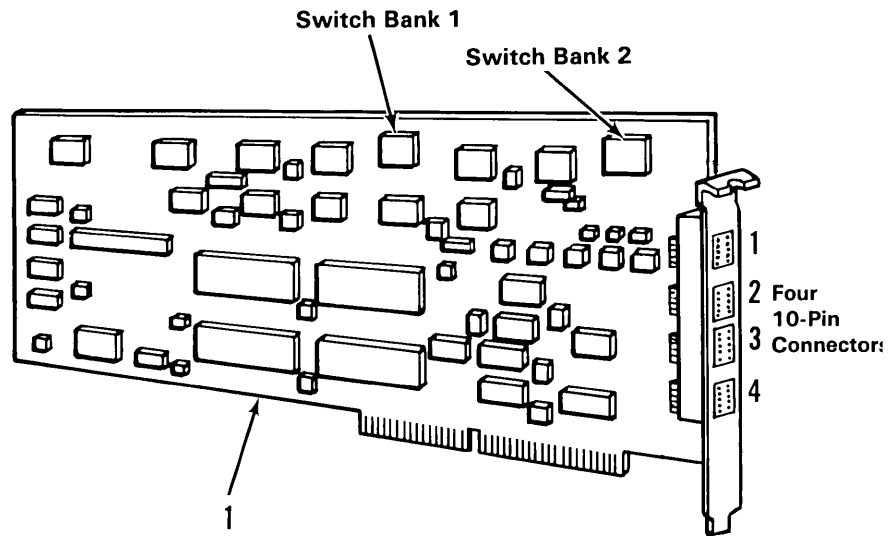
**Note:** Only one asynchronous adapter can use an address range. Each asynchronous adapter can be set to any of the four address ranges.

---





## Parts Information



Index Number	Part Number	Description
1	6299224 6298240 6299332 6298525 6298526	4 Port Asynchronous RS232C Adapter Modem Cable - RS232C (10 Pin) Connector, serial adapter (10 inch) Serial Printer Cable (10 Pin) ASCII Terminal Cable - RS232C (10 Pin)

---

## 4 Port Asynchronous RS422 Adapter

The 4 Port Asynchronous RS422 Adapter contains four asynchronous adapters. The 4 Port Asynchronous RS422 Adapter uses the I/O channel to communicate with the 32-bit processor or coprocessor.

### Specifications

Slot positions	2 - 5
I/O addresses	Address range 1, 1230 - 124F Address range 2, 2230 - 224F Address range 3, 3230 - 324F Address range 4, 4230 - 424F
Interrupt levels	9, 10, 11 (all shared)
Bit rates	50 - 19200 (set by program)
Bits per character	5, 6, 7, 8 (set by program)
Maximum number	3

### Removal and Replacement Procedures

Use the “Adapter Removal” on page 4-16 procedure for removal.

Use the “Adapter Replacement” on page 4-18 procedure for replacement.

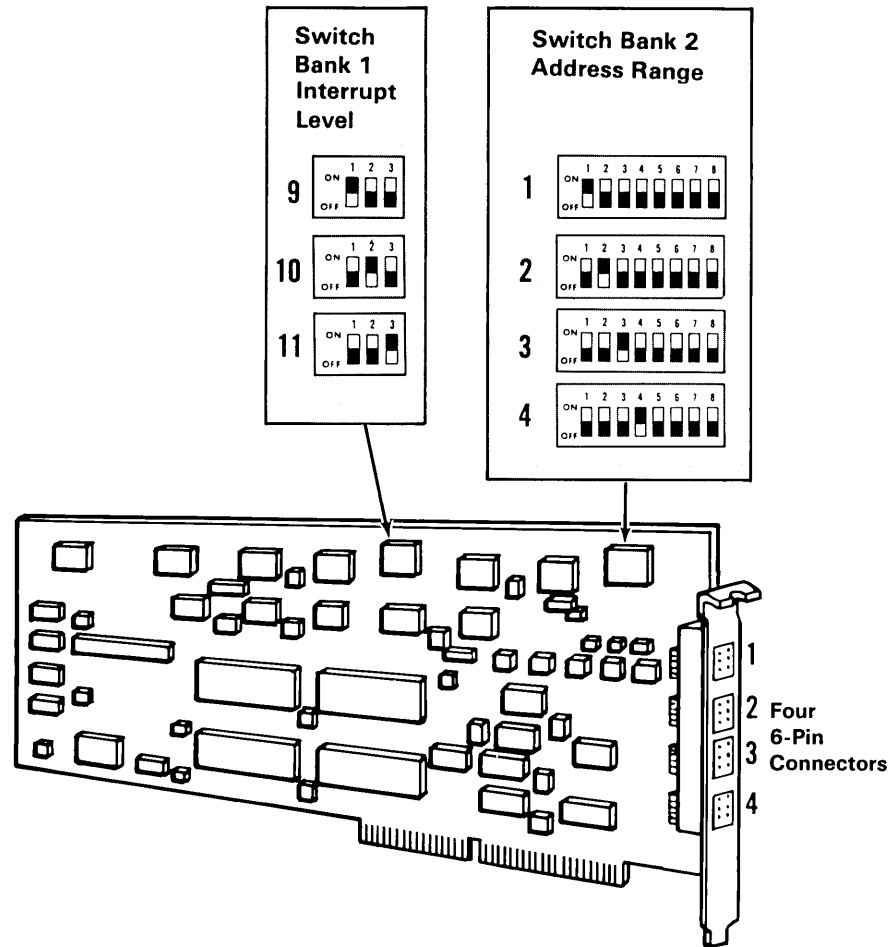
---

## Switch Settings

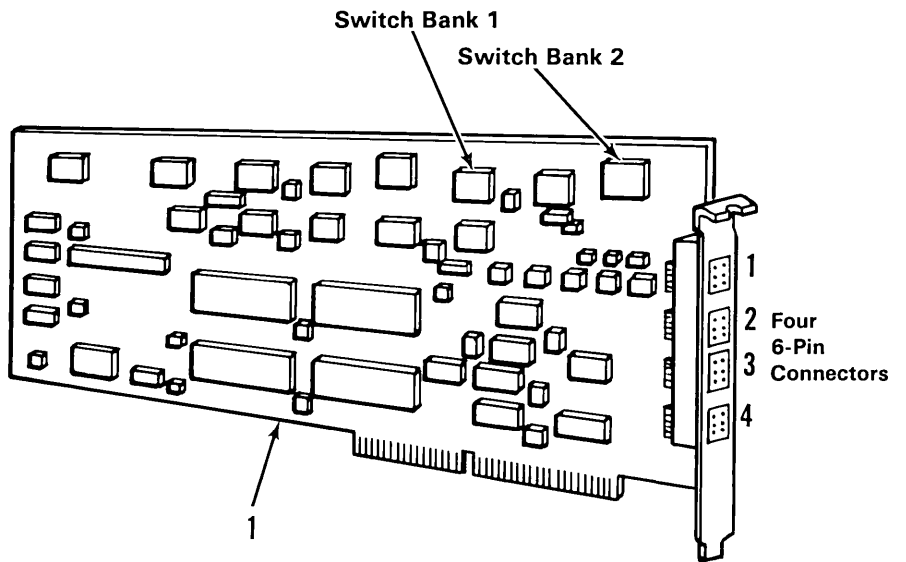
Use the diagram below to set the switches on your adapter.

**Note:** Only one asynchronous adapter can use an address range. Each asynchronous adapter can be set to any of the four address ranges.

