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IBM RT PC 6150 System Unit Hardware Maintenance and Service

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IBM RT PC
6150 System Unit
Hardware Maintenance and Service

Second Edition September 1986

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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.

- 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.

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 6150 System Unit contains no hazardous voltages or safety grounds outside the power supply. The power supply is a sealed unit and it is not field serviceable.

Safety Inspection Guide

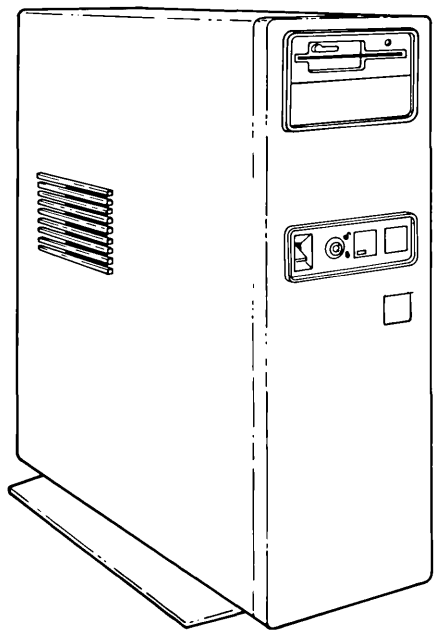
Use this guide to identify unsafe conditions. Use good judgment to identify potential safety hazards not covered by this guide. If unsafe conditions are present, determine how serious the hazards are and whether you should continue before correcting the problem.

Do the following checks:

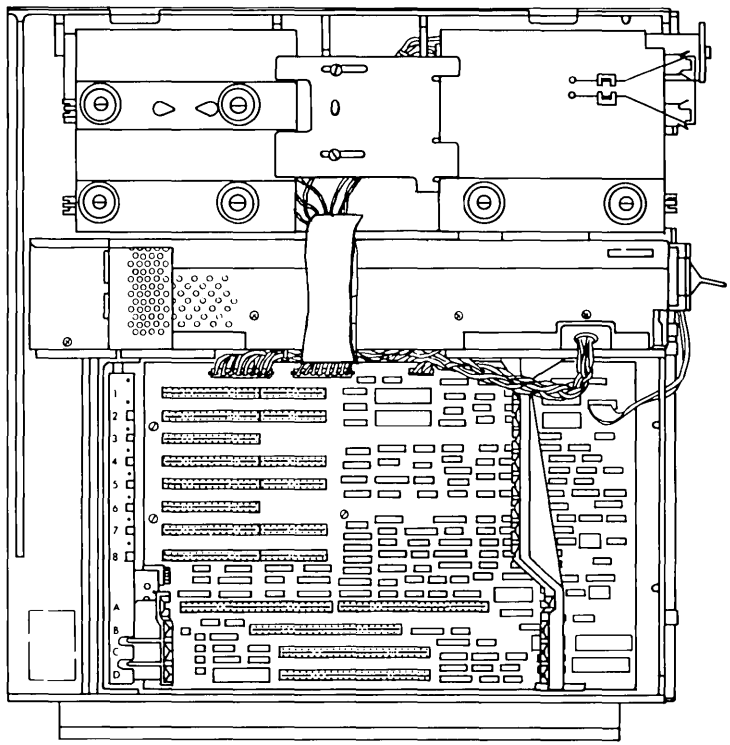
1. Check the covers for damage or alterations that expose the internal parts of the system unit or for sharp edges.

2. Check the covers for proper fit to the system unit. They should be in place and secure.

3. Gently rock the system unit from side to side to determine if it is steady.



4. Set the power switch on the system unit to Off.
5. Do the "Side Cover Removal" on page 4-14.
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.

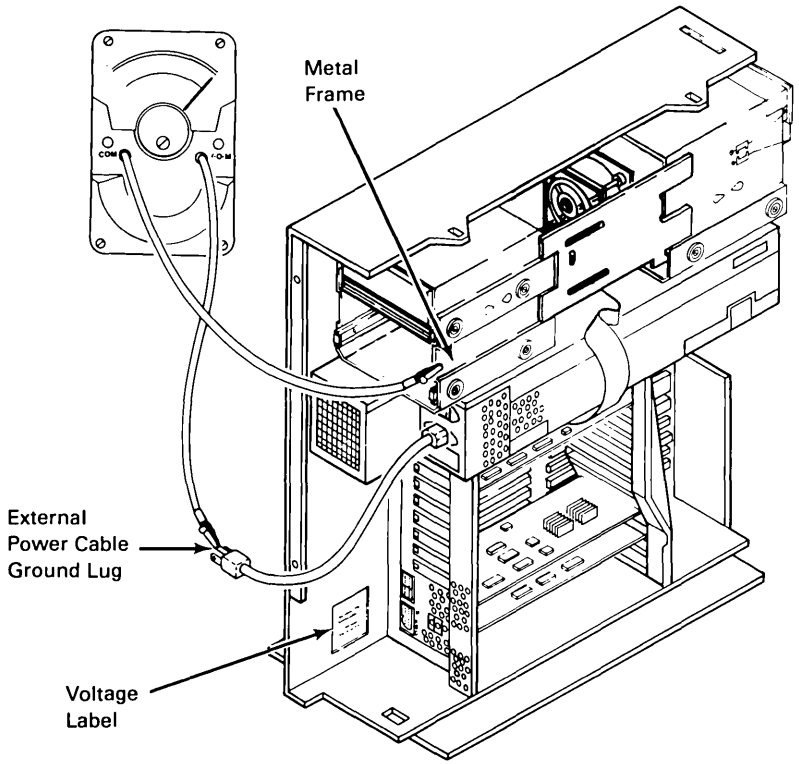


9. Check the voltage label on the rear of the system unit to ensure it matches the voltage at your outlet.

10. Check the external power cable for damage.

11. With the external power cable connected to the system unit, check for 0.1 ohm or less resistance between the ground lug on the external power cable plug and the metal frame.

12. Do the "Side Cover Replacement" on page 4-15.



About this Book

This manual provides service information about the IBM 6150 System Unit, adapters, and attached devices that do not have their own service information. This manual does not contain service information about attached printing and plotting devices.

Users of this manual should have training on the IBM 6150 System Unit.

This manual is divided into sections to make the information easier to find. A three or four-digit code is used in the page numbering of some sections to make future updating easier.

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, 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.

Section 7, "Diskette Drives" contains a description, specifications, terminator resistor settings, and parts information for each type of diskette drive.

Section 8, "Fixed-disk Drives" contains a description, specifications, terminator resistor settings, and parts information for each type of 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 6150 System Unit.

Section 12, "Tape Drive" contains a description, specifications, and parts information for the tape drive used with the IBM 6150 System Unit.

Appendix A, "Tool Requirements" contains descriptions of the tools needed to service the IBM 6150 System Unit.

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.

Appendix C. "Error Log Information" provides an overview of the Error Log reports, commands, and command examples.

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.

Related Publications

- *IBM RT PC Guide to Operations* describes the IBM 6150 and IBM 6151 System Units, the displays, keyboard, and other devices that can be attached. This guide also includes procedures for operating the hardware and moving the IBM RT PC System.

- *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. (*Packaged with IBM RT PC Options Installation*)

- *IBM RT PC Options Installation* provides instructions for choosing the correct switch settings, installing optional adapters, installing fixed-disk drives, and installing diskette drives in the IBM 6150 and IBM 6151 System Units. (Packaged with *IBM RT PC User Setup Guide*)

- *IBM RT PC Problem Determination Guide* provides instructions for running diagnostic routines to locate and identify hardware problems. A problem determination guide for software and 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 the IBM RT PC System. (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.
- *IBM 5085 Graphics Processor Maintenance Information Manual,* SY66-0101
- *IBM 5081-1,2 Display Maintenance Information Manual,* SY66-0102
- *IBM 5080 Attachment Adapter Manual*

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- To order from your IBM representative, use Order Number SV21-8025.
- To order from your IBM dealer, use Part Number 08F3465.

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 Personal Computer[1] System. 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.

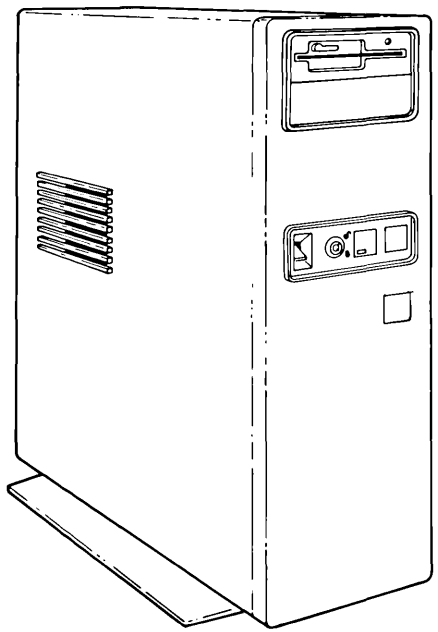
1 Trademark of IBM

Introduction

The IBM RT[2] PC System consists of the floor-standing system unit, a table-top display, and a keyboard. Your system may contain other devices such as printers and communication devices.

System Unit

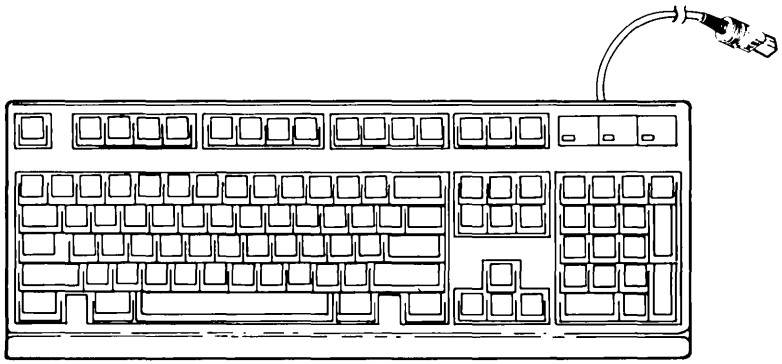
The IBM 6150 System Unit contains the processor, optional floating-point board, system memory, power supply, fixed-disk drives, diskette drives, and the adapters for the keyboard, mouse, display, fixed-disk drives, diskette drives, printers, plotters, tape drive, and communication devices.



2 Trademark of IBM

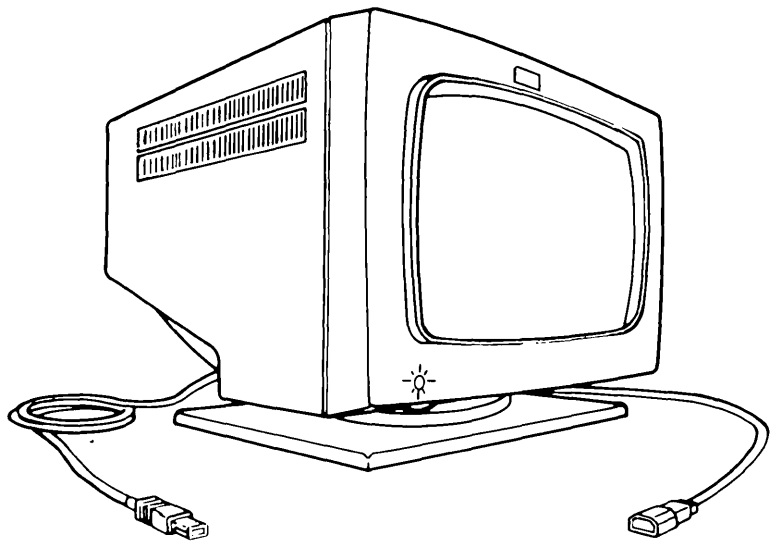
Keyboard

The keyboard adapter is built into the system board. The keyboard attaches to the KBD (keyboard) connector on the rear panel of the system unit. When the IBM 6150 System Unit is connected to an IBM 5085 Graphics Processor, the keyboard attaches to the Peripheral Connection Assembly (PCA) of the IBM 5085 Graphics Processor. The PCA is installed in the base of the IBM 5081 Display.



Display

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



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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.

Introduction to Diagnostics

Note: Some system unit components do not cool properly and may fail intermittently when covers are off. For this reason do not power the system unit on longer than 10 minutes with the covers off.

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 2-11 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 2-13 for more information about the Utilities.

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

  The Advanced Diagnostic Routines do 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 2-16 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 2-17 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 System Unit. 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 2-19 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 load 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 (about one second) numbers are for software failures. See "Two-Digit Display Codes During Diagnostic Programs" on page 2-18 for flashing numbers during the diagnostic checkouts.

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, 0c	If installed, this test resets the IBM Monochrome Display and Printer Adapter.
01, 1c	Tests the ROM modules on the processor board.
02	Tests for correct communication between the 32-bit processor and the system board.
03, 3c	Tests the memory controller on the processor board and the system memory boards in slots C and D.
04, 4c	Tests the processor board.
05, 5c	Tests the processor board.
07, 7c	Tests the I/O channel controller on the system board.

Number	Test description
08, 8c	Tests the I/O channel controller on the system board.
09	Tests the keyboard adapter on the system board and the indicators on the keyboard.
99	Shows 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.
13	Tests the built-in serial ports.
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.

Number	Test description
27	The memory capacity was exceeded during IPL.
29	The IPL operation is beginning.
30 - 87	Individual adapter or device tests.
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 contain the diagnostic programs used to check out and test the system. The diskettes are provided in the *Problem Determination Guide*. The Diagnostics 1 (DIAG-1) diskette is inserted in diskette drive A 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 Additional Device Drivers

The RT PC diagnostic programs provide the capability to load additional device drivers while loading the diagnostic programs. For example, if the device driver for an installed display is not present on the IBM RT PC Diagnostic Diskettes, a two-digit code of 94 displays. This code identifies the need for a display device driver. Other codes identify the other types of devices.

When an additional device driver is needed, do the following:

1. Remove the RT PC Diagnostic Diskette.
2. Depending on the two-digit code, obtain the correct diskette containing the device driver needed. Insert it into the diskette drive. The driver will load without any additional action.
3. Follow the instructions displayed or instructions with the device driver diskette. If a flashing two-digit code displays, the diskette failed to load. See the information with the device driver.

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 help if needed).
2. Set the power switch on the system unit to Off. If attached, set the power switch on the IBM 5085 to Off.
3. If present, remove the write-protect tab from the diagnostic diskettes.
4. Insert the Diagnostics 1 (DIAG-1) diskette in drive A and close the drive.
5. Set the keylock to Unlock.
6. If the IBM 5085 is attached, be sure the System Diskette is in the IBM 5085, then set the power switch to On.

7. Set the power switch on the IBM RT PC system unit and display to On.

8. Wait for the DIAGNOSTIC OPERATING INSTRUCTIONS to display (this may take up to 4 minutes).

9. If the IBM 5085 is attached, press and hold the Alt key and press the Sw Keybd key. This switches the keyboard to the IBM 6150. The Sw Keybd indicator should be On.

10. Read and follow the displayed instructions. 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
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).

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. The checkout options displayed are from the configuration record on the fixed disk. 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, the option is failing, the switch settings have been changed, or the option has been moved to another slot.

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 for that pattern.

Diskette Drive(s) Checkout

The Diskette Drive(s) Checkout option checks the diskette adapter and the diskette drives. 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 provides for selection of a read test to check 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
- Copy the diagnostic diskette
- Exercise the Ethernet[1] Network
- Display the installed features list
- Change the diagnostic test list
- Format the fixed disks on the IBM 9332
- Download microcode to the IBM 9332
- Display and alter the Vital Product Data record on the IBM 9332 fixed disk.

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:

1 Trademark of the Xerox Corporation

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 or write errors have occurred on the fixed disk or the diagnostic programs instruct you to use this utility. 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.

Utilities for Use with ETHERNET

The Utilities for Use with ETHERNET provide a means to exercise the IBM RT PC Baseband Adapter and part of the Ethernet Network. The utility transmits a block of data addressed to itself. The utility then checks the response of the adapter and the network status to determine if it is operating correctly. This utility works with both the wrap plug and with a functional Ethernet Network.

The result of the test is displayed in the UTILITIES FOR USE WITH ETHERNET SELECTION menu.

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. Menus guide you in changing the list. Only options that are installed in your system can be added to the list.

IBM 9332 Utilities

The IBM 9332 Utilities provide the following:

- A utility to download microcode to the IBM 9332 from a diskette.
- A utility to display and alter the Vital Product Data record on the IBM 9332 fixed disk.
- A utility to format the fixed disk on the IBM 9332. This utility erases all data and formats the fixed disk.

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, the option is failing, the switch settings have been changed, or the option has been moved to another slot.

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 shows that the test has been run.

Installation Verification

The Installation Verification program 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 instructions displayed.

Two-Digit Display Codes During Diagnostic Programs

The following chart is for flashing (approximately one second) numbers displayed in the two-digit display while running the standalone diagnostic programs.

Number	Description of the Problem
02	A read error occurred while using the diskette drive.
99	A program check or a machine check occurred.
c6	An undetermined programming error occurred.

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.

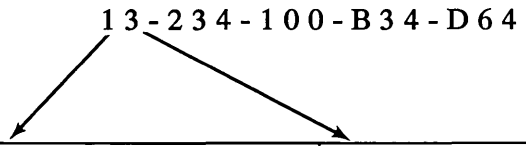
The Problem Isolation Charts (PICs) in Section 3 use the SRA numbers to isolate the failure to a failing FRU. Appendix B contains an SRA to FRU Cross-Reference List to provide the service technician with the part number of the failing FRU.

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

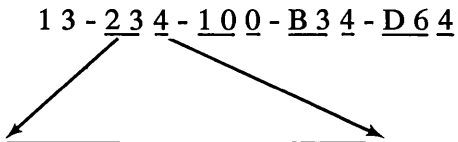
The left two digits of the SRN is the source number. The left digit of the source number identifies the device. The right digit of the source number identifies the procedure that produced the SRN. The following chart identifies the devices and procedures. Use the following SRN for an example.



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 - Plotter	6 - Problem determination procedures
7 - Reserved	7 - The device was not found when the diagnostic programs loaded
8 - Mouse	8 - Reserved
9 - Attached communications device	9 - Reserved
0 - Reserved	0 - Reserved
A - Tablet	
B - Dials Feature	
C - LPFK Feature	

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.



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 - Adapter slot 7 8 - Adapter slot 8 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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Service Repair Action Number Chart PIC 0020 3-0020-1
Problem Determination Procedure PIC 0030 3-0030-1
POST Indicator Chart PIC 0040 3-0040-1
Noise Problem PIC 0050 3-0050-1
Unresolved Problem PIC 0060 3-0060-1
Application Only Problems PIC 0080 3-0080-1
Intermittent Problems PIC 0090 3-0090-1
Memory Expansion Option PIC 2100 3-2100-1
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IBM 5151 Personal Computer Display PIC 5400 3-5400-1
IBM 5154 Enhanced Color Graphics Display PIC 5800 3-5800-1
IBM 6154 Advanced Color Display PIC 5900 3-5900-1
IBM 6153 Advanced Monochrome Graphics Display PIC 6000 3-6000-1
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Power Supply PIC 8800 3-8800-1
POST Errors 03 or 05 PIC 9810 3-9810-1
POST Error 23 PIC 9840 3-9840-1
Undetermined Problem PIC 9860 3-9860-1
|POST Errors 5c PIC 9870 3-9870-1

About this Section

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

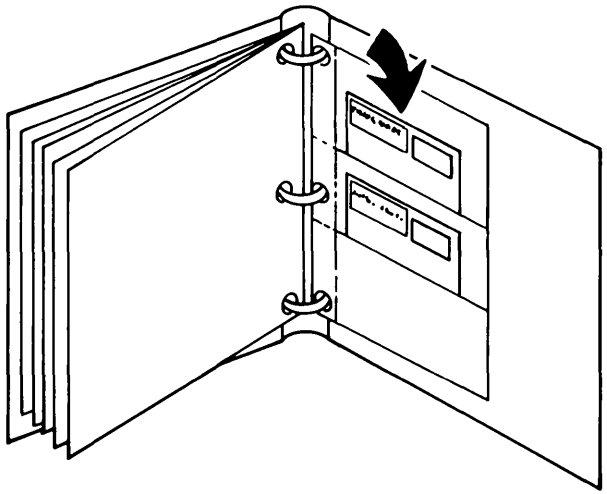
Start all problem isolation with "Start of Call PIC 0010" on page 3-0010-1.

Introduction

Begin the problem isolation at "Start of Call PIC 0010" on page 3-0010-1, then carefully follow the steps to isolate the failure to a field-replaceable unit.

The RT PC System Unit problem isolation procedures use the IBM RT PC Diagnostic Diskettes and run tests from the ADVANCED DIAGNOSTIC SELECTION menu. The diagnostic diskettes are stored in the *Problem Determination Guide*.

Information about the tools required is in Appendix A.



Start of Call PIC 0010

Read these notes:

1. Some system unit components do not cool correctly when the cover is off. For this reason do not power the system unit on longer than 10 minutes with the cover off.

2. Be sure to follow the instructions carefully. Do not do any actions such as; removing the diskette, operating the mouse, or keying characters, unless directed by the instructions.