---



## Parts Information



Index Number	Part Number	Description
1	6299225 6298246	4 Port Asynchronous RS422 Adapter ASCII Terminal Cable - RS422A

---

## IBM PC Network Adapter (5178)

The IBM PC Network Adapter (5178) attaches the system unit to the IBM PC Network. The IBM PC Network Adapter (5178) uses the I/O channel to communicate with the 32-bit processor and coprocessor.

### Specifications

Slot positions	1 - 5
I/O addresses	0360 - 0363
Memory addresses	0CC000 - 0CDFFF
DMA channel	3
Interrupt levels	3, 9
Maximum number	1

### Removal and Replacement Procedures

Use the “Adapter Removal” on page 4-16 procedure for removal.

Use the “Adapter Replacement” on page 4-18 procedure for replacement.

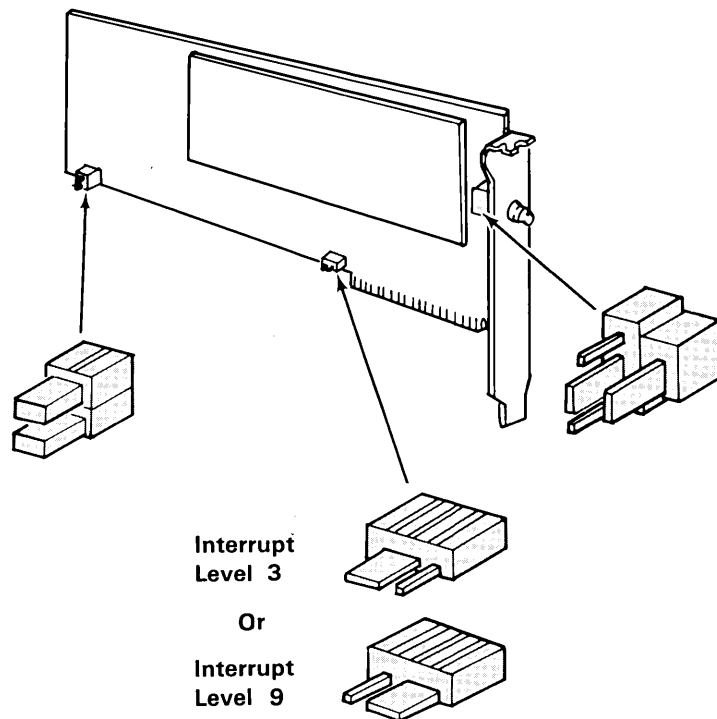
---

## Jumper Settings

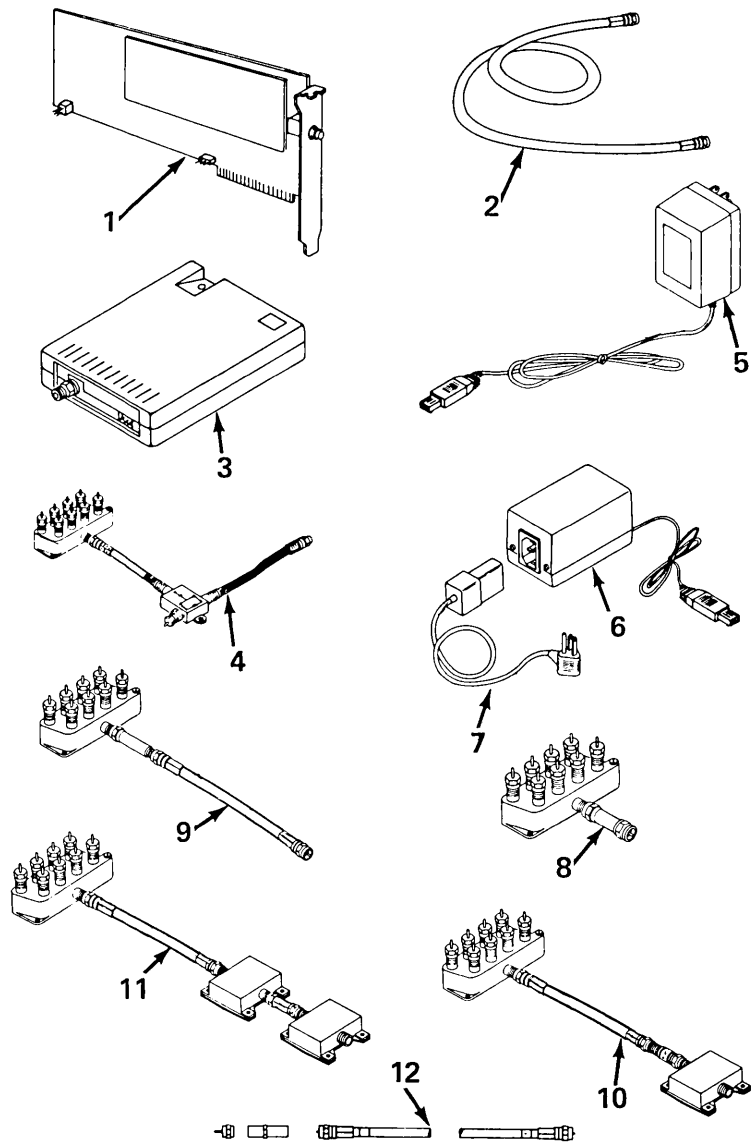
The interrupt level is the only selection required. Set all of the other jumpers as shown.

Use the diagram below to set the jumpers on the adapter.

---



## Parts Information



Index Number	Part Number	Description
1	8286171	PC Network Adapter
2	8286172	PC Network Adapter Cable
3	8286173	Translator assembly
4	8286174	Connection hardware assembly
	8286175	Spare parts kit -Kit consists of: a 7/16 and 9/16 inch wrench, 30Dd attenuator, labels - A, label kit assembly
5	8286176	PC Network 120 V ac transformer
6	8286177	PC Network 230 V ac transformer
7		Power cable, see Section 5
8	8286178	Base expander
9	8286179	Short distance kit
10	8286180	Medium distance kit
11	8286181	Long distance kit
12	8286182	Cable, 7.62m (25 feet)
12	8286183	Cable, 15.24m (50 feet)
12	8286184	Cable, 30.48m (100 feet)
12	8286185	Cable, 60.96m (200 feet)



---

## Personal Computer AT Serial/Parallel Adapter

The Personal Computer AT Serial/Parallel Adapter provides adapters for a serial port and a parallel printer. This adapter uses the I/O channel to communicate with the 32-bit processor and coprocessor.

### Specifications

Slot positions	1 - 5
Serial addresses	Primary adapter, 03F8-03FF Alternate adapter, 02F8-02FF
Parallel addresses	Primary adapter, 0378-037F Alternate adapter, 0278-027F
Interrupt levels	Primary serial, 4 Primary parallel, 7 Alternate serial, 3 Alternate parallel, 5
Bit rates	50 - 19200
Bits per character	5, 6, 7, 8
Maximum number	2

### Removal and Replacement Procedures

Use the “Adapter Removal” on page 4-16 procedure for removal.