3. Be sure that all programs or operating systems are stopped (get help if needed).

4. If the IBM 6150 System Unit is connected to an IBM 5085 Graphics Processor, do the following before loading the diagnostics:

   a. Set the power switch on the IBM 5085 to Off.
   b. Be sure the IBM 5085 System Diskette is in the IBM 5085, then set the power switch to On.
   c. Load the diagnostic programs in the IBM 6150.
   d. Switch the keyboard to the IBM 6150 (Alt-Sw Keybd).

5. If the problem is with the IBM 5085 or a device attached to the IBM 5085, go to the maintenance instructions for the IBM 5085.

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 2-19 for a description of the SRN.

4. Write the Service Request Number here:

13 - 234 - 100 - B34 - D64

DO YOU HAVE A SERVICE REQUEST NUMBER?

NO Go to "Problem Determination Procedure PIC 0030" on page 3-0030-1.

YES Continue on the next page.

Step 2

Look at the SRN. If needed, see 2-20.

4. Write the Service Request Number here:

13 - 234 - 100 - B34 - D64

IS THE PROCEDURE NUMBER A "1," "2," "3," or "7"?

NO Go to the "Problem Determination Procedure PIC 0030" on page 3-0030-1 and verify the SRN. Use the new SRN to analyze the problem.

YES Continue on the next page.

Step 3

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

SRA Number	Go to PIC
21x	"Memory Expansion Option PIC 2100" on page 3-2100-1
37x	"Memory Expansion Option PIC 2100" on page 3-2100-1
42x	"IBM PC Enhanced Graphics Adapter Memory PIC 4200" on page 3-4200-1
44x	"IBM PC Enhanced Graphics Adapter Memory PIC 4200" on page 3-4200-1
880	"Power Supply PIC 8800" on page 3-8800-1
981	"POST Errors 03 or 05 PIC 9810" on page 3-9810-1
984	"POST Error 23 PIC 9840" on page 3-9840-1
986	"Undetermined Problem PIC 9860" on page 3-9860-1
987	"POST Errors 5c PIC 9870" on page 3-9870-1

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 4

Count the SRA numbers in your SRN.

4. Write the Service Request Number here:

   16 - 987 - ____ - ____ - ____

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 PIC 0020" on page 3-0020-1.
2. Record the FRU name, repair checkout procedure, and the removal procedure reference.
3. Go to "Step 9" on page 3-0010-10.

NO Continue on the next page.

Step 5

Look at the SRN. If needed, see page 2-20.

4. Write the Service Request Number here:

13 - 234 - 1DD - B34 - D64

IS THE PROCEDURE NUMBER A "3"?

NO Do the following:

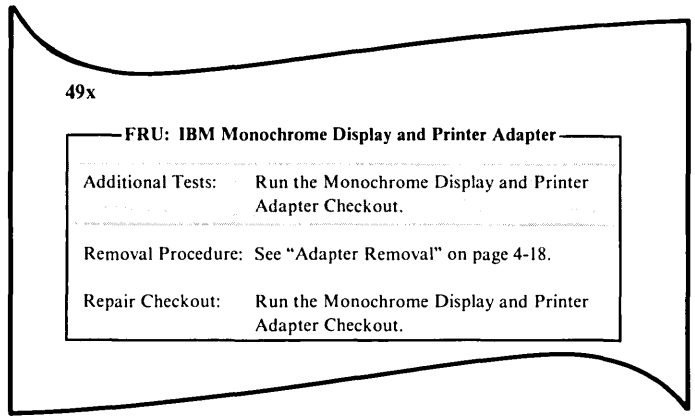
1. Find the leftmost SRA number in the "Service Repair Action Number Chart PIC 0020" on page 3-0020-1.
2. Record the FRU name, repair checkout procedure, and the removal procedure reference.
3. Go to "Step 9" on page 3-0010-10.

YES Continue on the next page.

Step 6

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 PIC 0020" on page 3-0020-1.
2. Record the FRU name, any additional test procedure, the repair checkout procedure, 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 9" on page 3-0010-10.

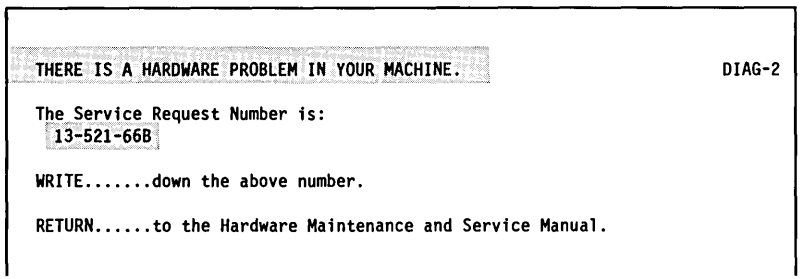
YES Continue on the next page.

Step 7

Note: Use the ADVANCED DIAGNOSTIC SELECTION menu to choose the additional test. If needed, see page 2-16.

Run the 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 3-0030-1.

If you have run the test previously, use the results from that test to answer this question.



DID THE ADDITIONAL TEST RESULT IN A SERVICE REQUEST NUMBER?

NO Go to "Step 18" on page 3-0010-19.

YES Continue on the next page.

Step 8

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

```
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.
```

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 PIC 0020" on page 3-0020-1.
2. Record the FRU name, the removal procedure reference, and the repair checkout reference.
3. Continue on the next page.

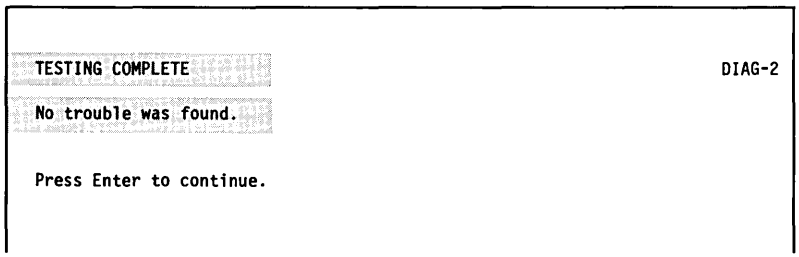
YES Continue on the next page.

Step 9

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 is always in the same location. 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 2-16.

   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.



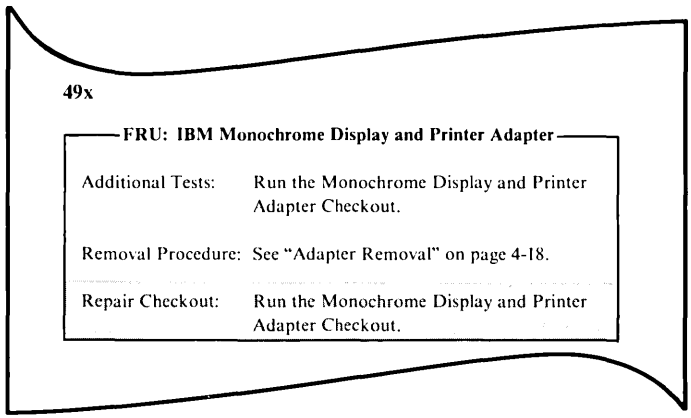
WERE YOU ABLE TO LOAD AND RUN THE REPAIR CHECKOUT AND DID THE "NO TROUBLE WAS FOUND" MESSAGE DISPLAY?

YES This completes the repair. If you still have a problem, go to "Problem Determination Procedure PIC 0030" on page 3-0030-1 to get a new SRN.

NO Continue on the next page.

Step 10

Look at the result you recorded after the repair checkout.



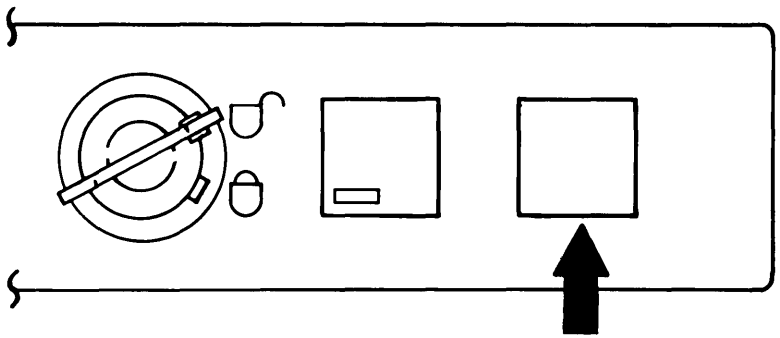
WERE YOU ABLE TO SELECT THE REPAIR CHECKOUT TEST?

YES Go to "Step 14" on page 3-0010-15.

NO Continue on the next page.

Step 11

Look at the operator panel.



IS THE TWO-DIGIT DISPLAY BLANK?

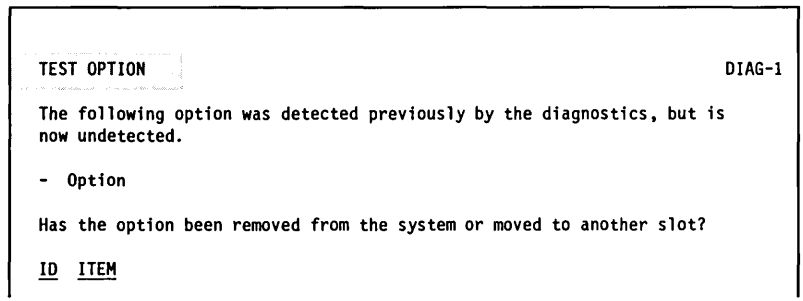
NO Do the following:

1. Find the number displayed in the two-digit display in the "POST Indicator Chart PIC 0040" on page 3-0040-1.
2. Record the SRN for that POST number. This is the repair checkout result.
3. Go to "Step 15" on page 3-0010-16.

YES Continue on the next page.

Step 12

Look at the display.



DID THE "TEST OPTION" MENU DISPLAY?

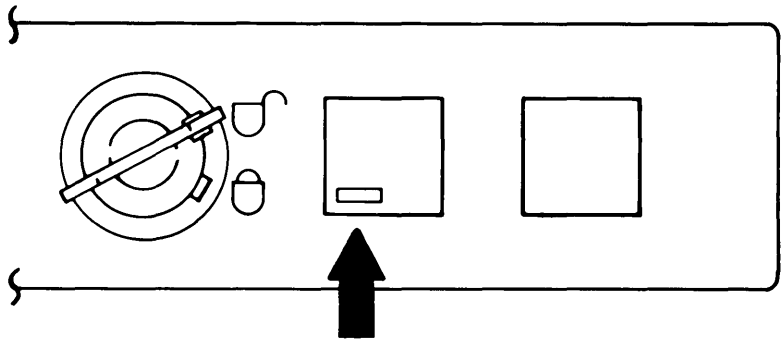
YES The TEST OPTION Menu displays when an option is in the configuration record but it was not sensed or it was sensed in a different location during POST.

1. Record the option displayed.
2. Choose an item on the menu, then record the SRN when it displays. This is the repair checkout result.
3. Check for proper installation of the option. If the option is a new FRU, it may be defective.
4. Go to "Step 16" on page 3-0010-17.

NO Continue on the next page.

Step 13

Look at the operator panel.



IS THE POWER-ON INDICATOR ON?

YES Go to "Step 17" on page 3-0010-18.

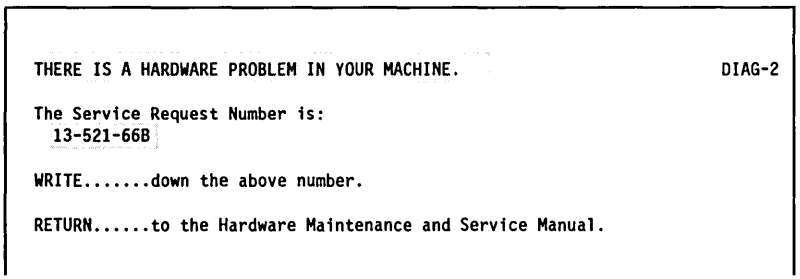
NO Be sure that both ends of the external power cable to the system unit are connected.

If you find a problem, go to the step where you were instructed to set the system unit power switch to On and try the procedure again.

If you do not find a problem, go to "Power Supply PIC 8800" on page 3-8800-1.

Step 14

Look at the display.



DID THE REPAIR CHECKOUT RESULT IN AN SRN?

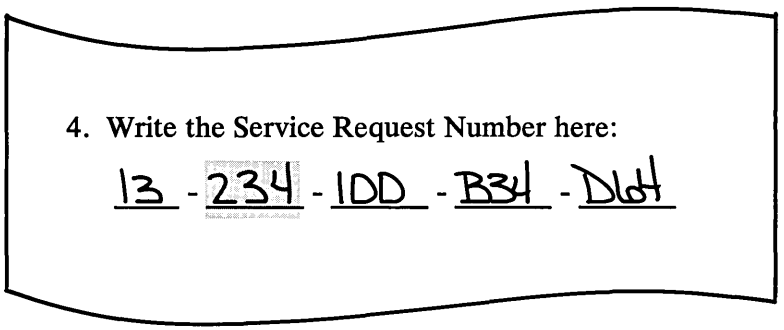
YES The SRN displayed is the repair checkout results.

1. Record the SRN displayed.
2. Go to "Step 16" on page 3-0010-17.

NO Go to "Undetermined Problem PIC 9860" on page 3-9860-1. Use the Repair Checkout procedure as the failing test procedure.

Step 15

Look at your SRN.



IS THE LEFTMOST SERVICE REPAIR ACTION NUMBER OF YOUR SERVICE REQUEST NUMBER "981" THROUGH "987"?

YES Go to "Step 19" on page 3-0010-20.

NO Continue on the next page.

Step 16

Look at the SRN you recorded after the repair checkout.

4. Write the Service Request Number here:

13 - 234 - 1DD - B34 - D64

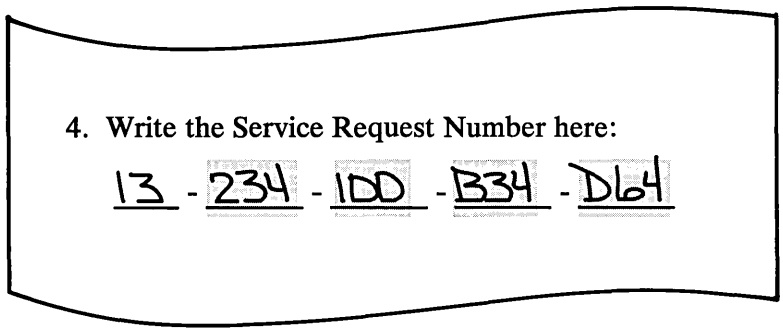
DID THE REPAIR CHECKOUT RUN RESULT IN THE SAME SRN YOU HAVE BEEN ANALYZING (ignore any location code changes)?

NO Either the system has more than one problem or another problem was created during service. Go to "Step 3" on page 3-0010-4 and analyze the new SRN.

YES Remove the new FRU and install the original FRU, then continue on the next page.

Step 17

Look at the SRN.



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

NO Use this procedure to continue analyzing the SRN.

1. Select another SRA number within the SRN.
2. Find the SRA number in "Service Repair Action Number Chart PIC 0020" on page 3-0020-1.
3. Record the FRU name, the repair checkout procedure, and the removal procedure reference.
4. Go to "Step 9" on page 3-0010-10.

YES Continue on the next page.

Step 18

The following question is used to determine the source of your SRN.

Problem Determination Procedure PIC 0030

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:

- Damaged covers
- Loose cables
- Cooling fan not running
- Broken latches, buttons, or switches
- Any other field-replaceable unit (FRU) with physical damage.

DID YOU FIND ONE OF THE ABOVE PROBLEMS?

YES Do the procedure for the problem:

HAVE YOU USED THE "PROBLEM DETERMINATION PROCEDURE PIC 0030" TO ANALYZE THIS PROBLEM?

YES Go to "Unresolved Problem PIC 0060" on page 3-0060-1.

NO Go to "Problem Determination Procedure PIC 0030" on page 3-0030-1.

Step 19

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

SRA Number	Go to PIC
981	"POST Errors 03 or 05 PIC 9810" on page 3-9810-1
984	"POST Error 23 PIC 9840" on page 3-9840-1
987	"POST Errors 5c PIC 9870" on page 3-9870-1

Service Repair Action Number Chart PIC 0020

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

Note: If an SRA number was released after this manual was printed, the information for that SRA number may be at the end of PIC 0020 or in a separate booklet.

10X

FRU: System Board

Additional Tests:	None
Removal Procedure:	See System Board Removal in Section 4.
Repair Checkout:	Run the System Checkout.

12X

FRU: RT PC 1MB Memory Expansion Option

Additional Tests:	None
Removal Procedure:	See Processor, Floating-Point, or System Memory Removal in Section 4.
Repair Checkout:	Run the System Checkout.

15x

FRU: RT PC 2MB Memory Expansion Option

Additional Tests:	None
Removal Procedure:	See Processor, Floating-Point, or System Memory Removal in Section 4.
Repair Checkout:	Run the System Checkout.

16x

FRU: RT PC 4MB Memory Expansion Option

Additional Tests:	None
Removal Procedure:	See Processor, Floating-Point, or System Memory Removal in Section 4.
Repair Checkout:	Run the System Checkout.

19x

FRU: RT PC Floating-Point Board

Additional Tests:	None
Removal Procedure:	See Processor, Floating-Point, or System Memory Removal in Section 4.
Repair Checkout:	Run the System Checkout.

1Cx

FRU: RT PC Advanced Floating-Point Board

Additional Tests:	None
Removal Procedure:	See Processor, Floating-Point, or System Memory Removal in Section 4.
Repair Checkout:	Run the System Checkout.

1Dx

FRU: RT PC 4MB Fast Memory Expansion Option

Additional Tests:	None
Removal Procedure:	See Processor, Floating-Point, or System Memory Removal in Section 4.
Repair Checkout:	Run the System Checkout.

1Ex

FRU: RT PC 8MB Fast Memory Expansion Option

Additional Tests:	None
Removal Procedure:	See Processor, Floating-Point, or System Memory Removal in Section 4.
Repair Checkout:	Run the System Checkout.

20x

FRU: RT PC AT Coprocessor Option

Additional Tests:	None
Removal Procedure:	See "Removal and Replacement Procedures" on page 9-023-1.
Repair Checkout:	Run the System Checkout.

21x

FRU: IBM AT 512 KB Memory Expansion Option

Do not return to the Start of Call PIC, go to "Memory Expansion Option PIC 2100" on page 3-2100-1.

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 nonsupported memory installed.
Repair Checkout:	Run the System Checkout.

23x

FRU: IBM AT Serial/Parallel Adapter

Additional Tests:	Run the IBM AT Serial/Parallel Adapter checkout.
Removal Procedure:	See Adapter Removal in Section 4.
Repair Checkout:	Run the IBM AT Serial/Parallel Adapter Checkout.

24x

FRU: IBM AT Math Co-Processor Module

Additional Tests:	None
Removal Procedure:	See "Removal and Replacement Procedures" on page 9-023-1.
Repair Checkout:	Run the System 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 0FFFFF. This area of memory is not supported as I/O channel memory in the IBM RT PC System. Check for nonsupported memory installed.
Repair Checkout:	Run the System Checkout.

28x

FRU: RT PC Multiprotocol Adapter

Additional Tests:	Run the RT PC Multiprotocol Adapter Checkout.
Removal Procedure:	See Adapter Removal in Section 4.
Repair Checkout:	Run the RT PC Multiprotocol Adapter Checkout.

2Bx

FRU: System Board

Additional Tests:	None
Removal Procedure:	See System Board Removal in Section 4.
Repair Checkout:	Run the System Checkout.

2Cx

FRU: System Board

Additional Tests:	None
Removal Procedure:	See System Board Removal in Section 4.
Repair Checkout:	Run the System Checkout.

30x

FRU: IBM Token-Ring Network RT PC Adapter

Additional Tests:	None
Removal Procedure:	See Adapter Removal in Section 4.
Repair Checkout:	Run the Token-Ring Network RT PC Adapter Checkout.

31x

FRU: IBM RT PC Network Adapter

Additional Tests:	None
Removal Procedure:	See Adapter Removal in Section 4.
Repair Checkout:	Run the IBM PC Network Adapter Checkout.

32x

FRU: RT PC 5080 Attachment Adapter

Additional Tests:	None
Removal Procedure:	See "Removal Procedure" on page 9-095-2.
Repair Checkout:	Run the System Checkout.

34x

FRU: IBM PC 3278/79 Emulation Adapter

Additional Tests:	None
Removal Procedure:	The long adapter is no longer available, use the short adapter. See Adapter Removal in Section 4.
Repair Checkout:	Run the System Checkout.

35x

FRU: 4-Port Asynchronous RS-232C Adapter (Buffered)

Additional Tests:	Run the RT PC 4-Port Asynchronous RS-232C Adapter Checkout.
Removal Procedure:	See Adapter Removal in Section 4.
Repair Checkout:	Run the RT PC 4-Port Asynchronous RS-232C Adapter Checkout.

36x

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 0FFFFF. This area of memory is not supported as I/O channel memory in the IBM RT PC System. Check for nonsupported memory installed.
Repair Checkout:	Run the System Checkout.

37x

FRU: IBM 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 3-2100-1.

38x

FRU: RT PC 5080 Peripheral Adapter

Additional Tests:	Run the RT PC 5080 Peripheral Adapter Checkout.
Removal Procedure:	See Adapter Removal in Section 4.
Repair Checkout:	Run the RT PC 5080 Peripheral Adapter Checkout.

39x

FRU: 4-Port Asynchronous RS-422A Adapter (Buffered)

Additional Tests:	Run the RT PC 4-Port Asynchronous RS-422A Adapter Checkout.
Removal Procedure:	See Adapter Removal in Section 4.
Repair Checkout:	Run the RT PC 4-Port Asynchronous RS-422A Adapter Checkout.

3Ax

FRU: RT PC S/370 Host Interface Adapter

Additional Tests:	None
Removal Procedure:	See "Removal Procedure" on page 9-097-2.
Repair Checkout:	Run the System Checkout.

40x

FRU: RT PC Baseband Adapter

Additional Tests:	Run the RT PC Baseband Adapter Checkout.
Removal Procedure:	See Adapter Removal in Section 4.
Repair Checkout:	Run the RT PC Baseband Adapter Checkout.

41x

FRU: IBM PC Enhanced Graphics Adapter

Additional Tests:	Run the Display Checkout.
Removal Procedure:	See "Removal and Replacement Procedures" on page 9-042-1.
Repair Checkout:	Run the Display Checkout.

42x

FRU: IBM PC Graphics Memory Expansion Card

Do not return to the Start of Call PIC, go to "IBM PC Enhanced Graphics Adapter Memory PIC 4200" on page 3-4200-1.

43x

FRU: Advanced Monochrome Graphics Display Adapter

Additional Tests:	Run the Display Checkout.
Removal Procedure:	See Adapter Removal in Section 4.
Repair Checkout:	Run the Display Checkout.

44x

FRU: IBM PC Graphics Memory Expansion Module

Do not return to the Start of Call PIC, go to "IBM PC Enhanced Graphics Adapter Memory PIC 4200" on page 3-4200-1.

45x

FRU: RT PC Advanced Color Graphics Display Adapter

Additional Tests:	Run the Display Checkout.
Removal Procedure:	See Adapter Removal in Section 4.
Repair Checkout:	Run the Display Checkout.

47x

FRU: Extended Monochrome Graphics Display Adapter

Additional Tests:	Run the Display Checkout.
Removal Procedure:	See Adapter Removal in Section 4.
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 in Section 4.
Repair Checkout:	Run the IBM Monochrome Display and Printer Adapter Checkout.

4Ax

FRU: IBM Megapel Display Processor

Additional Tests:	Run the Display Checkout.
Removal Procedure:	See "Removal Procedure" on page 9-053-2.
Repair Checkout:	Run the Display Checkout.

4Bx

FRU: IBM Megapel Display Controller

Additional Tests:	Run the Display Checkout and if listed, the IBM Megapel Parallel Port Checkout.
Removal Procedure:	See "Removal Procedure" on page 9-053-2.
Repair Checkout:	Run the Display Checkout and if listed, the IBM Megapel Parallel Port Checkout.

52x

FRU: IBM AT Fixed-Disk and Diskette Drive Adapter

Additional Tests:	None
Removal Procedure:	See Adapter Removal in Section 4.
Repair Checkout:	If your SRN also contains an SRA number of 98A, each fixed disk attached to this adapter must be formatted again. **Note:** This destroys all data recorded on the fixed disk. To format the fixed disk, use the Format Fixed-Disk utility. If needed, see Section 2. Run the System Checkout.

53x

FRU: Battery

Additional Tests:	None
Removal Procedure:	See Battery Removal in Section 4.
Repair Checkout:	Run the System Checkout.

54x

FRU: IBM 5151 Personal Computer Display

Additional Tests:	Run the Display Checkout.
Removal Procedure:	See Attached Device Removal in Section 4.
Repair Checkout:	Run the Display Checkout.

58x

FRU: IBM 5154 Enhanced Color Display

Additional Tests:	Run the Display Checkout.
Removal Procedure:	See Attached Device Removal in Section 4.
Repair Checkout:	Run the Display Checkout.

59x

FRU: IBM 6154 Advanced Color Graphics Display

Additional Tests:	Run the Display Checkout.
Removal Procedure:	See Attached Device Removal in Section 4.
Repair Checkout:	Run the Display Checkout.

5Bx

Note: References to the RT PC Small Computer Systems Interface Adapter is abbreviated as RT PC SCSI Adapter in this publication.

FRU: RT PC SCSI Adapter

Additional Tests:	Run the RT PC SCSI Adapter Checkout.
Removal Procedure:	See the following note, then see Adapter Removal in Section 4. **Note:** Check the fuse before replacing the adapter. If the fuse is defective, exchange the fuse.
Repair Checkout:	Run the RT PC SCSI Adapter Checkout.

5Cx

FRU: IBM RT PC SCSI Adapter Fuse

Additional Tests:	Run the RT PC SCSI Adapter Checkout.
Removal Procedure:	See Adapter Removal in Section 4, then exchange the fuse.
Repair Checkout:	Run the RT PC SCSI Adapter Checkout.

60x

FRU: IBM 6153 Advanced Monochrome Graphics Display

Additional Tests:	Run the Display Checkout.
Removal Procedure:	See Attached Device Removal in Section 4.
Repair Checkout:	Run the Display Checkout.

61x

FRU: IBM 5081 Display

Additional Tests:	Go to the IBM 5081 MIM.
Removal Procedure:	See the IBM 5081 MIM.
Repair Checkout:	Run the Display Checkout.

62x

FRU: IBM 6155 Extended Monochrome Graphics Display

Additional Tests:	Run the Display Checkout.
Removal Procedure:	See Attached Device Removal in Section 4.
Repair Checkout:	Run the Display Checkout.

63x

FRU: Operator Panel Board

Additional Tests:	None
Removal Procedure:	See Operator Panel Board Removal in Section 4.
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: IBM AT High Capacity Diskette Drive

Additional Tests:	Run the Diskette Drive(s) Checkout.
Removal Procedure:	See Diskette Drive Removal in Section 4.
Repair Checkout:	Run the Diskette Drive(s) Checkout.

66x

FRU: IBM AT Dual-Sided Diskette Drive

Additional Tests:	Run the Diskette Drive(s) Checkout.
Removal Procedure:	See Diskette Drive Removal in Section 4.
Repair Checkout:	Run the Diskette Drive(s) Checkout.

70x

FRU: Fixed-Disk Drive Type R70

Additional Tests:	None
Removal Procedure:	See Fixed-Disk Drive Removal in Section 4.
Repair Checkout:	Run the Fixed-Disk Drive(s) and Media Checkout.

74x

FRU: Fixed-Disk Drive Type R40

Additional Tests:	None
Removal Procedure:	See Fixed-Disk Drive Removal in Section 4.
Repair Checkout:	Run the Fixed-Disk Drive(s) and Media Checkout.

77x

FRU: Fixed-Disk Drive Type E70

Additional Tests:	None
Removal Procedure:	See Fixed-Disk Drive Removal in Section 4.
Repair Checkout:	Run the Fixed-Disk Drive(s) and Media Checkout.

78x

FRU: Keyboard

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

79x

FRU: Mouse

Additional Tests:	None
Removal Procedure:	See the Mouse "Removal Procedure" on page 10-143-1.
Repair Checkout:	Run the Mouse Checkout.

7Ax

FRU: IBM 5085 Dials Feature

Additional Tests:	Run the Dials Checkout.
Removal Procedure:	See the Dials Feature "Removal Procedure" on page 10-146-2.
Repair Checkout:	Run the Dials Checkout.

7Bx

FRU: IBM 5085 LPFK Feature

Additional Tests:	Run the Lighted Program Function Keyboard Checkout.
Removal Procedure:	See the LPFK Feature "Removal Procedure" on page 10-147-2.
Repair Checkout:	Run the Lighted Program Function Keyboard Checkout.

7Cx

FRU: Stylus for the Model 11 and 12 Tablet

Additional Tests:	Run the IBM 5083 Model 1x Tablet Checkout.
Removal Procedure:	See the Tablet "Removal Procedure" on page 10-145-2.
Repair Checkout:	Run the IBM 5083 Model 1x Tablet Checkout.

7Dx

FRU: Cursor for the Model 11 and 12 Tablet

Additional Tests:	Run the IBM 5083 Model 1x Tablet Checkout.
Removal Procedure:	See the Tablet "Removal Procedure" on page 10-145-2.
Repair Checkout:	Run the IBM 5083 Model 1x Tablet Checkout.

7Ex

FRU: IBM 5083 Model 11 Tablet

Additional Tests:	Run the IBM 5083 Model 1x Tablet Checkout.
Removal Procedure:	See the Tablet "Removal Procedure" on page 10-145-2.
Repair Checkout:	Run the IBM 5083 Model 1x Tablet Checkout.

80x

FRU: IBM 5083 Model 12 Tablet

Additional Tests:	Run the IBM 5083 Model 1x Tablet Checkout.
Removal Procedure:	See the Tablet "Removal Procedure" on page 10-145-2.
Repair Checkout:	Run the IBM 5083 Model 1x Tablet Checkout.

81x

FRU: IBM 6157 Streaming Tape Drive

Additional Tests:	Run the IBM 6157 Streaming Tape Drive Checkout.
Removal Procedure:	See Attached Device Removal in Section 4.
Repair Checkout:	Run the IBM 6157 Streaming Tape Drive Checkout.

82x

FRU: RT PC ESDI Magnetic Media Adapter

Additional Tests:	None
Removal Procedure:	See Adapter Removal in Section 4.
Repair Checkout:	If your SRN also contains an SRA number of 98A, each fixed disk attached to this adapter must be formatted again. **Note:** This destroys all data recorded on the fixed disk. To format the fixed disk, use the Format Fixed-Disk utility. If needed, see Section 2. Run the System Checkout.

84x

FRU: RT PC Processor Board

Additional Tests:	None
Removal Procedure:	See Processor, Floating-Point, or System Memory Removal in Section 4.
Repair Checkout:	Run the System Checkout.

85x

FRU: RT PC Streaming Tape Drive Adapter

Additional Tests:	Run the IBM 6157 Streaming Tape Drive Checkout.
Removal Procedure:	See Adapter Removal in Section 4.
Repair Checkout:	Run the IBM 6157 Streaming Tape Drive Checkout.

86x

FRU: RT PC Extended ESDI Magnetic Media Adapter

Additional Tests:	None
Removal Procedure:	See Adapter Removal in Section 4.
Repair Checkout:	If your SRN also contains an SRA number of 98A, each fixed disk attached to this adapter must be formatted again. **Note:** This destroys all data recorded on the fixed disk. To format the fixed disk, use the Format Fixed-Disk utility. If needed, see Section 2. Run the System Checkout.

87x

FRU: Keylock

Additional Tests:	None
Removal Procedure:	See Keylock Removal in Section 4.
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 3-8800-1.

8Ax

FRU: Stylus for the Model 1 Tablet

Additional Tests:	Run the IBM 5083 Model 1x Tablet Checkout.
Removal Procedure:	See the Tablet "Removal Procedure" on page 10-145-2.
Repair Checkout:	Run the IBM 5083 Model 1x Tablet Checkout.

8Bx

FRU: Cursor for the Model 1 Tablet

Additional Tests:	Run the IBM 5083 Model 1x Tablet Checkout.
Removal Procedure:	See the Tablet "Removal Procedure" on page 10-145-2.
Repair Checkout:	Run the IBM 5083 Model 1x Tablet Checkout.

8Cx

FRU: IBM 5083 Model 1 Tablet

Additional Tests:	Run the IBM 5083 Model 1x Tablet Checkout.
Removal Procedure:	See the Tablet "Removal Procedure" on page 10-145-2.
Repair Checkout:	Run the IBM 5083 Model 1x Tablet Checkout.

8Dx

Network Problem

This SRA number indicates that there may be a problem with the Network.

8Ex

FRU: Advanced Processor Board

Additional Tests:	None
Removal Procedure:	See Processor, Floating-Point, or System Memory Removal in Section 4.
Repair Checkout:	Run the System Checkout.

8Fx

SCSI Bus Problem

Additional Tests:	Run the RT PC SCSI Adapter Checkout to isolate the problem to a device on the SCSI bus.
Removal Procedure:	None
Repair Checkout:	Run the RT PC SCSI Adapter Checkout.

91x

FRU: Attached Device

The device attached to the port indicated by the x in the 91x SRA may be failing, however this documentation does not support the device.

If the device is serviced by an IBM Service Representative, use the service information with the device to resolve the problem.

If the device is not serviced by an IBM Service Representative, analyze any other SRA numbers in your SRN. If they do not resolve the problem, inform the customer that the problem is not in the system unit. Contact the appropriate service organization.

95x

FRU: IBM PC Network Components

Additional Tests:	Run the IBM PC Network Link Checkout.
Removal Procedure:	See the *Setup Instructions for the IBM PC Network Transformer and Translator Unit.*
Repair Checkout:	Run the IBM 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 3-9810-1.

982

Invalid SRA Number

Do not return to the Start of Call PIC, go to "Problem Determination Procedure PIC 0030" on page 3-0030-1.

983

Invalid SRA Number

Do not return to the Start of Call PIC, go to "Problem Determination Procedure PIC 0030" on page 3-0030-1.

984

POST Error 23

Do not return to the Start of Call PIC, go to "POST Error 23 PIC 9840" on page 3-9840-1.

985

Invalid SRA Number

Do not return to the Start of Call PIC, go to "Problem Determination Procedure PIC 0030" on page 3-0030-1.

986

Undetermined Problem

Do not return to the Start of Call PIC, go to "Undetermined Problem PIC 9860" on page 3-9860-1.

987

POST Error 5c

Do not return to the Start of Call PIC, go to "POST Errors 5c PIC 9870" on page 3-9870-1.

989

Missing Option

This SRA number indicates that an option was not detected by the diagnostic routines. (This may be caused by incorrect switch settings. If needed, see *IBM RT PC Options Installation.*) Use the Show Installed Options Utility to display the options installed. Find the options that are not being detected. One of the undetected options is defective. Exchange the undetected option, cable attached to the undetected option, or the adapter for the undetected option until the defective component is isolated.

Additional Tests:	None
Removal Procedure:	See the procedure for the defective component.
Repair Checkout:	Run the System Checkout or the checkout for the device.

98A

Format Fixed Disk

Analyze the SRA number for the fixed-disk drive and diskette adapter in this SRN first, because this SRA number indicates that some of the fixed disks must be formatted again.

All of the fixed disks attached to the fixed-disk and diskette drive adapter identified by another SRA number within this SRN, must be formatted after the adapter is exchanged. Go to the SRA number for the fixed-disk and diskette drive adapter identified in the SRN.

98B

Compatibility Problem

This SRA number indicates that there is a compatibility problem between some of the system components. Look at the FRU indicated by the next SRA after the 98B. That FRU is incompatible with some other system component. For more information, see the IBM 6100 Engineering Change Announcements (ECAs).

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 A – D

Additional Tests:	Run the Diskette Drive(s) Checkout.
Removal Procedure:	See Adapter Removal in Section 4.
Repair Checkout:	Run the Fixed-Disk Drive(s) and Media Checkout and the Diskette Drive(s) Checkout.

A2x

FRU: Fixed-Disk Drive E Cables

Additional Tests:	None
Removal Procedure:	See Adapter Removal in Section 4.
Repair Checkout:	Run the Fixed-Disk Drive(s) and Media Checkout.

A5x

FRU: External Power Cable

This SRA number is generated from an error log entry. There may be an intermittent problem with the external power cable. Check the external power cable for damage.

Additional Tests:	None
Removal Procedure:	None
Repair Checkout:	Run the System Checkout

A6x

FRU: IBM PC Network Cable

Additional Tests:	Run the IBM PC Network Link Checkout
Removal Procedure:	See the *Setup Instructions for the IBM PC Network Short, Medium, and Long Distance Kits.*
Repair Checkout:	Run the IBM PC Network Adapter Checkout.

A7x

FRU: RT PC Modem Cable – RS-232C (10 PIN)

Additional Tests:	Run the RT PC 4-Port Asynchronous RS-232C Adapter Checkout.
Removal Procedure:	See Adapter Removal in Section 4.
Repair Checkout:	Run the RT PC 4-Port Asynchronous 232C Adapter Checkout.

A8x

FRU: IBM AT Modem Cable – RS232C/9 Pin

Additional Tests:	Run the IBM AT Serial/Parallel Adapter Checkout.
Removal Procedure:	See Adapter Removal in Section 4.
Repair Checkout:	Run the IBM AT Serial/Parallel Adapter Checkout.

AAx

FRU: Fixed-disk and Diskette Drive Cables A – E

Additional Tests:	Run the Diskette Drive(s) Checkout.
Removal Procedure:	See Adapter Removal in Section 4.
Repair Checkout:	Run the Fixed-Disk Drive(s) and Media Checkout and the Diskette Drive(s) Checkout.

B1x

FRU: IBM Token-Ring Network RT PC Adapter Cable

Additional Tests:	None
Removal Procedure:	See Adapter Removal in Section 4.
Repair Checkout:	Run the Token-Ring Network RT PC Adapter Checkout

B2x

FRU: IBM PC Parallel Printer Cable

Additional Tests:	None
Removal Procedure:	See Adapter Removal in Section 4.
Repair Checkout:	Run a customer print job.

B3x

FRU: RT PC Serial Printer Cable (9 Pin)

Additional Tests:	None
Removal Procedure:	See Adapter Removal in Section 4.
Repair Checkout:	Run a customer print job.

B4x

FRU: RT PC ASCII Terminal Cable – RS-232C (10 Pin)

Additional Tests:	None
Removal Procedure:	See Adapter Removal in Section 4.
Repair Checkout:	Run a normal customer program.

B5x

FRU: RT PC ASCII Terminal Cable – RS-422A

Additional Tests:	None
Removal Procedure:	See Adapter Removal in Section 4.
Repair Checkout:	Run a normal customer program.

B6x

FRU: RT PC Serial Printer Cable (10 Pin)

Additional Tests:	None
Removal Procedure:	See Adapter Removal in Section 4.
Repair Checkout:	Run a normal customer program.

B7x

FRU: RT PC Modem Cable – RS232C (16 Pin)

Additional Tests:	Run the RT PC Multiprotocol Adapter Checkout.
Removal Procedure:	See Adapter Removal in Section 4.
Repair Checkout:	Run the RT PC Multiprotocol Adapter Checkout.

B8x

FRU: RT PC Automatic Calling Unit Cable – RS366

Additional Tests:	Run the RT PC Multiprotocol Adapter Checkout.
Removal Procedure:	See Adapter Removal in Section 4.
Repair Checkout:	Run the RT PC Multiprotocol Adapter Checkout.

B9x

FRU: RT PC Modem Cable - X.21

Additional Tests:	Run the RT PC Multiprotocol Adapter Checkout.
Removal Procedure:	See Adapter Removal in Section 4.
Repair Checkout:	Run the RT PC Multiprotocol Adapter Checkout.

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.

CDx

External Power Failure

This SRA number is generated from an error log entry. There may be a problem with the external power source.

CEx

DMA Channel Error

This SRA number is generated from an error log entry. A DMA channel error occurred. The failing DMA channel should be listed in the error log entry used to generate this SRA number.

Using the error log, find the DMA channel number, then isolate the problem to a FRU that uses that DMA channel.

Run the System Checkout to check any repairs.

CFx

I/O Channel Error

This SRA number is generated from an error log entry. An I/O channel error occurred. This error can be caused by any adapter installed in the system or the system board.

Run the System Checkout to isolate the failure. If a failure is not detected, suspect any AT 512 KB Memory Expansion Options installed.

Run the System Checkout to check any repairs.

D1x

Data Link Problem

This SRA number indicates a communication link problem.

D2x

Modem Problem

Run the checkout for the adapter attached to the failing modem.

If the checkout ends with the message No trouble was found, go to the maintenance package for the modem. If you do not have the service responsibility for the modem, inform the customer that the modem may need servicing.

D3x

Modem Interface Problem

This SRA number is generated from an error log entry. There may be a problem with the interface to the modem. Either the adapter in the location indicated by the x in the SRA number or a modem attached to that adapter is failing.

Run the System Checkout to check any repairs.

D6x

Electrostatic Discharge Problem

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

D7x

Media Problem

This SRA number is generated from an error log entry. There may be a problem with the media (diskette, tape cartridge). Try new media to isolate the problem.

D8x

Autocall Interface Problem

This SRA number is generated from an error log entry. There may be a problem with the interface to the automatic calling unit.

F4x

FRU: Unidentified Processor Board

The program detected a processor failure, however the processor board could not be identified. Look at the processor board and use the SRA number below for the processor type you have. If needed, see Section 5.

- For the Processor Board, see SRA number 84x.
- For the Advanced Processor Board, see SRA number 8Ex.

F6x

FRU: Unidentified Memory Option

The program detected a failure within a memory option, however the memory option type could not be determined. Look at the memory option in the slot indicated by the x in the SRA number to determine the type of memory option, then use the SRA number given below for that type. If needed, see Section 6.

- For 1MB Memory Expansion Option, use SRA number 12x.
- For 2MB Memory Expansion Option, use SRA number 15x.
- For 4MB Memory Expansion Option, use SRA number 16x.
- For 4MB Fast Memory Expansion Option, use SRA number 1Dx.
- For 8MB Fast Memory Expansion Option, use SRA number 1Ex.