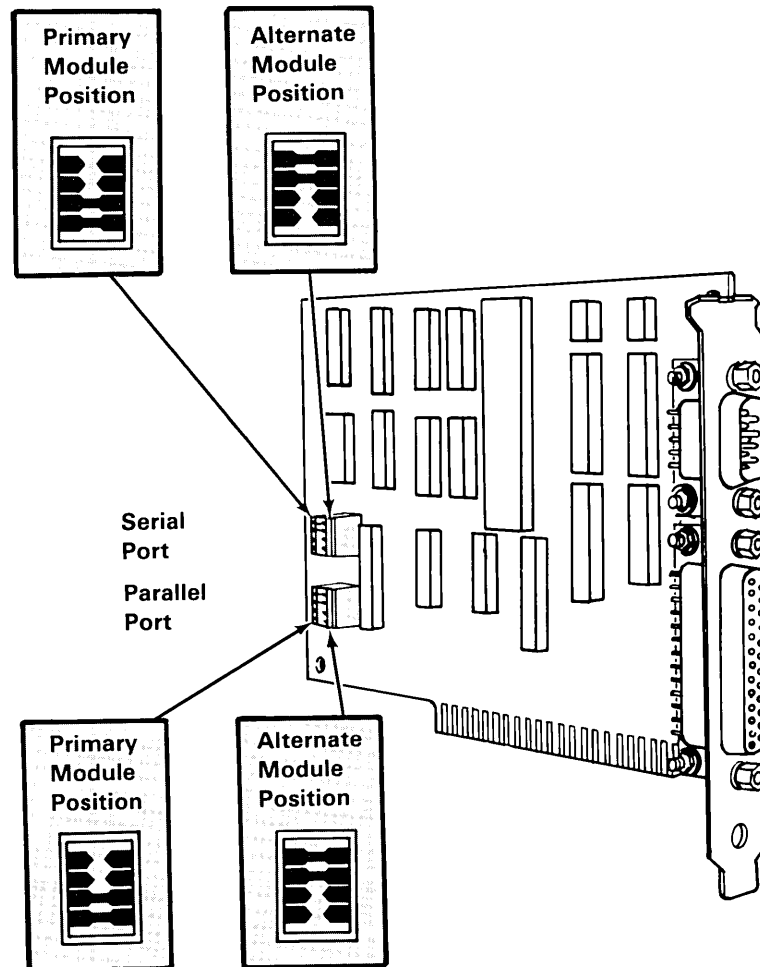
Use the “Adapter Replacement” on page 4-18 procedure for replacement.

---

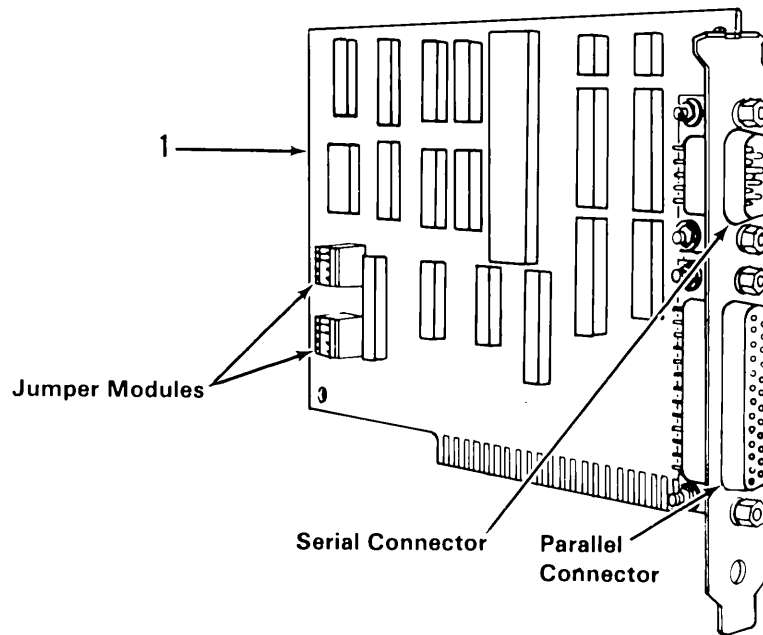
## Jumper Module Settings

Use the diagram below to set the jumper modules on your adapter.

---



## Parts Information



Index Number	Part Number	Description
1	8286147 8286194 6298963 8286170 8529214	Personal Computer AT Serial/Parallel Adapter Connector, serial adapter (10 inch) Serial Printer Cable (9 Pin) Modem Cable - RS232C/9 Pin Cable, parallel printer

---

## Streaming Tape Drive Adapter

The Streaming Tape Drive Adapter attaches the Streaming Tape Drive to the system unit. The Streaming Tape Drive Adapter uses the I/O channel to communicate with the 32-bit processor and coprocessor.

### Specifications

Slot positions	2 - 5
I/O addresses	01E8 - 01EF
Interrupt level	12
Maximum number	1

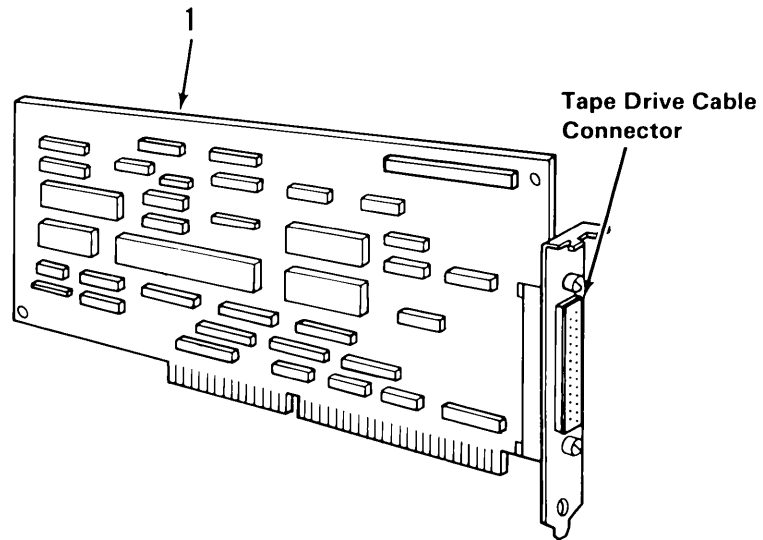
### Removal and Replacement Procedures

Use the “Adapter Removal” on page 4-16 procedure for removal.

Use the “Adapter Replacement” on page 4-18 procedure for replacement.

---

## Parts Information



Index Number	Part Number	Description
1	6299222	Streaming Tape Drive Adapter

---

## 3278/79 Emulation Adapter

The 3278/79 Emulation Adapter provides the hardware function to make the IBM RT PC Model 10 respond to a host system like an IBM 3278 or IBM 3279 Display Terminal.

### Specifications

Slot positions	1 - 5
I/O addresses	02D0 - 02DA
Memory addresses	0CE000 - 0CFFFF
Interrupt level	9
Maximum number	1

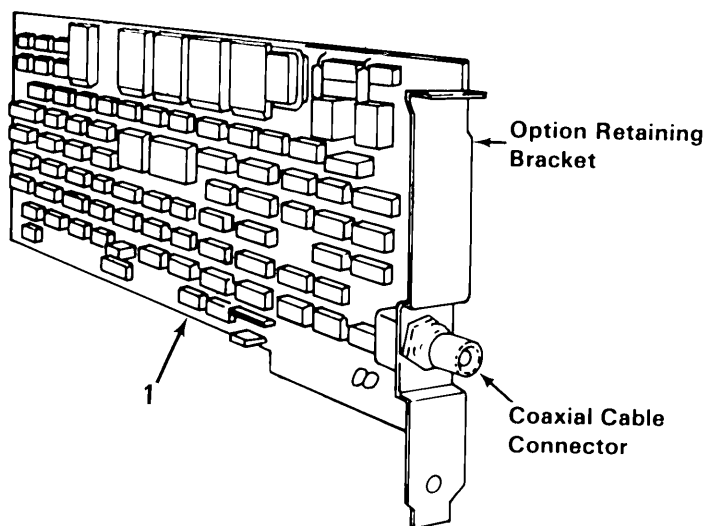
### Removal and Replacement Procedures

Use the “Adapter Removal” on page 4-16 procedure for removal.

Use the “Adapter Replacement” on page 4-18 procedure for replacement.