If the option is not listed above, it is not supported in this manual.

F7x

FRU: Unidentified Drive Cable

The program detected a drive cable failure, however the cable type could not be determined. Use the SRA numbers given below.

See SRA numbers A1x and A2x.

F8x

FRU: Unidentified Fixed-Disk and Diskette Adapter

The program detected a failure in the adapter for the fixed-disk and diskette drives, however the type of adapter could not be determined. Look at the adapter in the slot indicated by the x in the SRA number. Determine the adapter type, then use the SRA number below for that adapter. If needed, see Section 9.

- IBM AT Fixed-Disk and Diskette Drive Adapter. See SRA number 52x.
- RT PC ESDI Magnetic Media Adapter. See SRA number 82x.
- RT PC Extended ESDI Magnetic Media Adapter. See SRA number 86x.

If the adapter for the fixed-disk and diskette drives is not listed above, it is not supported in this manual.

F9x

Fixed-Disk Drive Problem

See supplemental information.

FAx

Fixed-Disk Drive Problem

See supplemental information.

FBx

FRU: Unidentified Fixed-Disk Drive

The program detected a fixed-disk drive failure, however the drive type could not be determined. Look at the label on the fixed-disk drive to determine the drive type, then use the SRA number given below for that drive type. If needed, see Section 8.

- For the type R40 fixed-disk drive, see SRA number 74x.
- For the type R70 fixed-disk drive, see SRA number 70x.
- For the type E70 fixed-disk drive, see SRA number 77x.

If the drive type is not listed above, it is not supported in this manual.

FCx

FRU: Unidentified Diskette Drive

The program detected a diskette drive failure, however the drive type could not be determined. Look at the diskette drive to determine the drive type, then use the SRA number given below for that drive type. If needed, see Section 7.

- For the IBM AT High Capacity Diskette Drive, see SRA number 64x.
- For the IBM AT Dual-Sided Diskette Drive, see SRA number 66x.

If the drive type is not listed above, it is not supported in this manual.

Problem Determination Procedure PIC 0030

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:

- Damaged covers
- Loose cables
- Cooling fan not running
- Broken latches, buttons, or switches
- Any other field-replaceable unit (FRU) with physical damage.

DID YOU FIND ONE OF THE ABOVE PROBLEMS?

YES Do the procedure for the problem:

- The covers are damaged — exchange the cover.
- A cable is loose — tighten the cable.
- Cooling fan not running — exchange the cooling fan.
- A latch, button, or switch is broken — exchange the FRU containing the latch, button, or switch.
- A FRU is damaged — exchange the FRU.

This completes the repair.

NO Continue on the next page.

Step 2

1. If attached, set the power switch on the IBM 5085 to Off.
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 diskette drive A and close the drive.

   Note: You may be instructed to insert another diagnostic diskette, if so, change to the diagnostic diskette called for and continue.
5. Set the keylock to Unlock.
6. If the IBM 5085 is attached, be sure the System Diskette is in the IBM 5085, then set the power switch to On.
7. Set the power switch on the IBM RT PC System Unit and display to On.
8. Wait 4 minutes or until the DIAGNOSTIC OPERATING INSTRUCTIONS menu displays.
9. If the IBM 5085 is attached, Press and hold the Alt key and press the Sw Keybd key. This switches the keyboard to the IBM 6150. The Sw Keybd indicator should be On.

IS THE TWO-DIGIT DISPLAY BLANK?

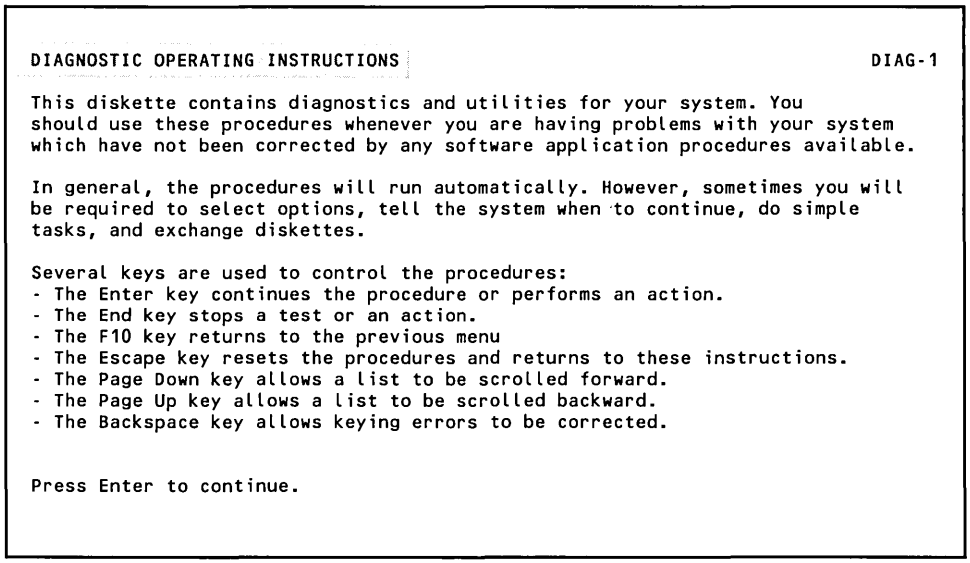
NO Go to "Step 11" on page 3-0030-11.

YES Continue on the next page.

Step 3

Look at the display screen.

Note: If the display is blank or too bright, check the power, brightness, and contrast controls before answering 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.

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
- 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.
```

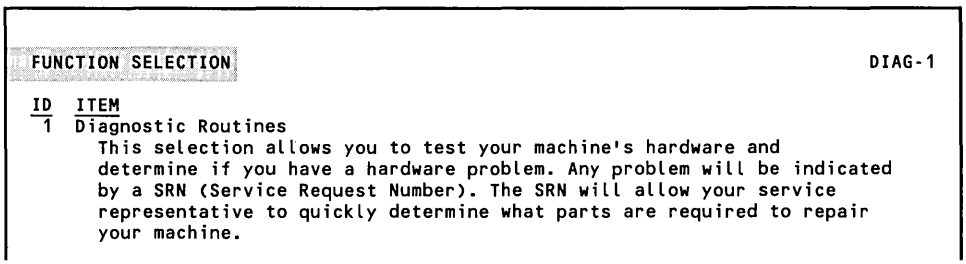
ARE THE "DIAGNOSTIC OPERATING INSTRUCTIONS" DISPLAYED WITHOUT AN OBVIOUS DISPLAY PROBLEM?

NO Go to "Step 17" on page 3-0030-17.

YES Continue on the next page.

Step 4

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



IS THE "FUNCTION SELECTION" MENU DISPLAYED?

NO Record SRN 36-780, then go to "Step 36" on page 3-0030-36.

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) and Media Checkout
 6  Serial Ports S1 and S2 Checkout
 7  IBM AT Serial/Parallel Adapter 1 in Slot X Checkout
 8  RT PC 4 Port Asynchronous RS232C Adapter 1 in Slot X Checkout
 9  RT PC 4 Port Asynchronous RS232C Adapter 2 in Slot X Checkout
10  RT PC 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 10" on page 3-0030-10.

NO Continue on the next page.

Step 6

Look at the displayed information.

```
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
```

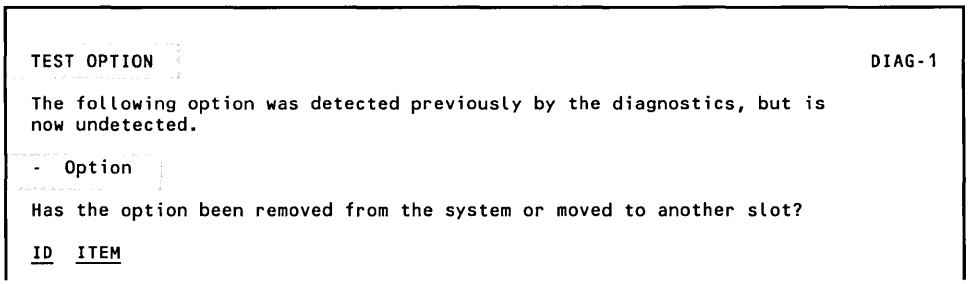
DID THE "TEST OPTION" MENU DISPLAY?

NO Go to "Step 8" on page 3-0030-8.

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 programs did not sense during POST. The option listed in the TEST OPTION menu was not sensed.



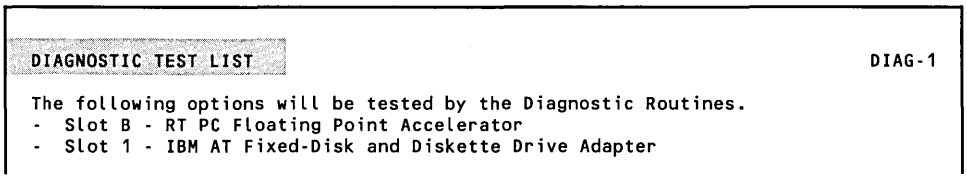
HAS THE OPTION LISTED IN THE "TEST OPTION" MENU BEEN REMOVED FROM THE SYSTEM OR MOVED TO ANOTHER SLOT?

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 36" on page 3-0030-36 when you get an SRN.

Step 8

Look at the displayed information.



DID THE "DIAGNOSTIC TEST LIST" MENU DISPLAY?

YES Continue on the next page.

NO Record SRN 36-780, then go to "Step 36" on page 3-0030-36.

Step 9

Follow the displayed instructions until a service request number or the ADVANCED DIAGNOSTIC SELECTION menu displays.

DID A SERVICE REQUEST NUMBER DISPLAY?

YES Go to "Step 36" on page 3-0030-36.

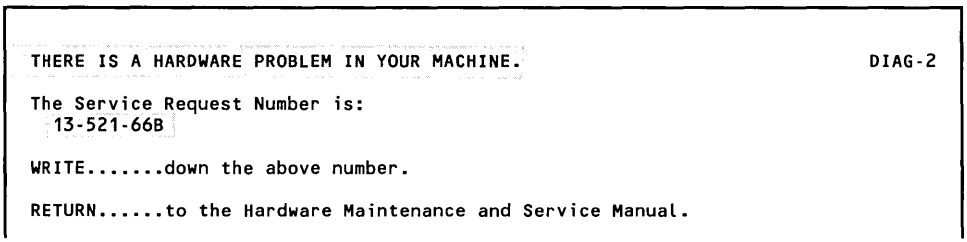
NO Continue on the next page.

Step 10

Notes:

1. If the test does not complete or an unexpected error occurs (such as the system loops or hangs, the Diagnostic Error message displays, anything displays in the two-digit display, the keyboard does not respond, or you cannot end a test), go to "Undetermined Problem PIC 9860" on page 3-9860-1.
2. If your system contains an option not listed on the DIAGNOSTIC SELECTION menu, look for a supplemental diagnostic information.

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.



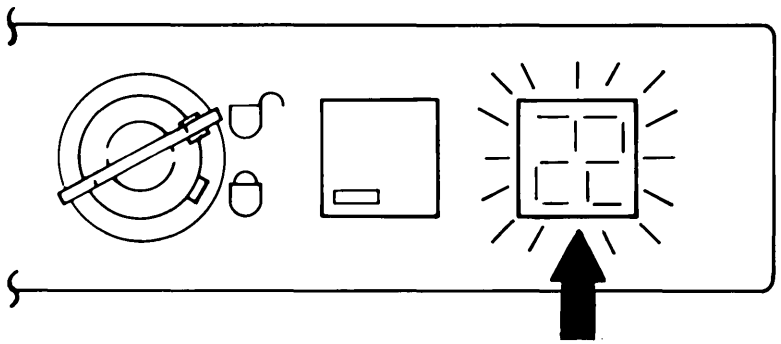
DID ANY TEST RESULT IN A SERVICE REQUEST NUMBER?

YES Go to "Step 36" on page 3-0030-36.

NO Go to "Step 30" on page 3-0030-30.

Step 11

Look at the two-digit display.



IS THE TWO-DIGIT DISPLAY FLASHING?

YES Go to "Step 23" on page 3-0030-23.

NO Continue on the next page.

Step 12

Look for the number displayed in the two-digit display in the following table.

Number	Go to Step
22	"Step 16" on page 3-0030-16
81	"Step 27" on page 3-0030-27
94	"Step 26" on page 3-0030-26
99	"Step 15" on page 3-0030-15

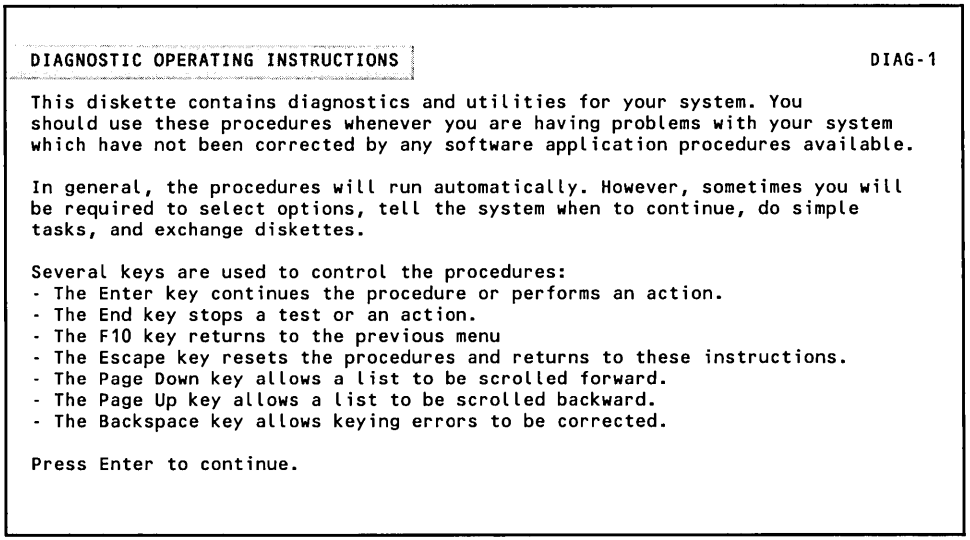
DID YOU FIND THE NUMBER IN THE TABLE?

YES Go to the step listed.

NO Continue on the next page.

Step 13

Look at the display.



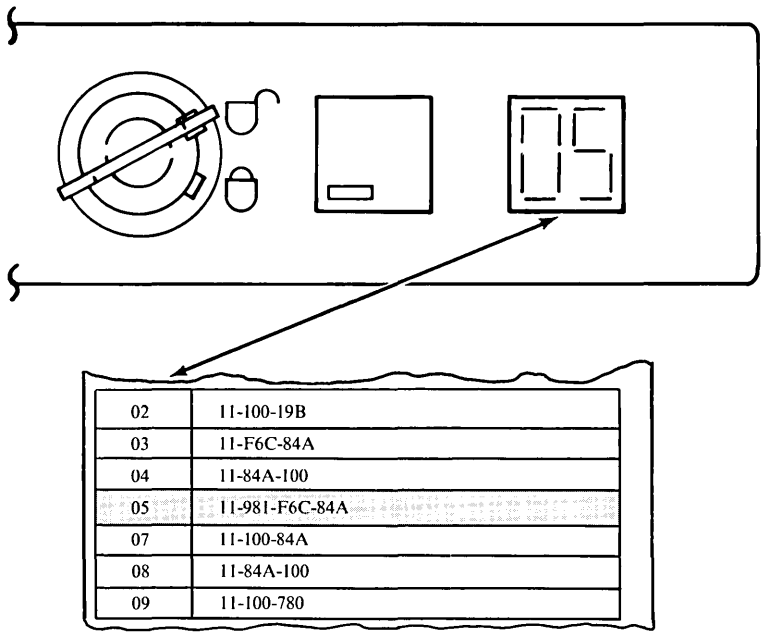
ARE THE "DIAGNOSTIC OPERATING INSTRUCTIONS" DISPLAYED?

YES Record SRN 11-630-84A, then go to "Step 36" on page 3-0030-36.

NO Continue on the next page.

Step 14

Find the POST number displayed in the two-digit display in the "POST Indicator Chart PIC 0040" on page 3-0040-1, then return here to answer the following question.



02	11-100-19B
03	11-F6C-84A
04	11-84A-100
05	11-981-F6C-84A
07	11-100-84A
08	11-84A-100
09	11-100-780

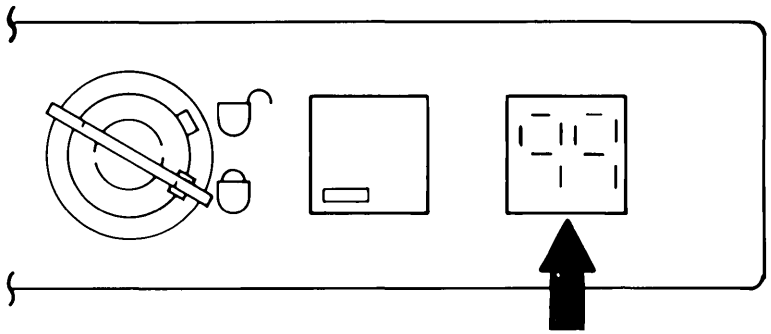
DID YOU FIND THE NUMBER IN THE CHART?

NO Record SRN 16-84A-630-100, then go to "Step 36" on page 3-0030-36.

YES Record the SRN for the number, then go to "Step 36" on page 3-0030-36.

Step 15

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



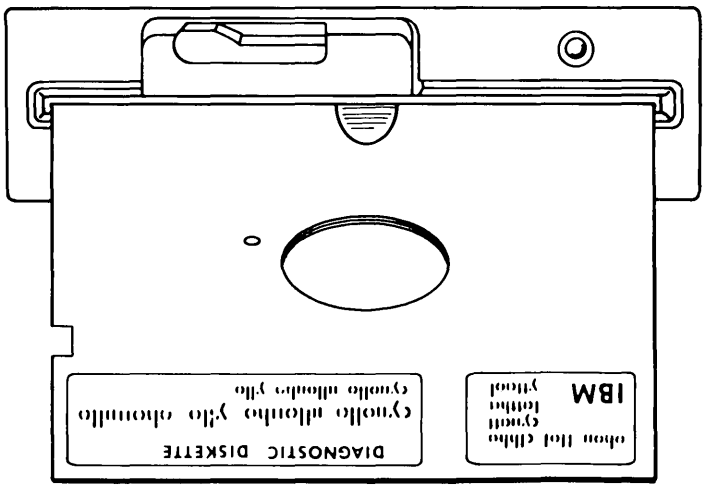
IS THE KEYLOCK IN THE LOCKED POSITION?

NO Record SRN 11-630-100, then go to "Step 36" on page 3-0030-36.

YES Set the keylock to Unlock, then go to "Step 2" on page 3-0030-2.

Step 16

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



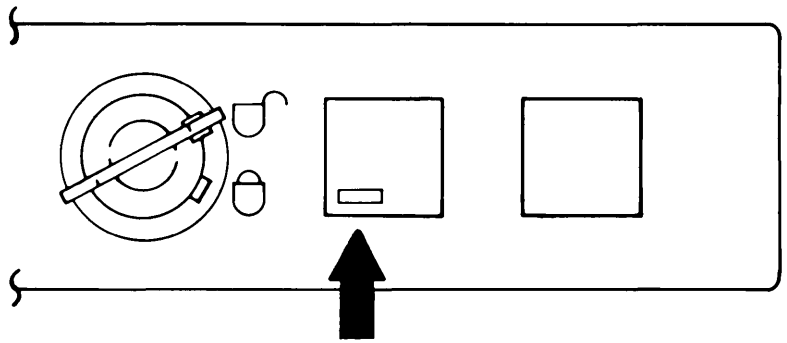
DID YOU FIND A PROBLEM?

YES Go to "Step 2" on page 3-0030-2.

NO Record SRN 16-F80-64A-A10, then go to "Step 36" on page 3-0030-36.

Step 17

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



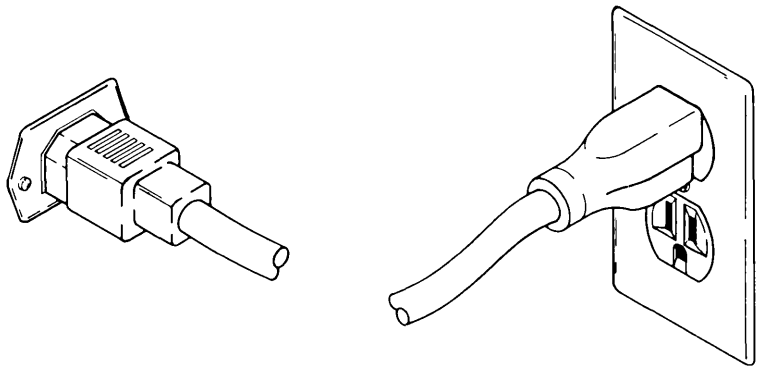
IS THE POWER-ON INDICATOR ON?

YES Go to "Step 19" on page 3-0030-19.

NO Continue on the next page.

Step 18

Be sure the external power cable to the system unit is plugged into the system unit and an outlet and that the outlet has correct voltage. If needed, see Section 5.



DID YOU FIND A PROBLEM?

YES If the outlet does not have correct voltage have the customer correct the problem, otherwise, plug the external power cable in.

This completes the repair.

NO Record SRN 16-880, then go to "Step 2" on page 3-8800-2.

Step 19

Some problems prevent the diagnostic diskette from loading and the ***Operating System*** loads instead.

Look at the display and determine if a screen from the customer's operating system is displayed. If needed, ask the customer for assistance in determining the above condition.

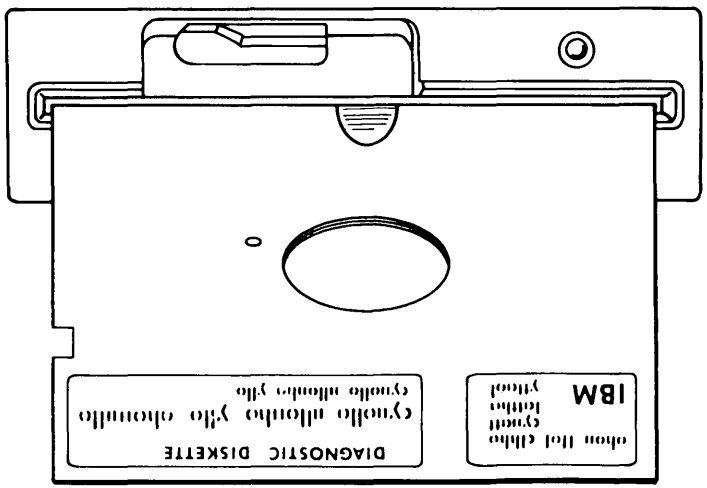
IS A SCREEN FROM THE CUSTOMER'S OPERATING SYSTEM DISPLAYED?

NO Go to "Step 21" on page 3-0030-21.

YES Continue on the next page.

Step 20

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 3-0030-2.

NO Record SRN 16-64A-F80-A10, then go to "Step 36" on page 3-0030-36.

Step 21

Look at the upper left corner of the display.

IS "DCP" DISPLAYED THERE?

YES Record SRN 16-64A-F80-A10, then go to "Step 36" on page 3-0030-36.

Note: A defective diagnostic diskette can cause this problem also.

NO Continue on the next page.

Step 22

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

Display Type	Go to PIC
IBM 5151 Personal Computer Display	"IBM 5151 Personal Computer Display PIC 5400" on page 3-5400-1
IBM 5154 Enhanced Color Display	"IBM 5154 Enhanced Color Graphics Display PIC 5800" on page 3-5800-1
IBM 6153 Advanced Monochrome Graphics Display	"IBM 6153 Advanced Monochrome Graphics Display PIC 6000" on page 3-6000-1
IBM 6154 Advanced Color Graphics Display	"IBM 6154 Advanced Color Display PIC 5900" on page 3-5900-1
IBM 6155 Extended Monochrome Graphics Display	"IBM 6155 Extended Monochrome Graphics Display PIC 6200" on page 3-6200-1
IBM 5081 Display	"IBM 5081 Display PIC 6100" on page 3-6100-1

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

YES Go to the PIC for your display.

NO The display is not supported by this manual, go to the service documentation for the attached display.

Step 23

This step is for flashing numbers only.

Look for the number displayed in the two-digit display in the following table.

Number	Go to Step
02	"Step 24" on page 3-0030-24
30	"Step 24" on page 3-0030-24
99	"Step 25" on page 3-0030-25

DID YOU FIND THE NUMBER IN THE TABLE?

YES Go to the step listed.

NO Go to "Step 25" on page 3-0030-25.

Step 24

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 16-64A-F80 and go to "Step 36" on page 3-0030-36.

Step 25

A program or machine check occurred. Go to "Undetermined Problem PIC 9860" on page 3-9860-1.

Step 26

Determine the type of display adapter the display is attached to. Look for 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
Advanced Color Graphics Display Adapter	12-450
Extended Monochrome Graphics Display Adapter	12-470
IBM Megapel Display Adapter	12-4B0

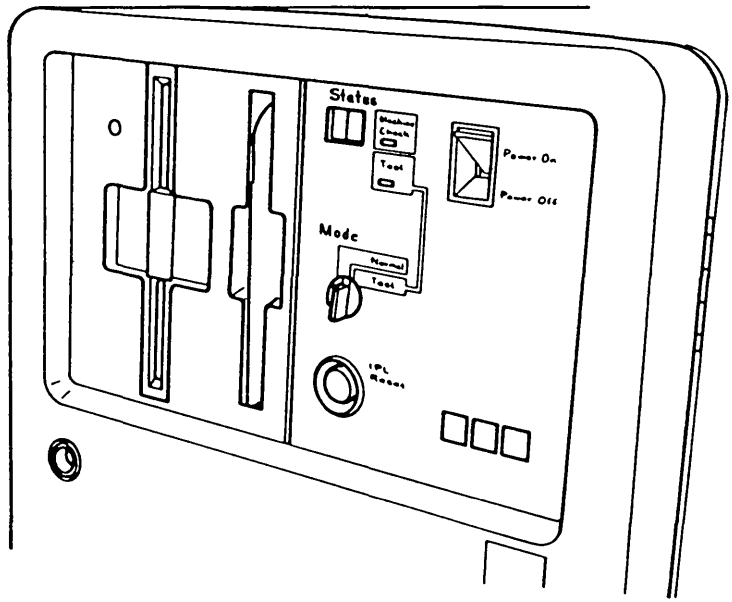
DID YOU FIND THE ADAPTER IN THE TABLE?

YES Record the SRN, then go to "Step 36" on page 3-0030-36.

NO See "Loading Additional Device Drivers" on page 2-9, then go to "Step 3" on page 3-0030-3. If you don't have an additional device driver diskette, then the display adapter is not supported in this documentation.

Step 27

Look at the cables attached to your system unit.



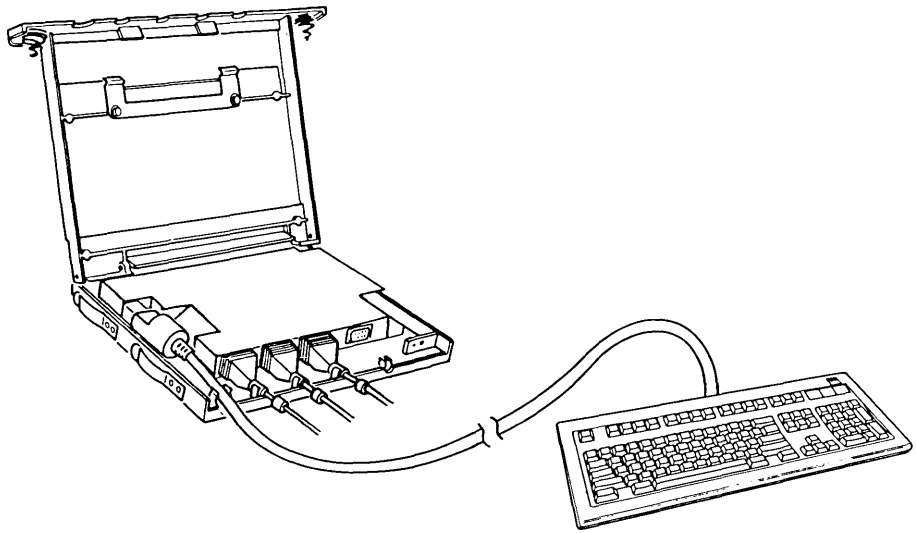
IS AN IBM 5085 CONNECTED TO YOUR SYSTEM UNIT?

NO Record SRN 32-780, then go to "Step 36" on page 3-0030-36.

YES Continue on the next page.

Step 28

Be sure the keyboard is connected to the Peripheral Connection Assembly (PCA) on the IBM 5085. The PCA is installed in the base of the IBM 5081 Display. If needed, see the *IBM 5085 Graphics Processor Maintenance Information Manual.*



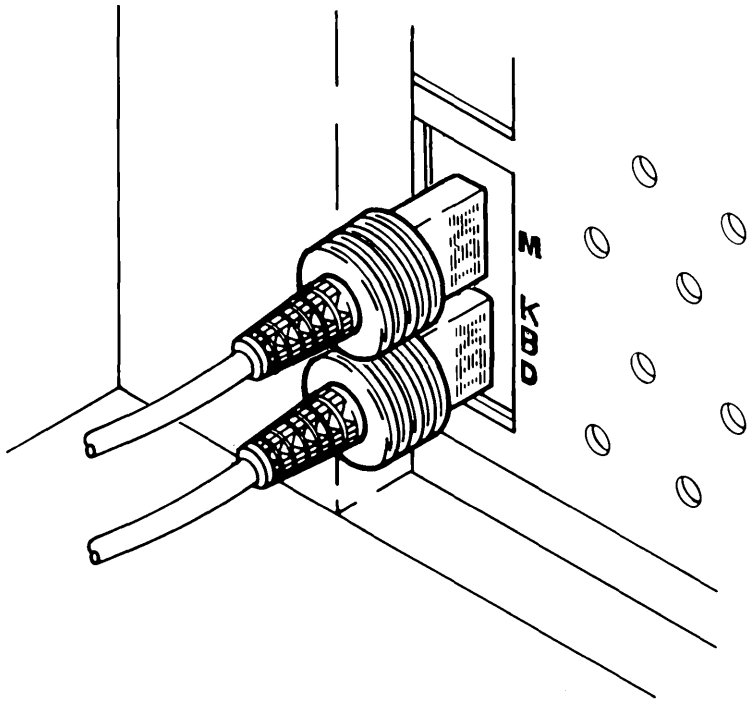
DID YOU FIND A PROBLEM?

YES This completes the repair.

NO Continue on the next page.

Step 29

Be sure the Y cable is correctly connected to the PCA on the IBM 5085 and to the M (mouse) and KBD (keyboard) connectors on the IBM 6150. The PCA is installed in the base of the IBM 5081. If needed, see the *IBM 5085 Graphics Processor Maintenance Information Manual.*



DID YOU FIND A PROBLEM?

YES This completes the repair.

NO Go to the maintenance instructions for the IBM 5085.

Step 30

The checkout routines ran correctly.

Each of the following problems are related to particular SRNs. Check the system for the following problems:

- The indicators on the keyboard are not working (check during power-on self-test).
- The speaker in the keyboard is not working or sounds continually (check during power-on self-test).
- The two-digit display fails to display correctly (check at the start of power-on self-test). The power-on self-test program displays 88 at the start of the test to check the two-digit display.

DID YOU FIND ONE OF THE ABOVE PROBLEMS?

YES Record the corresponding SRN for the problem.

- The indicators on the keyboard are failing, record 16-780.
- The two-digit display is failing, record 16-630-84A.
- The speaker in the keyboard is failing, record 16-780-100.

Note: If an IBM 5085 is attached, it can also cause a speaker problem.

Go to "Step 36" on page 3-0030-36.

NO Continue on the next page.

Step 31

A loud noise can be caused by moving parts in the system unit.

DID THE CUSTOMER REPORT A NOISE PROBLEM?

YES Go to "Noise Problem PIC 0050" on page 3-0050-1.

NO Continue on the next page.

Step 32

The problem may be an incorrect switch or jumper setting on an option, adapter, fixed-disk drive, or diskette drive. This may occur in a new installation or after a new option is installed. Ask the customer if this is a new installation or if a new option was added to the system.

DO YOU SUSPECT A SWITCH OR JUMPER SETTING IS THE PROBLEM?

YES Switch and jumper settings depend upon the system configuration. The *Options Installation* manual shows the switch settings for different configurations. Use the *Options Installation* manual to check the jumper and switch settings on your system, then continue on the next page.

NO Go to "Step 34" on page 3-0030-34.

Step 33

After checking the switch and jumper settings on your system, answer the following question.

DID YOU FIND A PROBLEM?

YES Run the System Checkout to verify the repair.

This completes the repair.

NO Continue on the next page.

Step 34

Some problems occur intermittently.

IS THIS PROBLEM FAILING INTERMITTENTLY?

YES Go to "Intermittent Problem PIC 0090" on page 3-0090-1.

NO Continue on the next page.

Step 35

Some problems may not be detected by the diagnostic routines but still fail when running a certain application program.

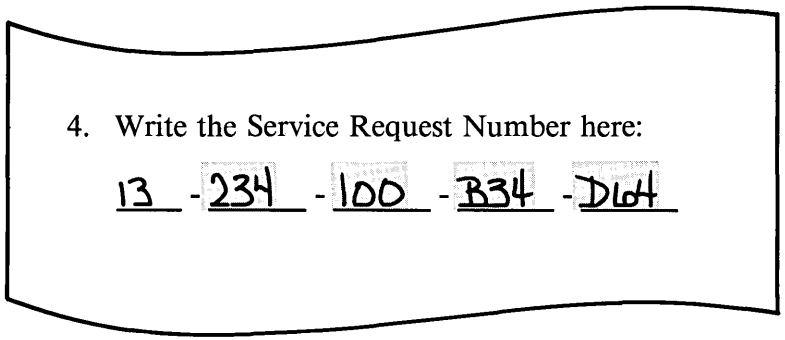
DOES THIS PROBLEM OCCUR ONLY WHEN RUNNING A CERTAIN APPLICATION PROGRAM?

YES Go to "Application Only Problems PIC 0080" on page 3-0080-1.

NO No trouble was found. This completes the repair.

Step 36

You may have already analyzed all the SRAs in the SRN using PIC 0010.



HAVE YOU ANALYZED EACH OF THE SRAs IN THE SRN USING PIC 0010?

YES Go to "Unresolved Problem PIC 0060" on page 3-0060-1.

NO Go to "Step 3" on page 3-0010-4 and analyze the new SRAs.

POST Indicator Chart PIC 0040

Note: This chart is for ***steady*** numbers only. For numbers that are flashing, go to "Undetermined Problem PIC 9860" on page 3-9860-1.

Do not use this PIC alone. Start at the "Start of Call PIC 0010" on page 3-0010-1.

Number	Service Request Number or Action
00	11-100-84A-490
01	11-84A
02	11-100-19B
03	11-F6C-84A
04	11-84A-100
05	11-981-F6C-84A
07	11-100-84A
08	11-84A-100
09	11-100-780
0c	11-100-8EA-490
10	11-100-84A
11	11-100
12	11-100
14	11-F80
1c	11-8EA
22	11-F80-64A-A10
23	11-984-F80-100

Number	Service Request Number or Action
25	Software problem during IPL. Power off to clear the problem.
27	11-F6C
30	12-490
31	12-410
32	12-430
33	12-450
34	12-470
35	12-FBC-F80-A10
36	12-FBD-F81-A10
37	12-FBE-F81-A20
39	12-100-F80
3c	11-F6C-8EA
40	12-F80-100
43	12-200-240
44	12-19B
45	12-490
46	12-340
47	12-1DC
48	12-1DD
4c	11-8EA-100
50	12-310
51	12-230

Number	Service Request Number or Action
52	12-5B0
53	12-350
54	12-230
55	12-350
56	12-390
57	12-390
58	12-320
59	12-3A0
5c	11-F6C-8EA
60	12-280
61	12-380
62	12-400
65	12-4A0
66	12-4B0
67	12-1CB
68	12-8EA
69	12-8EA
71	12-15C
72	12-12C
73	12-16C
74	12-1EC
76	12-12D
77	12-15D
78	12-16D

Number	Service Request Number or Action
79	12-1ED
7c	11-100-8EA
80	12-100
81	32-780
82	12-100
84	12-210
85	12-800
86	12-300
88	11-F4A-100
89	12-F4A-100
8c	11-8EA-100
90	12-850
93	12-64A-F80 (First, be sure the write protect tab is not on the diagnostic diskette.)
94	See "Loading Additional Device Drivers" on page 2-8, then use "Problem Determination Procedure PIC 0030" on page 3-0030-1.
95	12-F7x-FBx-F8x
99	The keylock is set to On.

Noise Problem PIC 0050

Use this PIC to find the FRU that is causing a loud noise.

Step 1

The device causing the noise can be identified by removing devices from the system unit.

IS THE NOISE COMING FROM THE SYSTEM UNIT?

NO Go to "Step 5" on page 3-0050-5.

YES Continue on the next page.

Step 2

The diskette drives, fixed-disk drives, power supply, and the cooling fan have moving parts that can cause noise problems.

CAN YOU IDENTIFY WHICH FRU IS CAUSING THE NOISE?

YES Do the following:

1. Exchange the FRU.
2. Run the System Checkout.
3. This completes the repair.

NO Continue on the next page.

Step 3

1. Set the power switch on the system unit to Off.
2. Do the "Side Cover Removal" on page 4-14.
3. Disconnect the power connectors to the diskette drives, fixed-disk drives, and the cooling fan.
4. Set the power switch on the system unit to On.

DO YOU STILL HAVE A NOISE PROBLEM?

YES Do the following:

1. Exchange the power supply.
2. Connect the power connectors to the drives and fan.
3. Run the System Checkout.
4. This completes the repair.

NO Continue on the next page.

Step 4

Either the diskette drives, fixed-disk drives, or the cooling fan is causing the problem.

1. Set the power switch on the system unit to Off.
2. Connect one of the drives or the cooling fan.
3. Set the power switch to On.

DO YOU STILL HAVE A NOISE PROBLEM?

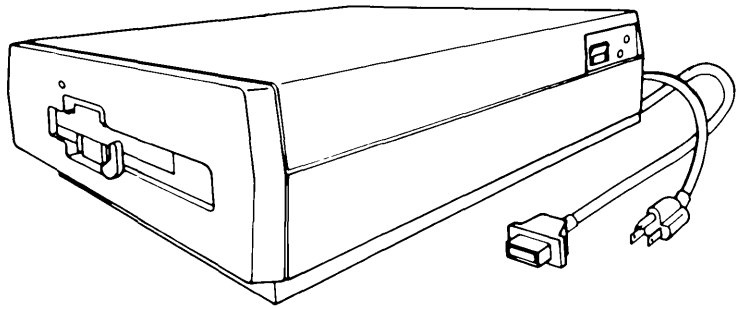
YES The device just connected is failing.

1. Exchange the device last connected.
2. Connect the remaining drives and cooling fan.
3. Run the System Checkout.
4. This completes the repair.

NO Repeat the steps above.

Step 5

Listen to the tape drive.



IS THE NOISE COMING FROM THE TAPE DRIVE?

YES The tape drive is causing the noise.

1. Exchange the tape drive.
2. Run the System Checkout.
3. This completes the repair.

NO Follow the procedures for servicing the device which has the noise problem.

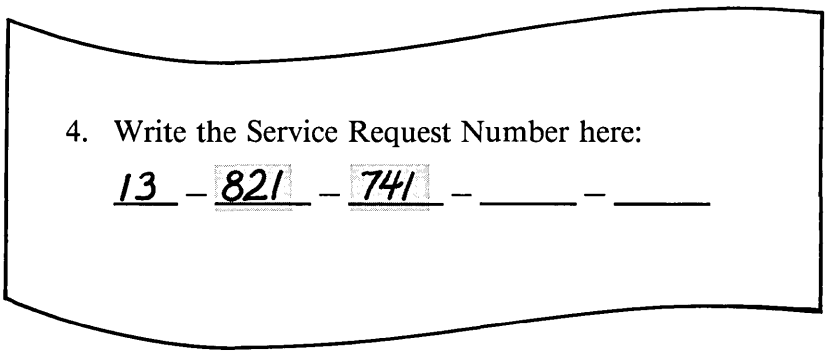
Unresolved Problem PIC 0060

Use this PIC for problems that still fail after all of the FRUs in the SRN have been exchanged.

Note: If the IBM 6150 is attached to an IBM 5085, disconnect the cable that attaches the IBM 5085 to the keyboard (KBD) and mouse (M) connectors at the IBM 6150 end. Connect the keyboard and mouse or tablet directly to the IBM 6150 connectors. Try the failing procedure. If the system does not fail, use the maintenance procedures for the IBM 5085 to isolate the problem.

Step 1

This problem may be caused by a defective cable. Look at the SRN.



DOES THE SRN CONTAIN THE SRA NUMBERS OF TWO FRUs THAT ARE CONNECTED BY A CABLE THAT HAS NOT BEEN EXCHANGED (such as a fixed-disk adapter and the fixed-disk drive)?

NO Go to "Step 3" on page 3-0060-3.

YES Continue on the next page.

Step 2

1. Exchange the cable.
2. Try the failing operation again.

DOES THE SYSTEM STILL FAIL?

NO This completes the repair.

YES Continue on the next page.

Step 3

Look at the SRN.

4. Write the Service Request Number here:
   13 - 234 - 100 - B34 - D64

IS THE PROCEDURE NUMBER A "2" OR A "7"?

NO Go to "Step 6" on page 3-0060-6.

YES Continue on the next page.

Step 4

The system board may be the problem.

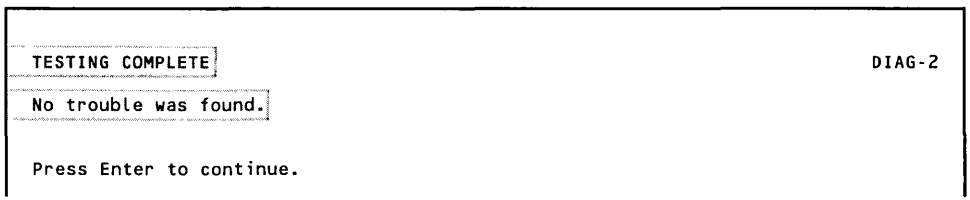
HAS THE SYSTEM BOARD BEEN REPLACED?

YES Go to "Step 6" on page 3-0060-6.

NO Continue on the next page.

Step 5

1. Exchange the System Board.
2. Run System Checkout.



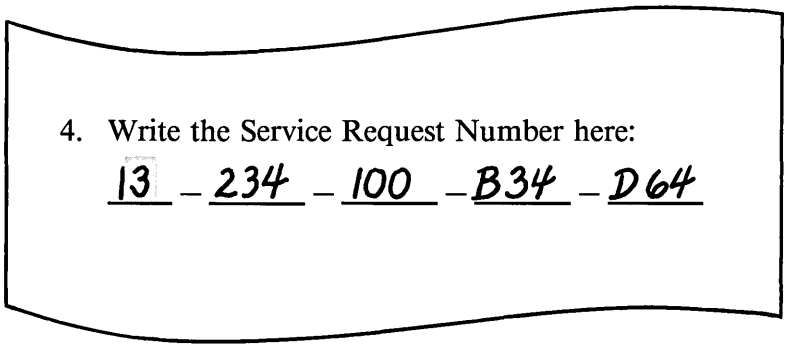
WERE YOU ABLE TO LOAD AND RUN SYSTEM CHECKOUT AND DID THE "NO TROUBLE WAS FOUND" MESSAGE DISPLAY?

YES This completes the repair.

NO Go to "Step 19" on page 3-0060-20.

Step 6

Look at the SRN.



IS THE PROCEDURE NUMBER A "1"?

NO Go to "Step 9" on page 3-0060-9.

YES Continue on the next page.

Step 7

A procedure number of 1 indicates that the system unit failed with an error code displayed in the two-digit display.

1. Set the power switch on the system unit to Off.
2. If needed, see Section 4 to remove the covers.
3. If present, remove the options from slots B and D. Then, remove all of the adapters from the adapter slots (record the slot numbers).
4. Set the power switch on the system unit to On and wait 2 minutes.

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

NO One of the remaining boards or options is failing. The order of most likely failure is:

1. The processor board
2. The system board
3. The memory expansion option in slot C.

Using the list above, exchange any FRU not already exchanged. To test each new FRU, set the power switch on the system unit to On and wait 2 minutes for 23 to display in the two-digit display. When 23 displays, the last FRU exchanged is the failing FRU.

Go to "Step 25" on page 3-0060-26.

YES Continue on the next page.

Step 8

One of the options or adapters you removed is failing.

1. Set the power switch on the system unit to Off.
2. Install one of the removed options or adapters. Use the following order, slots C, D, B, then the adapters in the other slots, being sure that the fixed-disk and diskette drive adapter is the last adapter installed.
3. Set the power switch on the system unit to On and wait 2 minutes, then answer the following question.

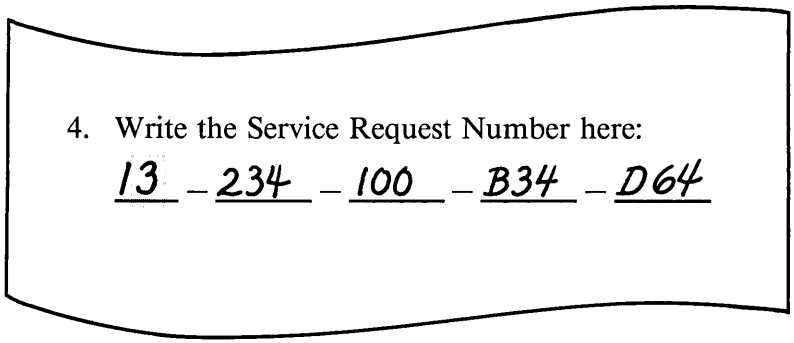
IS "23" DISPLAYED IN THE TWO-DIGIT DISPLAY?

YES Repeat the above steps.

NO The last option or adapter installed or a FRU attached to it is failing. Use the removal and replacement procedures in the section that applies to the FRU and exchange it. Go to "Step 25" on page 3-0060-26.

Step 9

Look at the SRN.



IS THE PROCEDURE NUMBER A "3"?

NO Go to "Step 19" on page 3-0060-20.

YES Continue on the next page.

Step 10

Look at the SRN.

4. Write the Service Request Number here:
   13 - 234 - _____ - _____ - _____

DOES THE SRN CONTAIN ONLY ONE SRA NUMBER?

NO Go to "Step 13" on page 3-0060-13.

YES Continue on the next page.

Step 11

The failure may be caused by a device or adapter attached to one of the FRUs indicated by an SRA number in the SRN. For example, the SRA number may indicate a tape drive and the tape drive adapter may be the failing FRU, or the SRA number may indicate the tape drive adapter and tape drive is the failing FRU.

4. Write the Service Request Number here:

   13 – 821 – 741 – _____ – _____

DOES THE SRA NUMBER INDICATE A FRU THAT HAS A DEVICE OR ADAPTER ATTACHED TO IT?

NO Go to "Step 13" on page 3-0060-13.

YES Continue on the next page.

Step 12

1. Exchange the device or adapter attached to the FRU indicated in the SRA number.
2. Try the failing procedure again.

DOES THE SYSTEM STILL FAIL?

NO This completes the repair.

YES Continue on the next page.

Step 13

The System Checkout routine will sometimes detect a problem that is not detected by the other diagnostics.