---

## Parts Information



Index Number	Part Number	Description
1	8654378	3278/79 Emulation Adapter

---

## Section 10. User Input Devices



---

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Keyboard .....	10-4
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Removal Procedure .....	10-4
Replacement Procedure .....	10-4
Parts Information .....	10-5
Mouse .....	10-6
Specifications .....	10-6
Removal Procedure .....	10-6
Replacement Procedure .....	10-6
Parts Information .....	10-7

---

## About this Section

This section contains information about the user input devices. Use the contents list on the preceding page to find information about your input device.

---

## Keyboard

The Keyboard contains the system speaker.

The Keyboard is a single field-replaceable unit and cannot be serviced in the field.

## Specifications

Number of keys	U.S., 101 WT, 102
Connector	6-Pin keyed
Power	From the system unit

## Removal Procedure

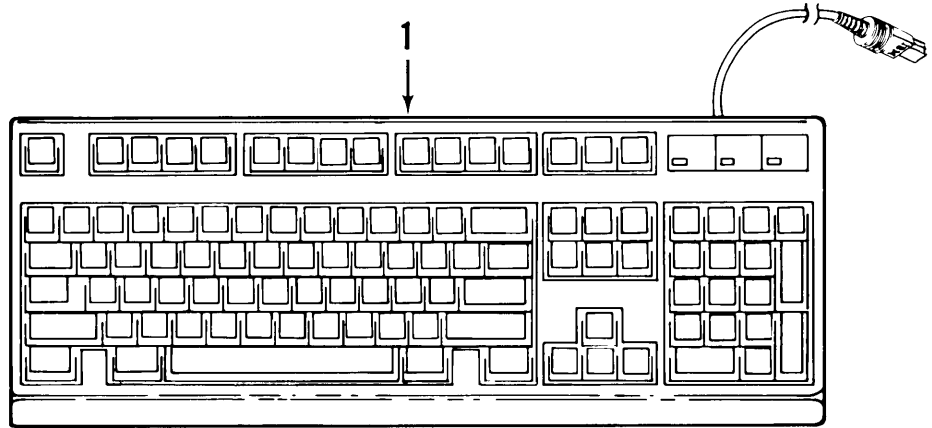
1. Do the “Rear Cover Removal” on page 4-10.
2. Pull the keyboard cable connector out from the keyboard connector on the system unit.

## Replacement Procedure

1. Push the keyboard cable connector into the keyboard connector on the system unit.
2. Do the “Rear Cover Replacement” on page 4-11.

---

## Parts Information



Index Number	Part Number	Description
1	6299238	Keyboard, U.S.
1	6299315	Keyboard, U.K., English
1	6299316	Keyboard, French
1	6299317	Keyboard, German
1	6299318	Keyboard, Spanish
1	6299319	Keyboard, Italian

---

## Mouse

The Mouse is a locator device used to control the system. The function controlled by the Mouse is determined by the program.

The Mouse is a single field-replaceable unit.

See the *IBM RT PC Guide to Operations* for the cleaning procedure.

## Specifications

Number of buttons	2
Connector	6-Pin keyed
Power	From the system unit

## Removal Procedure

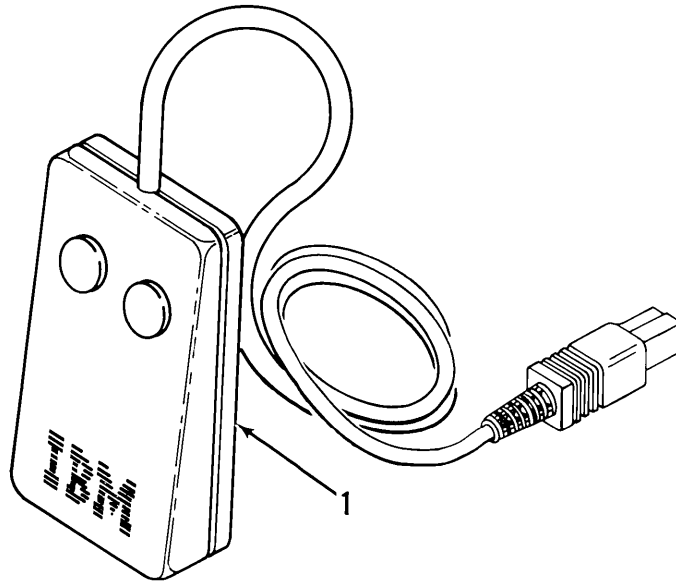
1. Do the "Rear Cover Removal" on page 4-10.
2. Pull the mouse cable connector out from the mouse connector on the system unit.

## Replacement Procedure

1. Push the mouse cable connector into the mouse connector on the system unit.
2. Do the "Rear Cover Replacement" on page 4-11.

---

## Parts Information



Index Number	Part Number	Description
1	6299239	Mouse



---

## Section 11. Displays



---

## CONTENTS

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IBM Personal Computer Display (5151) .....	11-4
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Removal and Replacement Procedures .....	11-4
Test Patterns .....	11-5
Parts Information .....	11-7
Advanced Monochrome Graphics Display (6153) .....	11-9
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Enhanced Color Display (5154) .....	11-11
Specifications .....	11-11
Removal and Replacement Procedures .....	11-11
Adjustments .....	11-12
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---

## **About this Section**

This section contains information about the IBM Displays used by the IBM RT PC Model 10. Use the contents list on the preceding page to find information about your display.

---

## IBM Personal Computer Display (5151)

The IBM Personal Computer Display (5151) is the same display used on the IBM Personal Computer. The internal parts of the display are not field replaceable.

### Specifications

Input voltage	Low voltage, 104 - 127 V ac High Voltage, 180 - 259 V ac
Power frequency	48 - 62 Hz
Adapters	IBM Monochrome Display and Printer Adapter and IBM PC Enhanced Graphics Adapter

### Removal and Replacement Procedures

Use the “Attached Device Removal” on page 4-20 procedure for removal.

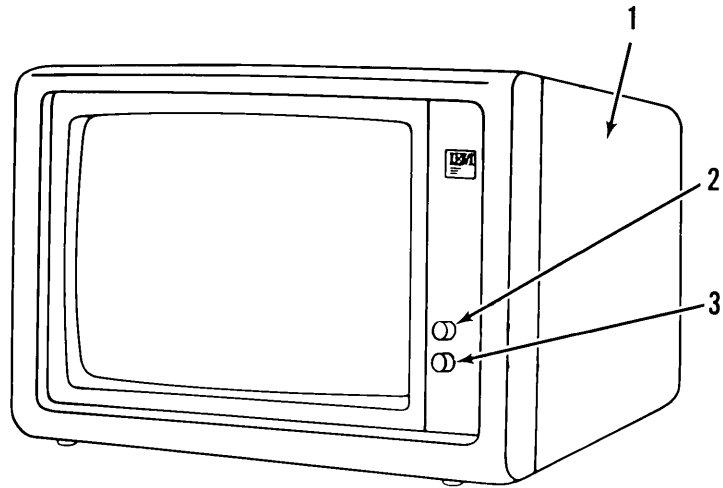
Use the “Attached Device Replacement” on page 4-21 procedure for replacement.





---

## Parts Information



Index Number	Part Number	Description
1	8529171	Display unit, low voltage
1	8529209	Display unit, high voltage
2	8529178	Contrast knob
3	8529177	Brightness knob
		For "Restricted Availability Parts" see the next page.