```
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) and Media Checkout
 6  Serial Ports S1 and S2 Checkout
 7  IBM AT Serial/Parallel Adapter 1 in Slot X Checkout
 8  RT PC 4 Port Asynchronous RS232C Adapter 1 in Slot X Checkout
 9  RT PC 4 Port Asynchronous RS232C Adapter 2 in Slot X Checkout
10  RT PC 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: _
```

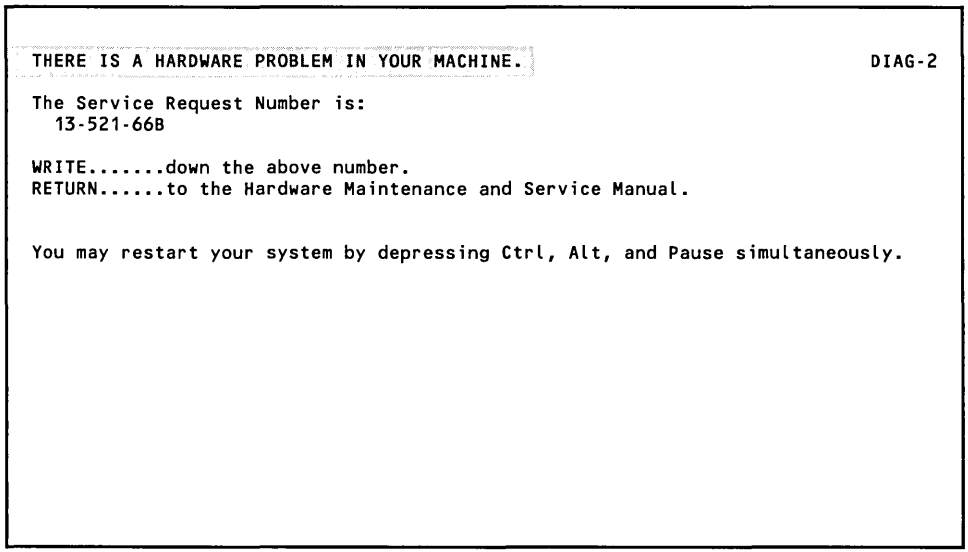
HAVE YOU RUN "SYSTEM CHECKOUT" USING THE ADVANCED DIAGNOSTIC ROUTINES?

YES Go to "Step 19" on page 3-0060-20.

NO Continue on the next page.

Step 14

Run the System Checkout using the Advanced Diagnostic Routines.



DID THE "THERE IS A HARDWARE PROBLEM IN YOUR MACHINE" SCREEN DISPLAY?

NO Go to "Step 16" on page 3-0060-16.

YES Continue on the next page.

Step 15

Look at the SRN.

```
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 YOU GET AN SRN THAT CONTAINS SRA NUMBERS THAT HAVE NOT BEEN ANALYZED?

YES Record the SRN, then go to "Step 3" on page 3-0010-4 and analyze the SRA numbers you have not analyzed.

NO Go to "Step 19" on page 3-0060-20.

Step 16

You are here because the system is failing only when a diagnostic checkout other than the System Checkout is run. The following FRUs are required to select a checkout procedure.

- The system board.
- The processor board.
- A memory expansion option in slot C.
- An adapter for the diskette drive.
- An IBM AT High Capacity Diskette Drive in drive position A.
- A display adapter.
- A display.
- The cables for the diskette drive.
- The power supply.
- The cooling fan.
- A keyboard.

Step 16 continues on the next page.

(Step 16 continued)

When the FRUs listed on the previous page are installed, the following selections display on the DIAGNOSTIC SELECTION menu.

- System Checkout
- Display Checkout
- Diskette Drive(s) Checkout
- Fixed-disk Drive(s) Checkout
- Keyboard Checkout.

IS THE DIAGNOSTIC CHECKOUT THAT FAILED IN THE LIST ABOVE?

YES Remove any FRU from the system unit that is not in the list above, then continue on the next page.

NO All other diagnostic checkouts relate to specific FRUs, they appear only when the FRUs are installed in the system unit.

Remove any FRU not listed above except FRUs that are related to the failing diagnostic checkout, then continue on the next page.

Step 17

Run the diagnostic checkout that fails. The TEST OPTION and the DIAGNOSTIC TEST LIST menu will display if the configuration was changed. Follow the instructions as they display.

```
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.
```

DID THE "THERE IS A HARDWARE PROBLEM IN YOUR MACHINE" SCREEN DISPLAY?

NO One of the FRUs you removed is failing. Install the FRUs one at a time until the failing FRU is identified. Test each FRU by running the failing diagnostic checkout. The TEST OPTION and the DIAGNOSTIC TEST LIST menu will display if the configuration was changed. Follow the instructions as they display. If you identify a failing FRU, use the removal and replacement procedures in the section that applies to the FRU and exchange it, then go to "Step 25" on page 3-0060-26. If you cannot identify a failing FRU, contact your service support person.

YES Continue on the next page.

Step 18

One of the FRUs still installed in the system unit is failing. The following list is in the most to least likely to fail order.

If you have not exchanged it already, use the removal and replacement procedures in the section that applies to the FRU and exchange it. Test each FRU by running the failing diagnostic checkout. If you identify the failing FRU, go to "Step 25" on page 3-0060-26. If you cannot identify a failing FRU, contact your service support person.

1. FRUs required to run the failing diagnostic checkout.
2. The system board.
3. The processor board.
4. A display adapter.
5. The memory expansion option in slot C.
6. The adapter for the fixed-disk and diskette drive.
7. The power supply.
8. An IBM AT High Capacity Diskette Drive in drive position A.
9. The cables for the fixed-disk and diskette drive.
10. The cooling fan.
11. A display.
12. A keyboard.

Step 19

The following FRUs are required to run the System Checkout. Remove any other FRUs that are installed in the system unit.

- The system board.
- The processor board.
- A memory expansion option in slot C.
- An adapter for the diskette drive.
- An IBM AT High Capacity Diskette Drive in drive position A.
- A display adapter.
- A display.
- The cables for the diskette drive.
- The power supply.
- The cooling fan.
- A keyboard.

Run the System Checkout. The TEST OPTION and the DIAGNOSTIC TEST LIST menu will display if the configuration was changed. Follow the instructions as they display.

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

YES One of the FRUs you removed is failing. Install the FRUs one at a time until the failing FRU is identified. Test each FRU by running the failing diagnostic checkout. The TEST OPTION and the DIAGNOSTIC TEST LIST menu will display if the configuration was changed. Follow the instructions as they display. If you identify a failing FRU, use the removal and replacement procedures in the section that applies to the FRU and exchange it, then go to "Step 25" on page 3-0060-26. If you cannot identify a failing FRU, contact your service support person.

NO Continue on the next page.

Step 20

One of the FRUs still installed in the system unit is failing. The most likely failing order depends on the failing area. The failing area can be related to the types of FRUs that you have exchanged that did not fix the problem. Find the area that best describes your problem in the table below, then go to that step.

Failing Area	Go to Step
Displays	"Step 21" on page 3-0060-22
Fixed-disk and diskette drives	"Step 22" on page 3-0060-23
Keyboard	"Step 23" on page 3-0060-24
Other or unknown area	"Step 24" on page 3-0060-25

Step 21

The following FRUs are the most likely to cause display failures.

Exchange the FRUs that have not been exchanged in the following order. Test each FRU by running System Checkout. If you identify a failing FRU, use the removal and replacement procedures in the section that applies to the FRU and exchange it, then go to "Step 25" on page 3-0060-26. If you cannot identify a failing FRU, contact your service support person.

1. The display.
2. The display adapter.
3. The system board.
4. The processor board.
5. A memory expansion option in slot C.
6. An adapter for the fixed-disk and diskette drive.
7. The power supply.
8. The IBM AT High Capacity Diskette Drive in drive position A.
9. The cables for the fixed-disk and diskette drive.
10. The cooling fan.
11. The keyboard.

Step 22

The following FRUs are the most likely to cause a failure in the fixed-disk and diskette drives.

Exchange the FRUs that have not been exchanged in the following order. Test each FRU by running System Checkout. If you identify a failing FRU, use the removal and replacement procedures in the section that applies to the FRU and exchange it, then go to "Step 25" on page 3-0060-26. If you cannot identify a failing FRU, contact your service support person.

1. An adapters for the fixed-disk and diskette drives.
2. The cables for the fixed-disk and diskette drive.
3. The IBM AT High Capacity Diskette Drive.
4. The system board.
5. The processor board.
6. The power supply.
7. The display adapter.
8. A memory expansion option in slot C.
9. The cooling fan.
10. The display.
11. The keyboard.

Step 23

The following FRUs are the most likely to cause a keyboard failure.

Exchange the FRUs that have not been exchanged in the following order. Test each FRU by running System Checkout. If you identify a failing FRU, use the removal and replacement procedures in the section that applies to the FRU and exchange it, then go to "Step 25" on page 3-0060-26. If you cannot identify a failing FRU, contact your service support person.

1. The keyboard.
2. The system board.
3. The processor board.
4. The power supply.
5. The display adapter.
6. An adapter for the fixed-disk and diskette drive.
7. A memory expansion option in slot C.
8. The IBM AT High Capacity Diskette Drive.
9. The cables for the fixed-disk and diskette drive.
10. The cooling fan.
11. The display.

Step 24

The following FRUs are also likely to cause a failure.

Exchange the FRUs that have not been exchanged in the following order. Test each FRU by running System Checkout. If you identify a failing FRU, use the removal and replacement procedures in the section that applies to the FRU and exchange it. Go to "Step 25" on page 3-0060-26. If you cannot identify a failing FRU, contact your service support person.

1. The system board.
2. The processor board.
3. A memory expansion option in slot C.
4. An adapter for the fixed-disk and diskette drive.
5. The AT High Capacity Diskette Drive.
6. The cables for the fixed-disk and diskette drive.
7. The display adapter.
8. The power supply.
9. The cooling fan.
10. The display.
11. The keyboard.

Step 25

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. If needed, see Section 4 to install the covers.
4. Set the power switch on the system unit to On.
5. Follow the instructions on the menus to run the System Checkout. The TEST OPTION and the DIAGNOSTIC TEST LIST menu will display if the configuration was changed. Follow the instructions as they display. If needed, see page 2-17.

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

NO If the same failure occurs, contact your service support person, otherwise, go to "Problem Determination Procedure PIC 0030" on page 3-0030-1.

YES This completes the repair.

Application Only Problems PIC 0080

Use this PIC to find problems that fail only when an application program is running and the diagnostic programs run without a failure.

Step 1

The AIX[1] Operating System provides an error logging function.

IS THE CUSTOMER USING THE "AIX OPERATING SYSTEM"?

NO Go to "Step 8" on page 3-0080-8.

YES Continue on the next page.

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Step 2

1. Record the time.
2. Ask the operator to load the operating system and turn on the Error Log. The command to turn on the Error Log is:

   /usr/lib/errdemon

3. Ask the operator to run the failing application program.
4. After a failure occurs, ask the operator to print a Summary Report of the permanent errors starting at the time you recorded. The command is (where **MMddhhmmyy** is month, day, hour, minute, year):

   errpt -d t01 -sMMddhhmmyy | print

5. Look at the printed error log. If needed, see Appendix C.

ARE THERE ANY ERRORS LISTED?

NO Go to "Step 8" on page 3-0080-8.

YES Continue on the next page.

Step 3

Look at the printed Summary Report.

ARE THERE ANY HARDWARE ERRORS LISTED?

NO Have the customer follow the procedures for reporting the types of errors listed.

YES Continue on the next page.

Step 4

Ask the operator to print a Detail Report for the hardware errors listed. The command is (where **MMddhhmmyy** is month, day, hour, minute, year):

```
errpt -a -d t01 -d h00 -sMMddhhmmyy | print
```

ARE THE HARDWARE ERRORS RELATED TO THE HARDWARE YOU SERVICE?

NO Have the customer follow the procedures for resolving the problems listed.

YES Continue on the next page.

Step 5

1. Record the SRNs for the errors that are related to the hardware you service.
2. Look up the FRUs that correspond to the SRAs in each SRN.
3. Use the removal and replacement procedures in the section that applies to the FRU and exchange the FRU that corresponds to the first SRA in the SRN.
4. Ask the customer to run the failing application again.

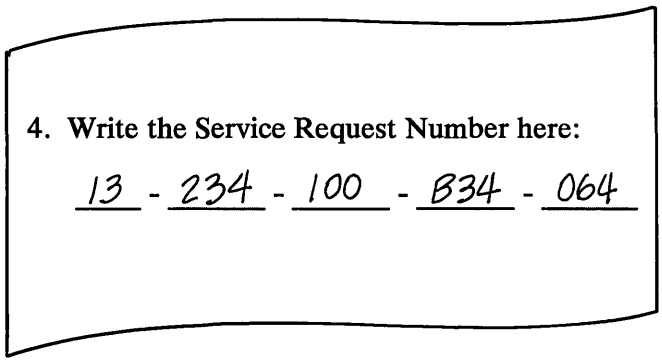
DID THE SAME FAILURE OCCUR?

NO This completes the repair.

YES Continue on the next page.

Step 6

One of the FRUs that correspond to the SRAs in the SRN should fix the problem.



HAVE YOU EXCHANGED ALL OF THE FRUs THAT CORRESPOND TO THE SRAs IN EACH SRN?

YES Contact your service support person.

No Continue on the next page.

Step 7

1. Remove the last FRU you exchanged.
2. Install the original FRU.
3. Use the removal and replacement procedures in the section that applies to the FRU and exchange the FRU that corresponds to the next SRA in the SRN.
4. Ask the customer to run the failing application again.

DID THE SAME FAILURE OCCUR?

YES Go to "Step 6" on page 3-0080-6.

NO This completes the repair.

Step 8

The failure is not being detected by the diagnostic programs or the error log. The problem may be in the software.

DO YOU SUSPECT A SOFTWARE PROBLEM?

YES Have the customer follow the procedures for software problems.

NO Continue on the next page.

Step 9

The following lists devices and the most likely failing FRUs for each device:

Diskette	The adapter for the fixed-disk and diskette drives, a diskette drive, a diskette
Fixed disk	The adapter for the fixed-disk and diskette drives, a fixed-disk drive
Printer	The printer adapter, the printer, the printer cable
Plotter	The plotter adapter, the plotter, the plotter cable
Terminal	The terminal adapter, the terminal, the terminal cable
Modem	The adapter the modem is attached to, the modem, the modem cable
Coprocessor	The IBM AT Coprocessor Option, the IBM AT Math Co-processor module, the IBM AT 512KB Memory Expansion Option
Display	The display adapter, the display, the display cable
5080 Adapter	The RT PC 5080 Attachment Adapter, The RT PC 5080 Attachment Adapter cables, the IBM 5085
Keyboard	The keyboard, the system board
Mouse	The mouse, the system board
Tape	The tape drive adapter, the tape drive, the tape cartridge.

In addition to the above FRUs, the following common FRUs could also cause a problem:

- System board
- Processor board
- Memory expansion option
- Floating-point board
- Power supply.

Step 9 continues on the next page.

(Step 9 continued)

1. Find the device that best describes your failure in the lists on the previous page.
2. Record the FRUs listed for that device and the common FRUs that are installed in your system.
3. Replace one of the FRUs.
4. Ask the customer to run the failing application program again.

DID THE SAME FAILURE OCCUR?

NO This completes the repair.

YES Continue on the next page.

Step 10

1. Remove the last FRU you exchanged.
2. Install the original FRU.

HAVE ALL THE FRUs YOU RECORDED BEEN EXCHANGED?

YES Contact your service support person.

NO Continue on the next page.

Step 11

1. Exchange the next FRU on your list.
2. Ask the customer to run the failing application program again.

DID THE SAME FAILURE OCCUR?

YES Go to "Step 10" on page 3-0080-11.