## Restricted Availability Parts

Index Number	Part Number	Description of the Restricted Availability Parts
	8529179	Logo/label kit, 120 V
	8654205	Logo/label kit, 220/240 V -Kits consist of: front and rear name plates, FCC label, caution label
	8529229	Front panel
	8529230	Back cover
	8529231	Upper cover plug
	8529232	Foot
	8529176	Power cord holder
	8529173	Signal cable
	8529235	Transformer, 120 V
	8654206	Transformer, 220/240 V
	8529237	Control support
	8529236	Transformer support
	8529175	Fuse, 0.75 Amp for 120 V
	8654204	Fuse, 0.50 Amp for 220/240 V
	8529233	Analog card
	8529234	PC card
	8529174	Power cord 120 V
	8654203	Power cord 220/240 V
	8529180	Misc. hardware kit -Kit consists of: CRT mounting screw, transformer screw, CRT mounting support, CRT bracket to front panel, transformer support to front panel, rubber bushing screw, rubber bushing nut, cable restraint screw, star washer

---

## Advanced Monochrome Graphics Display (6153)

The Advanced Monochrome Graphics Display (6153) displays black characters on a white background. The display is a single field-replaceable unit.

The Advanced Monochrome Graphics Display (6153) has a *raster test* position on the Brightness and Raster Test control. When the Brightness and Raster Test control is turned fully clockwise to the raster test position the display screen is lighted.

### Specifications

Input voltage	Low voltage, 90 - 137 V ac High Voltage, 180 - 259 V ac
Power frequency	48 - 62 Hz
Adapter	Advanced Monochrome Graphics Display Adapter

### Removal and Replacement Procedures

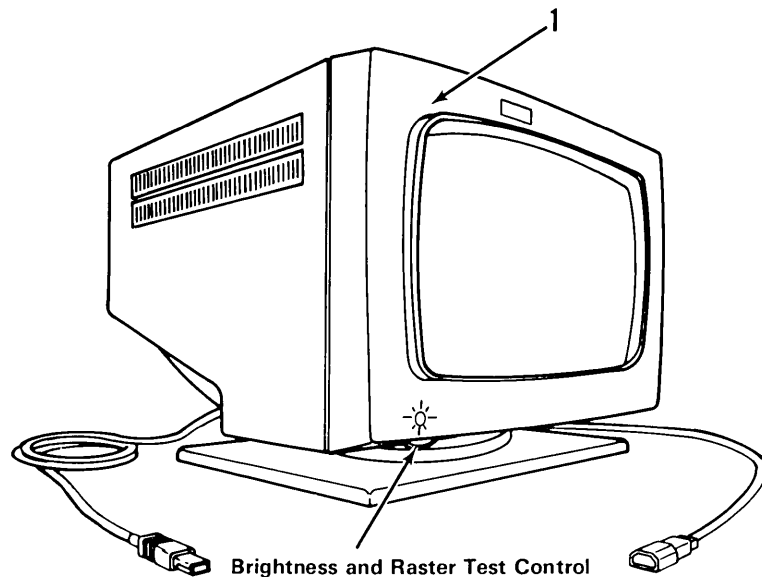
Use the “Attached Device Removal” on page 4-20 procedure for removal.

Use the “Attached Device Replacement” on page 4-21 procedure for replacement.



---

## Parts Information



Index Number	Part Number	Description
1	6299240	Display unit, low voltage
1	6299241	Display unit, high voltage

---

## Enhanced Color Display (5154)

The Enhanced Color Display (5154) can display up to 64 colors depending on the mode selected and the software used. The display is a single field-replaceable unit.

### Specifications

Input voltage	Low voltage, 90 - 137 V ac High voltage, 180 - 259 V ac
Power frequency	48 - 62 Hz
Modes	Mode 1, 16 color - 15.75 kHz Mode 2, 64 color - 21.80 kHz
Vertical sync pulse	Mode 1, positive Mode 2, negative
Adapter	Enhanced Graphics Adapter

### Removal and Replacement Procedures

Use the “Attached Device Removal” on page 4-20 procedure for removal.

Use the “Attached Device Replacement” on page 4-21 procedure for replacement.

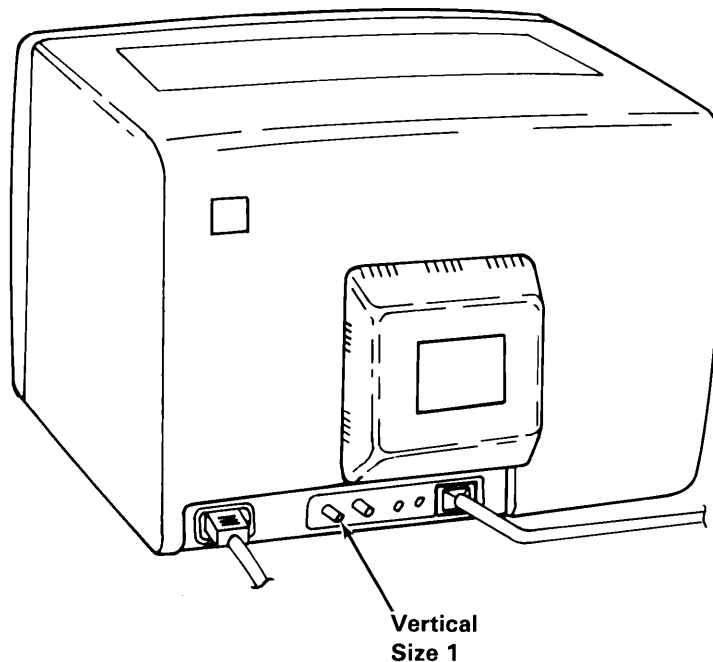
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## Adjustments

The Adjustments are on the rear panel of the display. Use the following descriptions to set the controls.

### Vertical Size 1

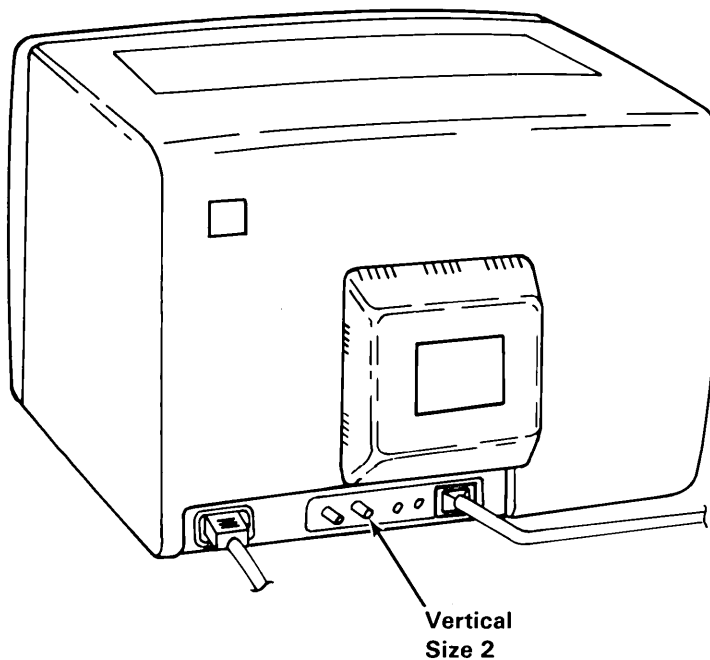
1. Set the power switch on the system unit to Off.
2. Set the power switch on the display to On.
3. Turn the Brightness control fully clockwise.
4. Adjust the Vertical Size 1 control counterclockwise until a black area appears at the top and bottom of the screen. Then turn the control clockwise until the black areas disappear.
5. Set the Brightness control to the desired setting.



---

## Vertical Size 2

1. Be sure the display is attached to an Enhanced Graphics Adapter and the mode switches are set for enhanced mode. If needed, see Section 9.
  2. Set the power switch on the system unit and display to On.
  3. Turn the Brightness control fully clockwise.
  4. Adjust the Vertical Size 2 control until the black areas are equal on all sides, then return the Brightness control to the desired setting.
- 

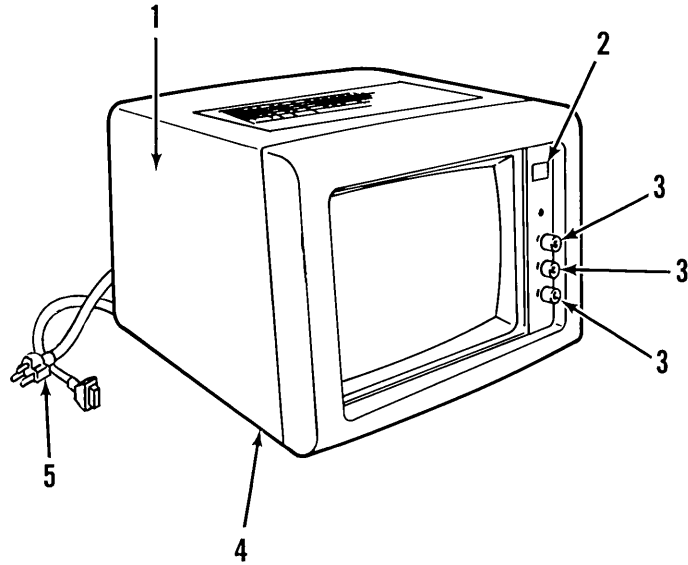






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## Parts Information



Index Number	Part Number	Description
1	6321035	Display unit, model 001
1	6321049	Display unit, model 002
1	6321036	Display unit, model 003
2	6321061	Logo and label kit -Kit consists of: back logo, bottom cover warning labels (five languages)
3	6321056	Knob and cover cap kit -Kit consists of: on/off knob, contrast knob, brightness knob, cover cap (2), rear knob (2)
4	6323319	Rubber feet kit -Kit consists of: rubber feet (4), washers (4), screws (4)
5		Power cable, see Section 5
		For "Restricted Availability Parts" see the next page.



---

## Restricted Availability Parts

Index Number	Part Number	Description of the Restricted Availability Parts
	6321050	Front cover
	6321051	Rear cover
	6321052	Main PC board assembly, chassis, CRT drive card
	6321053	Power supply with cover
	6321054	Video amplifier assembly, RGB cable and connector
	6321055	Front control assembly
	6321057	Power-on indicator
	6321058	Rear control panel assembly, strain relief
	6321059	Signal cable
	6135903	Degaussing coil
	6321064	Miscellaneous hardware kit -Kit consists of: CRT rubber mounting washers (4), plastic drive board shield, plastic shield retainers (2), CRT and deflection yoke assembly with wires, ground band, CRT warning label
	6321060	Model 001, model 002
	6321063	Model 003

---

## Section 12. Tape Drive

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## CONTENTS

About this Section .....	12-3
Streaming Tape Drive (6157) .....	12-4
Specifications .....	12-4
Removal and Replacement Procedures .....	12-4
Parts Information .....	12-5

---

## About this Section

This section contains information about the IBM tape drive used by the IBM RT PC Model 10.

---

## Streaming Tape Drive (6157)

The Streaming Tape Drive (6157) uses a 1/4-inch tape cartridge. The tape drive contains a power supply and plugs into an outlet. The tape drive is a single field-replaceable unit.

See *IBM 6157 Streaming Tape Drive Setup and Operating Instructions* for the head cleaning procedure.

### Specifications

Tape cartridges	3M DC300XLP, DEI 400442, DEI 400555, CIPHER 207340-001, or equivalent
Input voltage	U.S., 90 - 137 V ac WT low voltage, 90 - 137 V ac WT high voltage, 180 - 259 V ac
Maximum number Adapter	1 Streaming Tape Drive Adapter

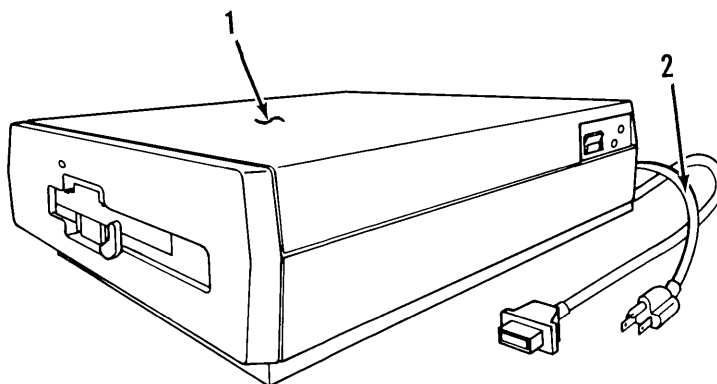
### Removal and Replacement Procedures

Use the “Attached Device Removal” on page 4-20 procedure for removal.

Use the “Attached Device Replacement” on page 4-21 procedure for replacement.

---

## Parts Information



Index Number	Part Number	Description
1	6299237	Tape unit, U.S., WT low voltage
1	6298375	Tape unit, WT high voltage
2		Power cable, see Section 5
		For "Restricted Availability Parts" see the next page.

---

## Restricted Availability Parts

Index Number	Part Number	Description of the Restricted Availability Parts
	6453920	WT power supply
	6453921	WT power filter
	6453922	WT signal cable
	6453975	WT fan, low voltage
	6453923	WT fan, high voltage
	6453924	WT top cover
	6453925	WT base
	6453926	WT rear cover
	6453927	WT front bezel
	6453928	WT switch bezel
	6453929	WT lock lever kit
	6453930	WT cork feet
	6453931	WT tray
	6453932	WT power switch
	6453933	WT drive

---

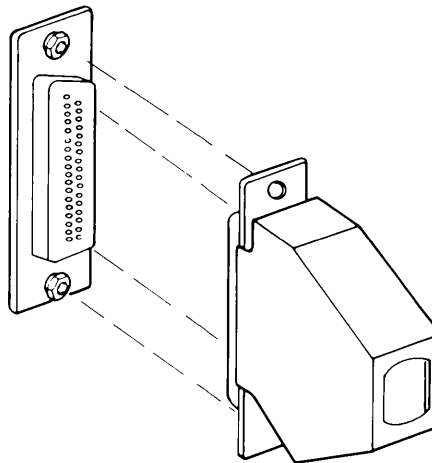
## Appendix A. Tool Requirements

This appendix contains the descriptions and part numbers for special tools used to service the IBM RT PC Model 10.

### Wrap Plugs

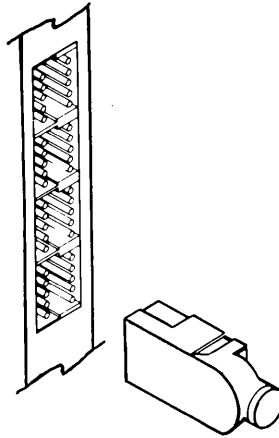
The advanced diagnostic routines use wrap plugs to test the device adapters. You are directed by the diagnostic program to install or remove the wrap plug.

The wrap plugs are stored in the back of this manual.