NO This completes the repair.

Intermittent Problems PIC 0090

Use this PIC for intermittent problems that do not fail while running the diagnostic routines.

Step 1

Some problems occur every time an application program is running.

DOES THE PROBLEM OCCUR EVERY TIME AN APPLICATION PROGRAM IS RUNNING?

YES Go to "Application Only Problems PIC 0080" on page 3-0080-1.

NO Continue on the next page.

Step 2

The AIX Operating System provides error logging.

IS THE CUSTOMER USING THE "AIX OPERATING SYSTEM"?

NO Go to "Step 9" on page 3-0090-9.

YES Continue on the next page.

Step 3

1. Ask the operator when the error last occurred.
2. Ask the operator to login on the AIX Operating System.
3. Ask the operator to print a Summary Report of all permanent errors starting about an hour before the reported error occurred. The command is (where **MMddhhmmyy** is month, day, hour, minute, year):

   errpt -d t04,t04 -sMMddhhmmyy | print

4. Check the log for errors. If needed, see Appendix C.

ARE ANY ERRORS RECORDED?

NO No trouble was found. Ask the operator to run the system with the error log turned on so that if any errors are detected they will be recorded.

YES Continue on the next page.

Step 4

Look at the printed Error Summary report.

ARE THERE ANY HARDWARE ERRORS LISTED?

NO Ask the customer to follow the procedure for resolving the types of errors listed.

YES Continue on the next page.

Step 5

Ask the operator to print a Detail Report of the hardware errors listed. The command is (where **MMddhhmmyy** is month, day, hour, minute, year):

```
errpt -a -d t01 -d h00 -sMMddhhmmyy | print
```

ARE THE HARDWARE ERRORS RELATED TO THE HARDWARE YOU SERVICE?

NO Ask the customer to follow the procedure for resolving the type of errors listed.

YES Continue on the next page.

Step 6

1. Record the SRNs for the errors that are related to the hardware you service.
2. Look up the FRUs that correspond to the SRAs in each SRN.
3. The FRUs are listed in the most likely to fail order.
4. Exchange the FRUs one at a time. Check the fix by asking the customer to run the failing application program again.

DID THE SAME FAILURE OCCUR?

NO This completes the repair.

YES Continue on the next page.

Step 7

One of the FRUs that correspond to the SRAs in the SRN should fix the problem.

4. Write the Service Request Number here:

   13 - 234 - 100 - B34 - D64

HAVE YOU EXCHANGED ALL OF THE FRUs THAT CORRESPOND TO THE SRAs IN EACH SRN?

YES Contact your service support person.

NO Continue on the next page.

Step 8

1. Remove the last FRU you exchanged.
2. Install the original FRU.
3. Exchange the FRU that corresponds to the next SRA in the SRN.
4. Ask the customer to run the failing application again.

DID THE SAME FAILURE OCCUR?

YES Go to "Step 7" on page 3-0090-7.

NO This completes the repair.

Step 9

The diagnostics can be run in loop mode by selecting the Run Test Multiple Times option in the TEST METHOD SELECTION menu. Run the diagnostics in loop mode for several minutes on any device you think is failing.

DID THE DIAGNOSTICS FIND A PROBLEM?

YES Do the following steps:

1. Record the name of the FRU for each SRA in the SRN. The FRUs are listed in the most likely to fail order.
2. Exchange each FRU one at a time. Check each FRU by running the diagnostics in loop mode for several minutes.

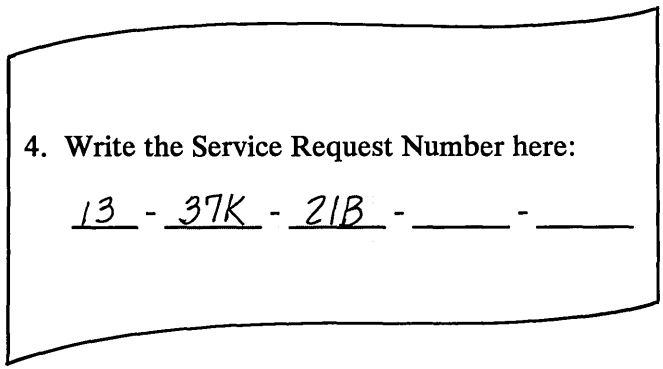
NO No trouble was found. If you still have a problem, contact your support person.

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.



IS ANY OF THE SRAs "210"?

YES Go to "Step 6" on page 3-2100-7.

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 that letter, then go to "Step 3" on page 3-2100-4.

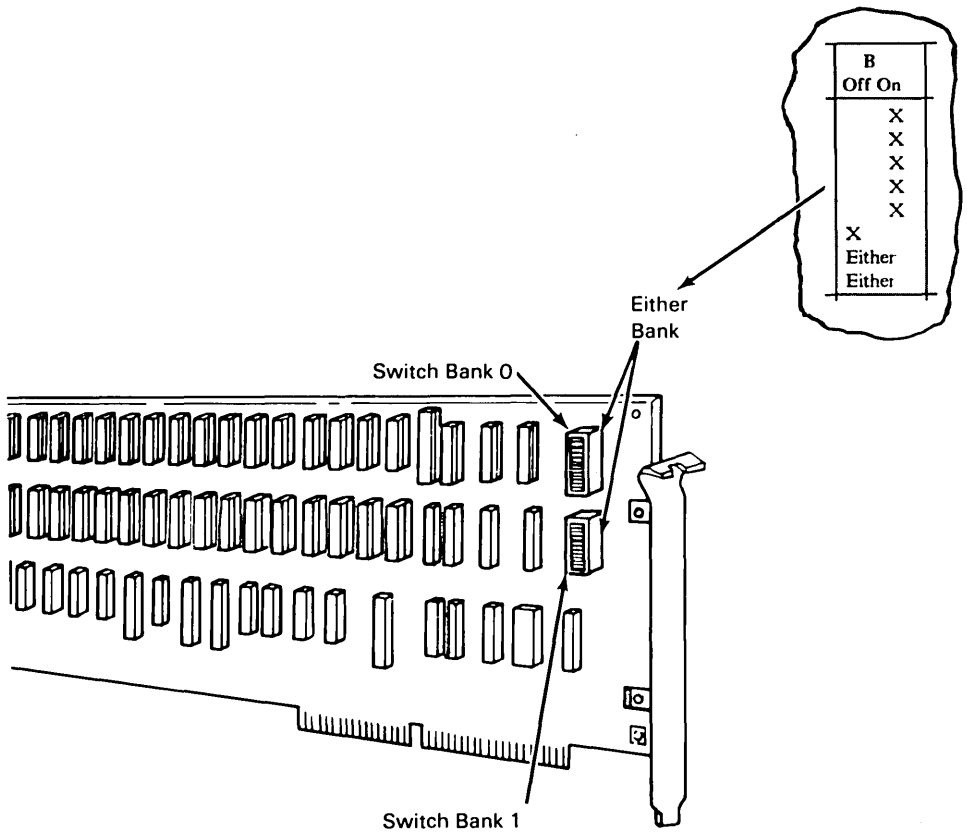
SRA Letter	A Off On	B Off On	C Off On	D Off On	E Off On	F Off On
Switch 1	X	X	Not	Not	X	X
Switch 2	X	X	valid	valid	X	X
Switch 3	X	X	I/O	I/O	X	X
Switch 4	X	X	memory	memory	X	X
Switch 5	X	X	addresses	addresses	X	X
Switch 6	X	X			X	X
Switch 7	Either	Either			Either	Either
Switch 8	Either	Either			Either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

SRA Letter	G Off On	H Off On	I Off On	J Off On	K Off On	L 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 Off On	N Off On	O Off On	P 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

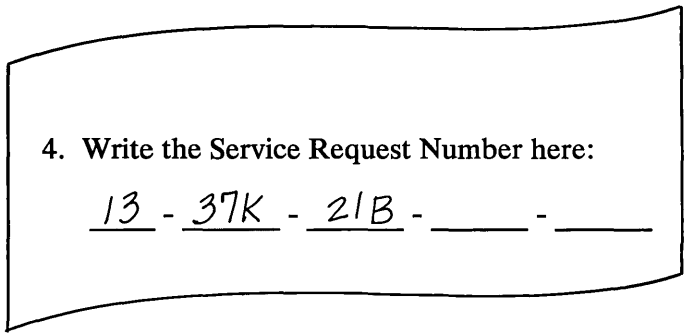
Find the IBM AT 512 KB Memory Expansion Option installed in your system unit with ***either*** Switch Bank 0 or Switch Bank 1 set like you recorded.



Continue on the next page.

Step 4

Look at your SRN.



DOES YOUR SRN HAVE A "37x" SRA?

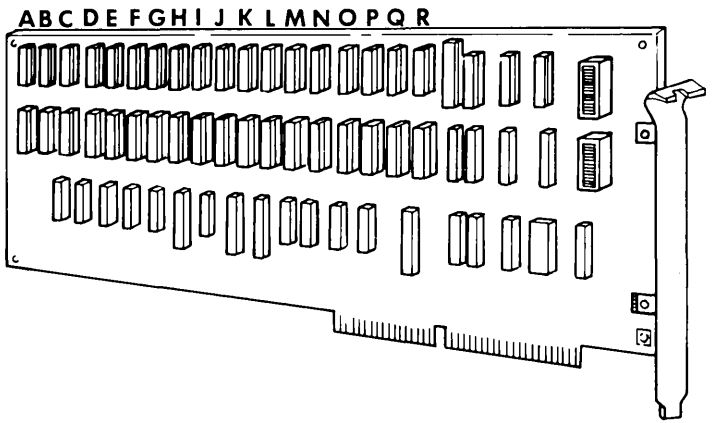
NO Exchange the memory option, then run System Checkout.

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 of 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 the xxK Bytes of IBM AT Memory Checkout. If needed see page 2-16.



DID A FAILURE OCCUR WITH THE SAME SRN?

YES Exchange the IBM AT 512 KB Memory Expansion Option, then go to "Step 7" on page 3-2100-8.

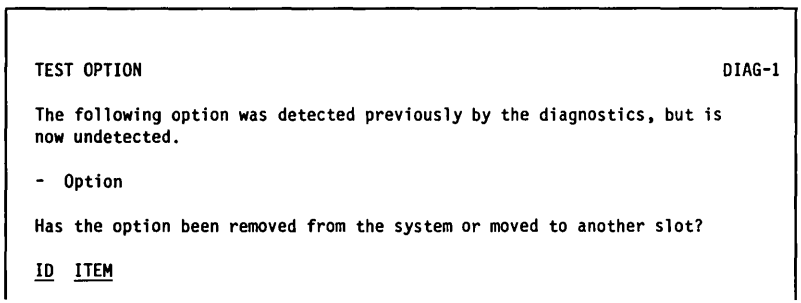
NO Go to "Step 7" on page 3-2100-8.

Step 6

The diagnostic programs were unable to determine the location of the failing IBM AT 512 KB Memory Expansion Option.

1. Exchange one of the IBM AT 512 KB Memory Expansion Options.
2. Run xxK Bytes of IBM AT Memory Checkout. If needed see page 2-16.

   Note: If the failing memory expansion option is still installed in the system unit, you will get the TEST OPTION menu. Answer the question on the menu to get an SRN.



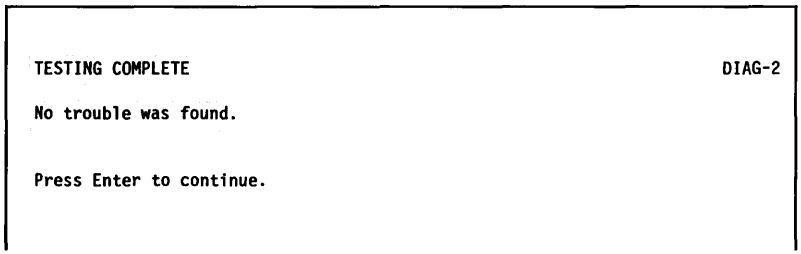
DID YOU GET THE SAME SRN?

YES Repeat the above steps.

NO Continue on the next page.

Step 7

1. Do the "Side Cover Replacement" on page 4-15.
2. Run xxK Bytes of IBM AT Memory Checkout. If needed see page 2-16.



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

YES This completes the repair.

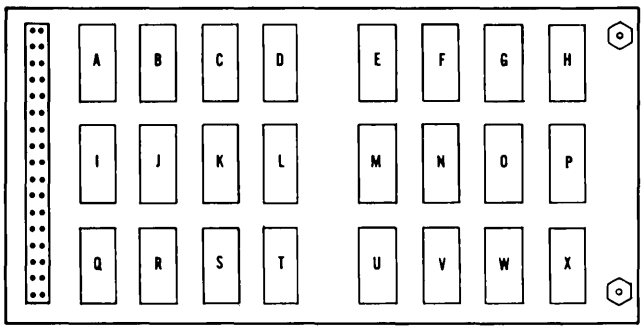
NO If the System Checkout resulted in the same SRN that you have been analyzing, go to "Unresolved Problem PIC 0060" on page 3-0060-1 otherwise go to "Problem Determination Procedure PIC 0030" on page 3-0030-1

IBM PC Enhanced Graphics Adapter Memory PIC 4200

This PIC analyzes the 42x and 44x SRA numbers. The letter in the 42x SRA number identifies the slot that the IBM PC Enhanced Graphics Adapter is in. The letter in the 44x SRA number identifies the failing module on the IBM PC Graphics Memory Expansion Card.

Step 1

1. Using the drawing below, find the module that corresponds to the letter in the 44x SRA.
2. Use the "Removal and Replacement Procedures" on page 9-042-1, to exchange that module.
3. Run the Display Checkout.



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

YES Go to "Step 4" on page 3-4200-4.

NO If you were unable to select and run the Display Checkout, go to "Problem Determination Procedure PIC 0030" on page 3-0030-1. Otherwise, continue on the next page.

Step 2

1. Use the "Removal and Replacement Procedures" on page 9-042-1, to install the original module on the IBM PC Graphics Memory Expansion Card again, but do not install the card on the IBM PC Enhanced Graphics Adapter.
2. Install the IBM PC Enhanced Graphics Adapter in the system unit without the IBM PC Graphics Memory Expansion Card.
3. Run the Display Checkout.

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

NO The IBM PC Enhanced Graphics Adapter is failing.

1. Use the "Removal and Replacement Procedures" on page 9-042-1, to exchange the IBM PC Enhanced Graphics Adapter. Be sure to install the IBM PC Graphics Memory Expansion Card on the new adapter.
2. Run the Display Checkout.

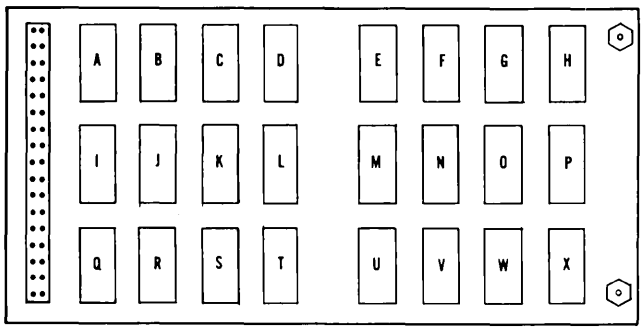
YES Continue on the next page.

Step 3

Exchange the following FRUs to isolate the failure. Check each FRU by running the Display Checkout. Be sure to install the original FRUs in their correct positions if they are not identified as the failing FRU.

1. Exchange the IBM PC Graphics Memory Expansion Card (install the original modules on it).
2. Exchange the modules one at a time or in groups to identify the failing module.
3. Exchange the IBM PC Enhanced Graphics Adapter.

If you still have a problem and the same SRN is displayed, go to "Unresolved Problem PIC 0060" on page 3-0060-1, otherwise go to "Problem Determination Procedure PIC 0030" on page 3-0030-1.



Step 4

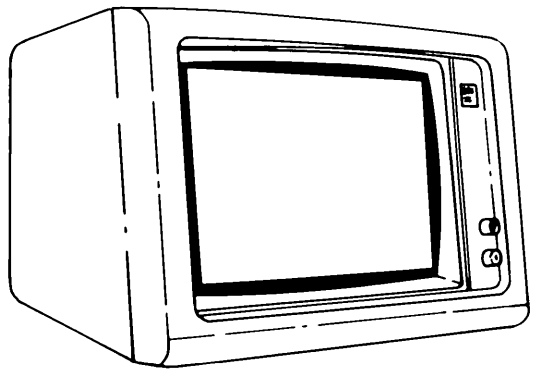
1. Install any FRUs that were removed.
2. Run the System Checkout.
3. If you still have a problem, go to "Problem Determination Procedure PIC 0030" on page 3-0030-1.

IBM 5151 Personal Computer Display PIC 5400

Use this PIC to get an SRN when there is a problem that prevents you from reading the display screen easily, the two-digit display is blank, and the system unit power indicator is on.

Step 1

1. Turn the Brightness and Contrast controls fully clockwise.
2. Look at the display screen.



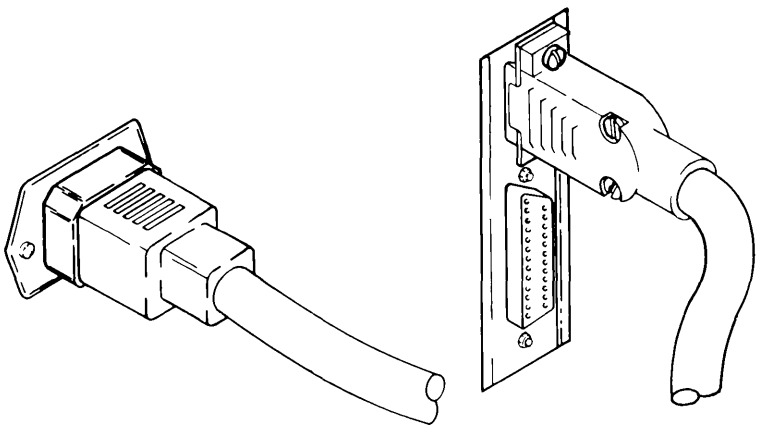
IS THE BACKGROUND OF THE DISPLAY LIGHTED?

YES Go to "Step 3" on page 3-5400-3.

NO Continue on the next page.

Step 2

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



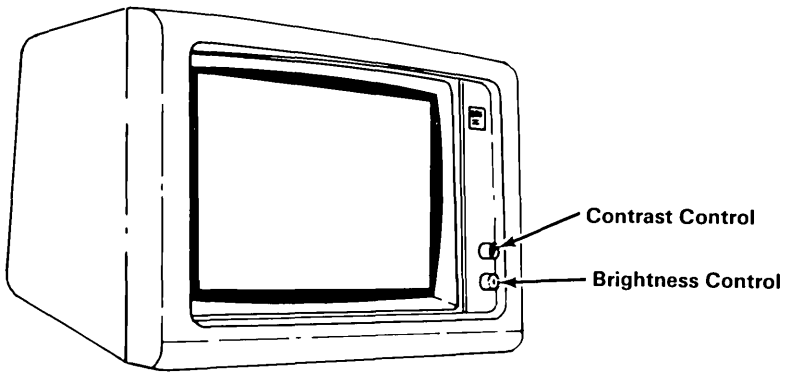
DID YOU FIND A PROBLEM?

YES This completes the repair.

NO Record SRN 26-540-490, then go to "Step 5" on page 3-5400-5.

Step 3

Try to set the Brightness and Contrast controls to the desired level.



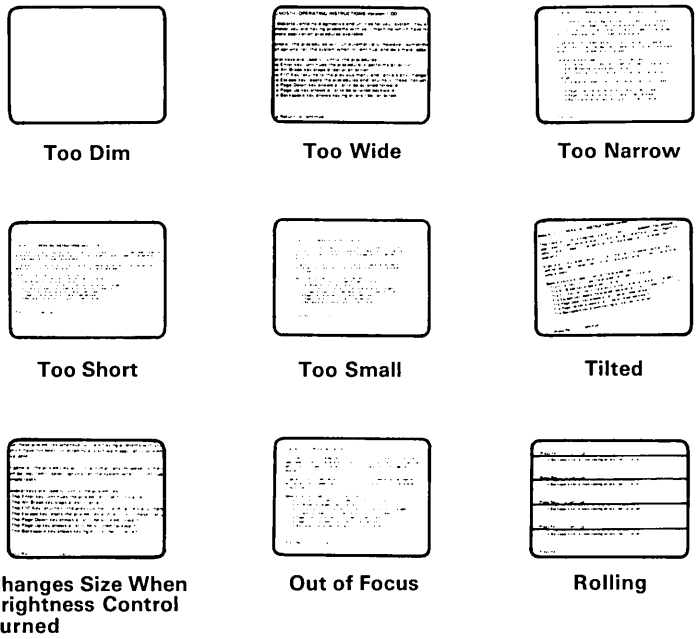
WERE YOU ABLE TO SET THE DISPLAY TO THE DESIRED LEVEL?

NO Record SRN 26-540-490, the go to "Step 5" on page 3-5400-5.

YES Continue on the next page.

Step 4

Look at the display screen.



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

NO Record SRN 26-490-540, then continue on the next page.

YES Record SRN 26-540-490, then continue on the next page.