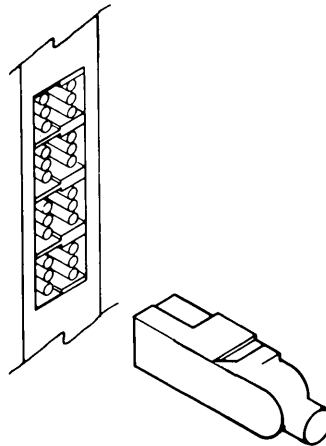


**Printer Adapter Wrap Plug (Part Number 8529228)**

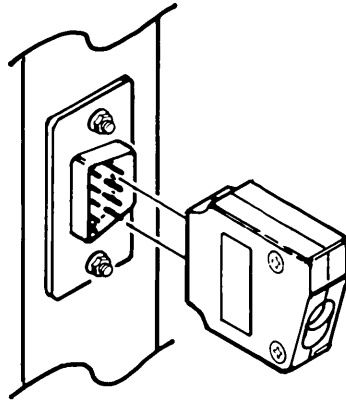




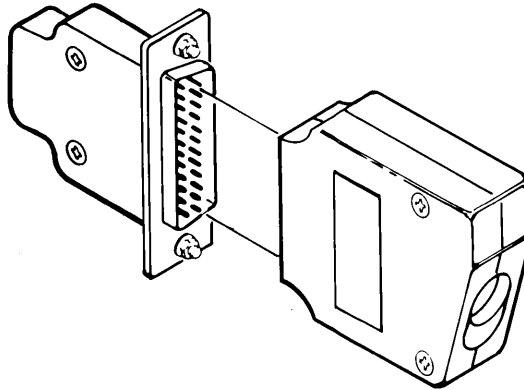
**4 Port Asynchronous RS232C Adapter Wrap Plug (Part Number 6298966)**



**4 Port Asynchronous RS422 Adapter Wrap Plug (Part Number 6298967)**



**Serial Port Wrap Plug, 9-pin (Part Number 6298965)**

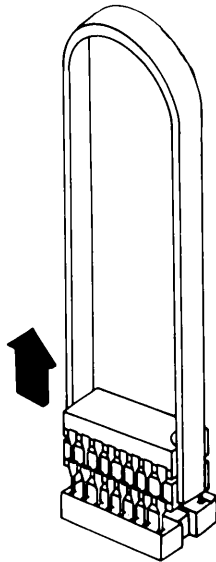


**Serial Port Cable Wrap Plug, 25-pin (Part Number 6298964)**

---

## Module Puller

To remove a module, grasp the module with the module puller and gently lift one end and then the other, to avoid bending the pins.



**Module Puller** (Part Number 9900764)

## Multimeter

A multimeter is used to measure resistance during the safety check. Use your normal multimeter for this check.

---

## Appendix B. SRA to FRU Cross-Reference List

This appendix contains a list of the Service Repair Action (SRA) numbers used by the IBM RT PC Model 10. Use this list to determine the FRU part number or service action each SRA number represents.

<b>SRA Number</b>	<b>Part Number</b>	<b>Description</b>
10x	6299231	System board
12x	6848223	1MB Memory Expansion Option
15x	6299228	2MB Memory Expansion Option
19x	6299220	Floating-point board
20x	6299226	Personal Computer AT Coprocessor Option
21x	8286115	AT 512 KB Memory Expansion Option
22x		I/O memory error. Check for non-IBM memory.
23x	8286147	Personal Computer AT Serial/Parallel Adapter
24x	8286127	Personal Computer AT Math Co-Processor
26x		I/O memory error. Check for non-IBM memory.
31x	8286171	IBM PC Network Adapter
34x	8654378	3278/79 Emulation Adapter
35x	6299224	4 Port Asynchronous RS232C Adapter
37x	8286139	AT 512 KB Memory Expansion Option Module
39x	6299225	4 Port Asynchronous RS422 Adapter
41x	8654215	Enhanced Graphics Adapter
42x	6323468	Graphics Memory Expansion Card
43x	6299223	Advanced Monochrome Graphics Display Adapter
44x	8654219	Graphics Memory Module (1 each)
49x	8529148	IBM Monochrome Display and Printer Adapter
52x	8286125	AT Fixed-Disk and Diskette Drive Adapter
53x	6299201	Battery
54x	8529171	IBM Personal Computer Display, low voltage

---

<b>SRA Number</b>	<b>Part Number</b>	<b>Description</b>
54x	8529209	IBM Personal Computer Display, high voltage
58x	6321035	Enhanced Color Display, model 001
58x	6321049	Enhanced Color Display, model 002
58x	6321036	Enhanced Color Display, model 003
60x	6299240	Advanced Monochrome Graphics Display, low voltage
60x	6299241	Advanced Monochrome Graphics Display, high voltage
63x	6453886	Operator panel board
64x	8286130	High Capacity Diskette Drive
74x	6299235	40MB Fixed-Disk Drive
78x	6299238	Keyboard, U.S.
78x	6299315	Keyboard, U.K. and English
78x	6299316	Keyboard, French
78x	6299317	Keyboard, German
78x	6299318	Keyboard, Spanish
78x	6299319	Keyboard, Italian
79x	6299239	Mouse
81x	6299237	Streaming Tape Drive, U.S., WT low voltage
81x	6298375	Streaming Tape Drive, WT high voltage
84x	6299230	Processor board
85x	6299222	Streaming Tape Drive Adapter
87x	6299485	Keylock
88x	6298452	Power supply, U.S.
88x	6298454	Power supply, WT low voltage
88x	6298453	Power supply, WT high voltage
88x	6952300	Power cable, U.S., Venezuela, Canada
88x	6952301	Power cable, Cook County, Illinois
88x	6952311	Power cable, Australia, New Zealand
88x	6952320	Power cable, Europe
88x	6952329	Power cable, Denmark
88x	6942347	Power cable, South Africa
88x	6952356	Power cable, U.K.
88x	6952365	Power cable, Swiss
88x	6952374	Power cable, Italian
88x	6942383	Power cable, Israel

---

<b>SRA</b>	<b>Part</b>	<b>Description</b>
<b>Number</b>	<b>Number</b>	
91x		Attached device
95x	8286173	IBM PC Network Translator
95x	8286174	Connection hardware
95x	8286176	Power transformer, U.S.
95x	8286177	Power transformer, WT
981		POST Error 03 or 05
982		POST Error 00 or 04
983		POST Error 11 or 12
984		POST Error 23
985		Invalid display data
986		Undetermined problem
991		Obvious problem
A1x	6298379	Cable, fixed-disk and diskette drive
A6x	8286182	Cable, PC Network 7.62m (25 foot)
A6x	8286172	Adapter cable
A6x	8286183	Cable, PC Network 15.24m (50 foot)
A6x	8286184	Cable, PC Network 30.48m (100 foot)
A6x	8286185	Cable, PC Network 60.96m (200 foot)
A7x	6298240	Modem Cable - RS232C (10 Pin)
A7x	6299332	Connector, serial adapter (10 inch)
A7x	8286170	Modem Cable - RS232C/9 Pin
B2x	8529214	Cable, parallel printer
B3x	6298963	Serial Printer Cable (9 Pin)
B4x	6298526	ASCII Terminal Cable - RS232C (10 Pin)
B5x	6298246	ASCII Terminal Cable - RS422A
B6x	6298525	Serial Printer Cable (10 Pin)
B6x	8286194	Connector, serial adapter (10 inch)
CCx		Software problem
D1x		Data link problem
D2x		Modem problem
D6x		Electrostatic discharge problem



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## Glossary

**A.** Ampere.

**ac.** Alternating current.

**adapter.** A device for connecting two parts that differ.

**alternating current (ac).** A current that periodically reverses its direction of flow.

**American National Standard Code for Information Exchange (ASCII).** The standard code, using a coded character set consisting of 7-bit coded characters (8 bits including parity check), used for information exchange between data processing systems, data communication systems, and associated equipment. The ASCII set consists of control characters and graphic characters.

**ampere (A).** A unit of measure for electric current.

**ASCII.** American National Standard Code for Information Exchange.

**asynchronous transmission.** In data communications, a method of transmission in which the bits included in a character, or block of characters, occur during a specific time interval. However, the start of each character or block of characters can occur at any time during this interval. Contrast with *synchronous transmission*.

**BIOS.** Basic Input/Output System

**bits per second (bps).** A unit of measurement representing the number of discrete binary digits transmitted by a device in one second.

**bps.** Bits per second.

**British thermal units (BTU).** A standard unit of measurement of heat.

**BTU.** British thermal units.

**byte.** (1) A sequence of eight adjacent binary digits that are operated on as a unit. (2) A binary character operated on as a unit. (3) The representation of a character.

**C.** Celsius.

**Celsius (C).** A temperature scale. Contrast with Fahrenheit (F).

**characters per second (cps).** A standard unit of measurement for the speed at which a printer prints.

**computer.** A functional unit that can do substantial computation, including many arithmetic operations or logic operations, without intervention by a human operator during a run.



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**configuration.** (1) The arrangement of a computer system or network as defined by the nature, number, and the chief characteristics of its functional units. More specifically, the term configuration may refer to a hardware configuration or a software configuration. (2) The devices and programs that make up a system, subsystem, or network.

**cps.** Characters per second.

**cursor.** (1) A movable symbol (such as an underline) on a display, used to indicate to the operator where the next typed character will be placed or where the next action will be directed. (2) A marker that indicates the current data access location within a file.

**data.** (1) A representation of facts, concepts, or instructions in a formalized manner suitable for communication, interpretation, or processing by human or automatic means. (2) Any representations, such as characters or analog quantities, to which meaning is, or might be assigned.

**direct memory access (DMA).** A method of transferring data between main storage and I/O devices that does not require processor intervention.

**disk drive.** The same as fixed disk drive.

**diskette.** A thin, flexible magnetic plate that is permanently sealed in a protective cover. It can be used to store information copies from the disk or another diskette.

**diskette drive.** A mechanism used to read and write information on diskettes.

**display.** (1) A device for visual presentation of information. (2) To present data visually.

**DMA.** Direct memory access.

**duplex.** Pertains to communications data that can be sent and received at the same time. Same as *full duplex*.

**ECC.** Error checking and correction.

**error-checking and correction (ECC).** The detection, in the processing unit, and correction of all single-bit errors, plus the detection of double-bit and some multiple-bit errors.

**F.** Fahrenheit.

**Fahrenheit (F).** A temperature scale. Contrast with Celsius (C).

**FCC.** Federal Communications Commission.

**field-replaceable unit (FRU).** Parts or devices that can be replaced during the normal servicing of the equipment.

**fixed-disk drive.** A mechanism used to read and write information on fixed disk.

**format.** (1) A defined arrangement of such things as characters, fields, and lines, usually used for displays, printouts, or files. (2) The pattern which determines how data is recorded.

**FRU.** Field-replaceable unit.

**hardware.** The equipment, as opposed to the programming, of a computer system.

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**hertz (Hz).** A unit of frequency equal to one cycle per second.

**Hz.** Hertz.

**initial program load (IPL).** The process of loading the system programs to prepare the system to run jobs. See *initialize*.

**initialize.** To set counters, switches, addresses, or contents of storage to 0 or other starting values at the beginning of, or at prescribed points in, the operation of a computer routine.

**input/output (I/O) device.** A device in a data processing system by which data may be entered into the system, received from the system, or both.

**interrupt.** (1) To temporarily stop a process. (2) In data communications, to take an action at a receiving station that causes the sending station to end a transmission. (3) A signal sent by an I/O device to the processor when an error has occurred or when assistance is needed to complete I/O. An interrupt usually suspends execution of the currently executing program.

**IPL.** initial program load.

**I/O.** Input/output.

**k.** Prefix kilo; 1000.

**K.** When referring to storage capacity; 1024.

**m.** Meter.

**M.** When referring to computer storage capacity, 1 048 576.

**memory.** Storage on electronic chips. Examples of memory are random access memory, read only memory, or registers. See *storage*.

**modem (modulator-demodulator).** A device that converts data from a computer to a signal that can be transmitted on a communications line, and converts the signal received to data for the computer.

**operating system.** Software that controls the execution of programs; an operating system may provide services such as resource allocation, scheduling, input/output control, and data management.

**PEL.** Picture element.

**picture element (PEL).** The smallest displayable unit on a display.

**port.** (1) To make the programming changes necessary to allow a program that runs on one type of computer to run on another type of computer. (2) An access point for data input to or data output from a computer system.

**POST.** power-on self-test.

**power-on self-test (POST).** Tests that run first after initial power on to test the operation of the system.

**power supply.** A device that produces the power needed to operate electronic equipment.

**processor.** (1) In a computer, a functional unit that interprets and executes instructions. (2) A functional unit, a part of another unit such as a

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terminal or a processing unit, that interprets and executes instructions.

**program.** A file containing a set of instructions conforming to a particular programming language syntax.

**radio frequency (RF).** An ac frequency that is higher than the highest audio frequency. So called because of the application to radio communication.

**RAM.** Random access memory. Read/write memory.

**random access memory (RAM).** Read/write memory.

**raster.** A predetermined pattern of lines that provides uniform coverage of a display space.

**read.** To acquire or interpret data from a storage device, from a data medium, or from another source.

**read-only memory (ROM).** A storage device whose contents cannot be modified. The memory is retained when power is removed.

**read/write memory.** A storage device whose contents can be modified. Also called RAM.

**resident.** Permanently located in memory, such as read-only memory.

**ROM.** Read-only memory.

**RS232C.** A standard by the EIA for communication between computers and external equipment.

**setup.** (1) In a computer that consists of an assembly of individual computing units, the arrangement of interconnections between the units, and the adjustments needed for the computer to operate. (2) The preparation of a computing system to perform a job or job step. Setup is usually performed by an operator and often involves performing routine functions, such as mounting tape reels. (3) The preparation of the system for normal operation.

**software.** (1) Computer programs, procedures, and rules concerned with the operation of a data processing system. (2) Contrast with hardware.

**source number.** The two leftmost digits of a service request number. Identifies the entity that sensed the error.

**SRA number.** Service repair action number.

**SRN.** Service request number.

**storage.** (1) The location of saved information. (2) In contrast to memory, the saving of information on physical devices such as disk or tape. See *memory*. (3) The retention of data in a storage device. (4) The placement of data into a storage device.

**synchronous transmission.** (1) Data transmission which the time of occurrence of each signal representing a bit is related to a fixed time frame. (2) Data transmission which the sending and receiving devices are operating continuously at substantially the same frequency and are maintained, through correction, in a desired phase relationship.

**TD.** Transmit data.

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**transmission.** (1) The sending of data from one place for reception elsewhere. (2) In ASCII and data communication, a series of characters including headings and text. (3) The dispatching of a signal, message, or other form of intelligence by wire, radio, telephone, or other means. (4) One or more blocks or messages. For BSC and start-stop devices, a transmission is terminated by an EOT character. (5) Synonymous with data transmission.

**V.** Volt.

**volt.** The basic practical unit of electric pressure. The potential that causes electrons to flow through a circuit.

**W.** Watt.

**watt.** The practical unit of electric power.

**write.** To make a permanent or transient recording of data in a storage device or on a data medium.



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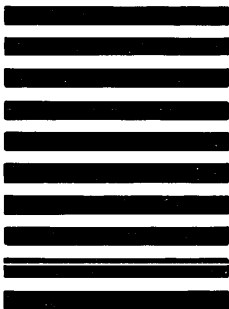
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