Step 5

Look at the display adapter your IBM 5151 is attached to. If your IBM 5151 is attached to an IBM PC Enhanced Graphics Adapter, change the 490 SRA number you recorded to 410.

4. Write the Service Request Number here:

13 - 234 - 100 - B34 - D64

HAVE YOU ANALYZED ALL OF THE SRAs IN THE SRN USING PIC 0010?

YES Go to "Unresolved Problem PIC 0060" on page 3-0060-1.

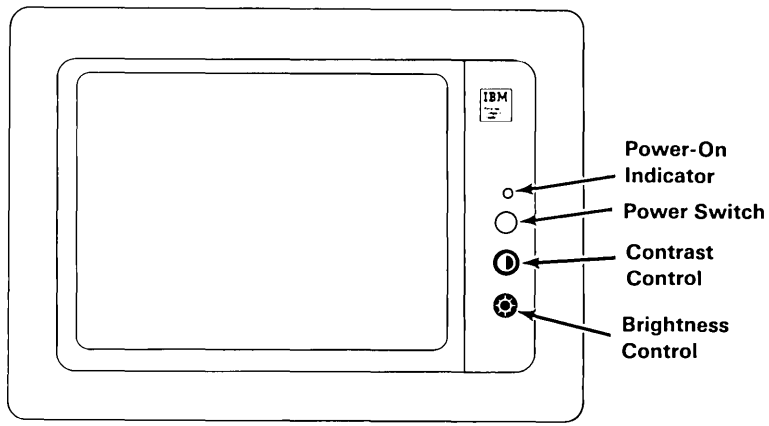
NO Go to "Step 3" on page 3-0010-4 and analyze the new SRAs.

IBM 5154 Enhanced Color Graphics Display PIC 5800

Use this PIC to get an SRN when there is a problem that prevents you from reading the display screen easily, the two-digit display is blank, and the power-on indicator is on.

Step 1

1. Be sure the power switch on the display is set to On.
2. Look at the power-on indicator on the display.



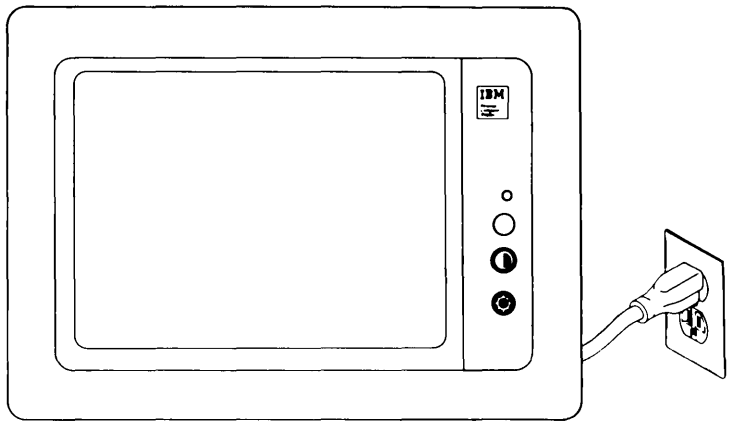
IS THE POWER-ON INDICATOR ON?

YES Go to "Step 3" on page 3-5800-3.

NO Continue on the next page.

Step 2

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



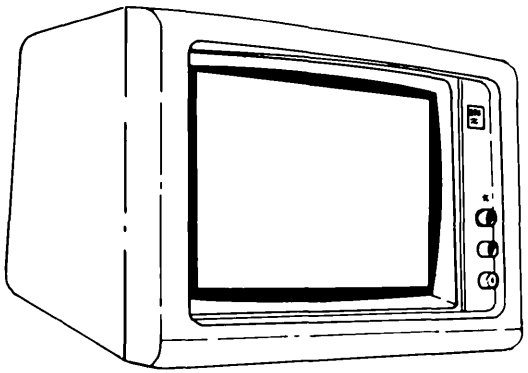
DID YOU FIND A PROBLEM?

YES This completes the repair.

NO Record SRN 26-580, then go to "Step 7" on page 3-5800-7.

Step 3

1. Set the power switch on the system unit to Off.
2. Turn the Brightness control fully clockwise.
3. Wait 1 minute, then answer the following question.



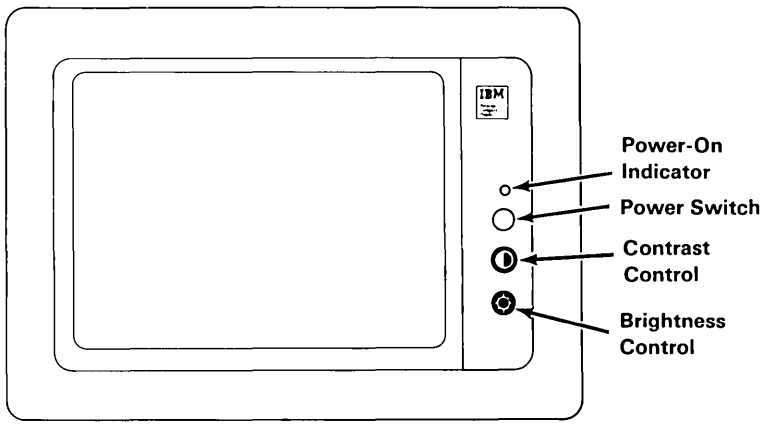
IS THE DISPLAY SCREEN COMPLETELY LIGHTED?

NO Record SRN 26-580, then go to "Step 7" on page 3-5800-7.

YES Continue on the next page.

Step 4

Turn the Brightness Control fully counter-clockwise.



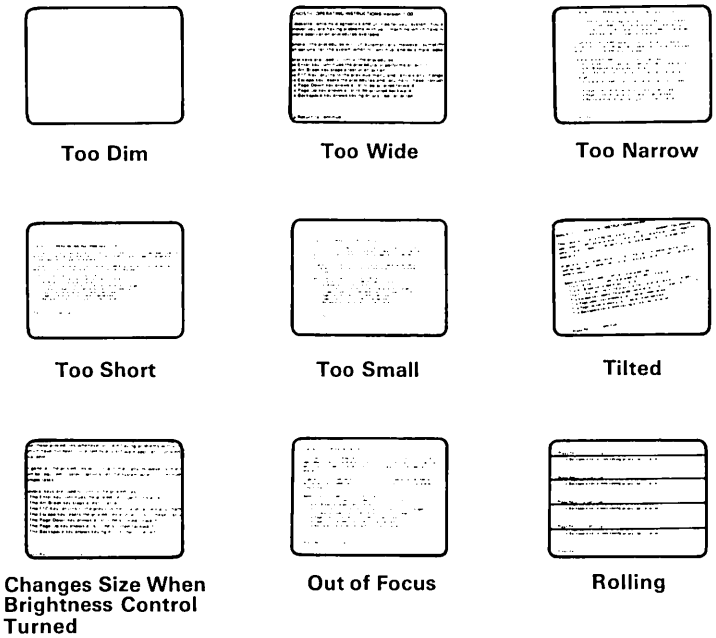
IS THE SCREEN DARK?

NO Record SRN 26-580, then go to "Step 7" on page 3-5800-7.

YES Continue on the next page.

Step 5

1. Set the power switch on the system unit to On.
2. Wait 4 minutes or until the OPERATING INSTRUCTIONS display.
3. Adjust the Brightness Control to the desired level.
4. Look at the display screen.



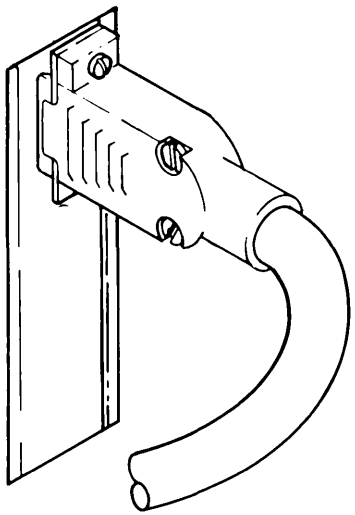
DOES YOUR DISPLAY HAVE A PROBLEM SIMILAR TO ANY OF THE DISPLAY SCREENS ABOVE?

YES Record SRN 26-580-410, then go to the next page.

NO Continue on the next page.

Step 6

Be sure the display signal cable is securely plugged into the system unit.



IS THE DISPLAY SIGNAL CABLE SECURELY PLUGGED INTO THE SYSTEM UNIT?

YES Record SRN 16-410-580, then go to the next page.

NO This completes the repair.

Step 7

You may have already analyzed all the SRAs in the SRN using PIC 0010.

4. Write the Service Request Number here:

13 - 234 - 100 - B34 - D64

HAVE YOU ANALYZED ALL OF THE SRAs IN THE SRN USING PIC 0010?

YES Go to "Unresolved Problem PIC 0060" on page 3-0060-1.

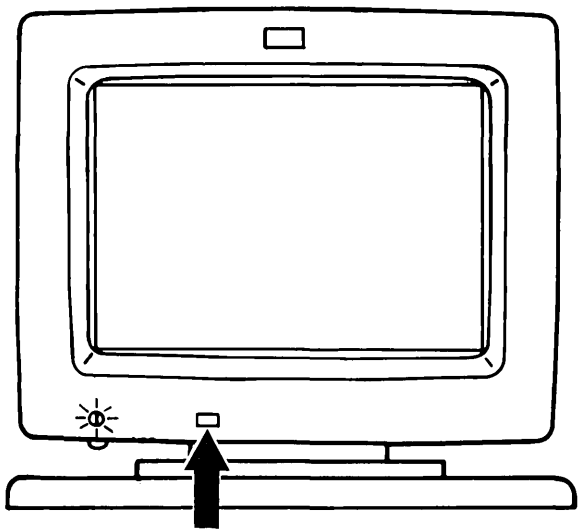
NO Go to "Step 3" on page 3-0010-4 and analyze the new SRAs.

IBM 6154 Advanced Color Display PIC 5900

Use this PIC to get an SRN when there is a problem that prevents you from reading the display screen easily, the two-digit display is blank, and the power-on indicator is on.

Step 1

Be sure the Power On and Brightness Control is set to On.



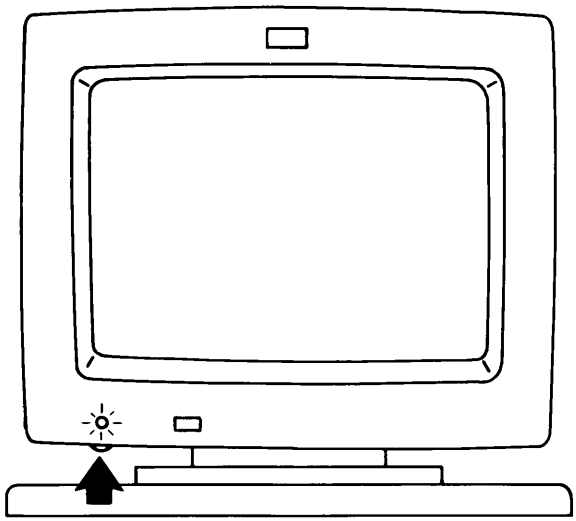
IS THE DISPLAY POWER-ON INDICATOR ON?

NO Go to "Step 4" on page 3-5900-4.

YES Continue on the next page.

Step 2

1. Set the power switch on the system unit to Off.
2. Turn the Power On and Brightness Control fully clockwise.
3. Wait about 1 minute.



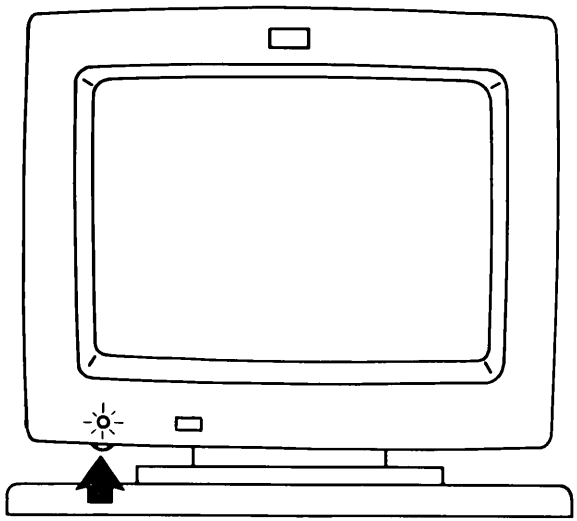
IS THE SCREEN COMPLETELY LIGHTED EXCEPT FOR THE BORDER?

NO Record SRN 26-590, then go to "Step 7" on page 3-5900-7.

YES Continue on the next page.

Step 3

1. Set the power switch on the system unit to On.
2. Wait about 4 minutes.
3. Try to set the Power On and Brightness Control to the desired level, then answer the following question.



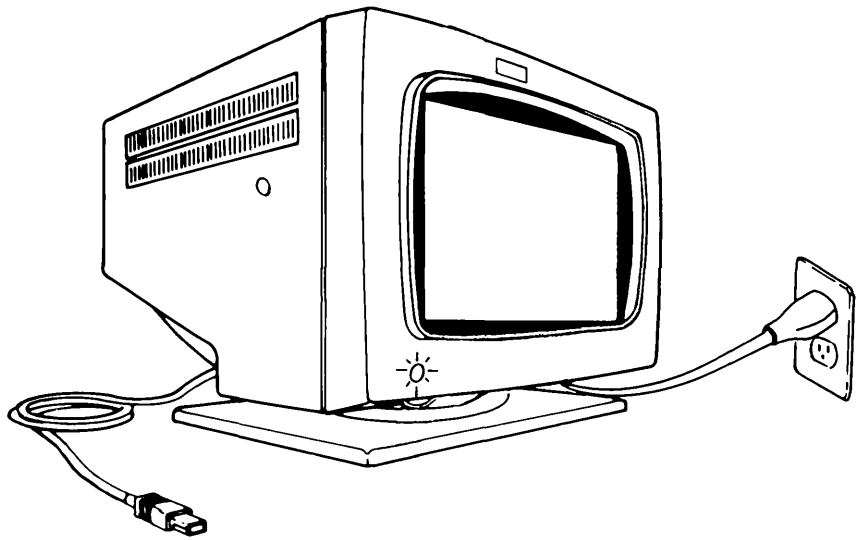
WERE YOU ABLE TO ADJUST THE DISPLAY TO THE DESIRED LEVEL?

YES Go to "Step 5" on page 3-5900-5.

NO Record SRN 26-590-450, the go to "Step 7" on page 3-5900-7.

Step 4

Be sure that the display power cable is correctly connected to an outlet and that the outlet has power.



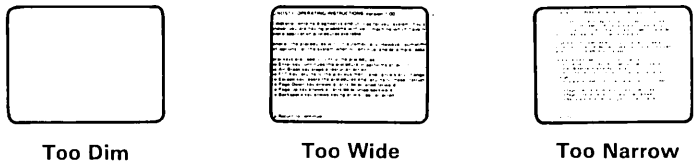
DID YOU FIND A PROBLEM?

YES This completes the repair.

NO Record SRN 26-590, then go to "Step 7" on page 3-5900-7.

Step 5

Look at the display screen.

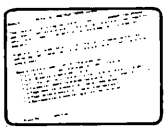

Too Dim

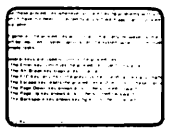
Too Wide

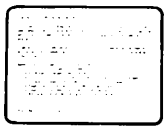
Too Narrow

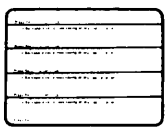
Too Short

Too Small


Tilted


Changes Size When Brightness Control Turned


Out of Focus


Rolling

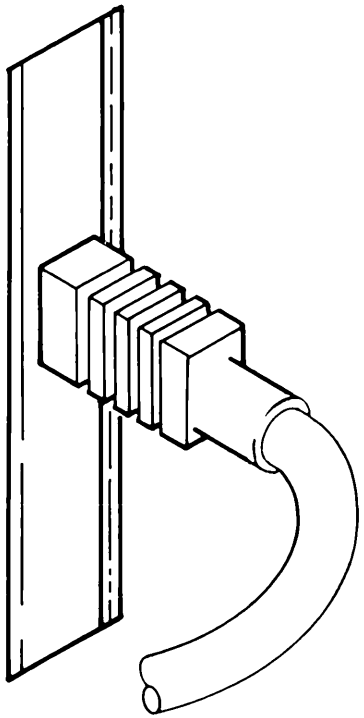
DOES YOUR DISPLAY HAVE A PROBLEM SIMILAR TO ANY OF THE DISPLAY SCREENS ABOVE?

YES Record SRN 26-590-450, then go to "Step 7" on page 3-5900-7.

NO Continue on the next page.

Step 6

Be sure the display signal cable is securely plugged into the system unit.



IS THE DISPLAY SIGNAL CABLE SECURELY PLUGGED INTO THE SYSTEM UNIT?

YES Record SRN 16-450-590, then go to the next page.

NO This completes the repair.

Step 7

You may have already analyzed all the SRAs in the SRN using PIC 0010.

4. Write the Service Request Number here:

13 - 234 - 1DD - B34 - D164

HAVE YOU ANALYZED ALL OF THE SRAs IN THE SRN USING PIC 0010?

YES Go to "Unresolved Problem PIC 0060" on page 3-0060-1.

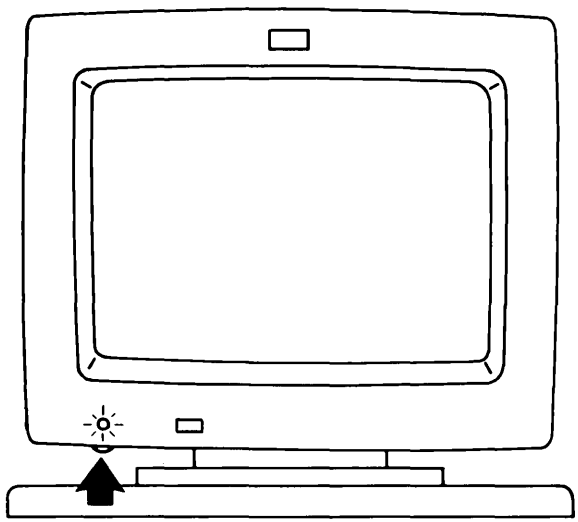
NO Go to "Step 3" on page 3-0010-4 and analyze the new SRAs.

IBM 6153 Advanced Monochrome Graphics Display PIC 6000

Use this PIC to get an SRN when there is a problem that prevents you from reading the display screen easily, the two-digit display is blank, and the power-on indicator is on.

Step 1

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



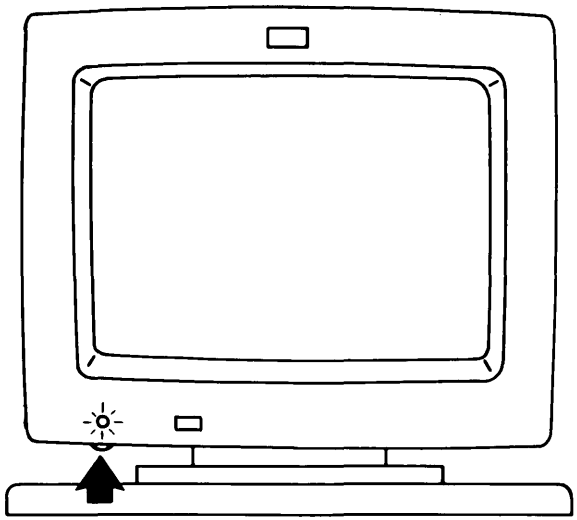
IS THE DISPLAY SCREEN COMPLETELY LIGHTED?

NO Go to "Step 3" on page 3-6000-3.

YES Continue on the next page.

Step 2

Try to set the Brightness and Raster Test control to the desired level.



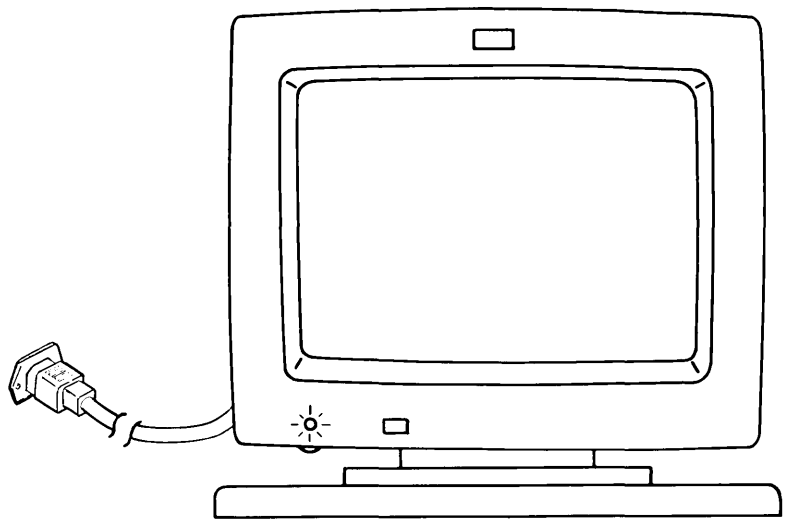
WERE YOU ABLE TO SET THE DISPLAY TO THE DESIRED LEVEL?

NO Record SRN 26-600-430, then go to "Step 6" on page 3-6000-6.

YES Go to "Step 4" on page 3-6000-4.

Step 3

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



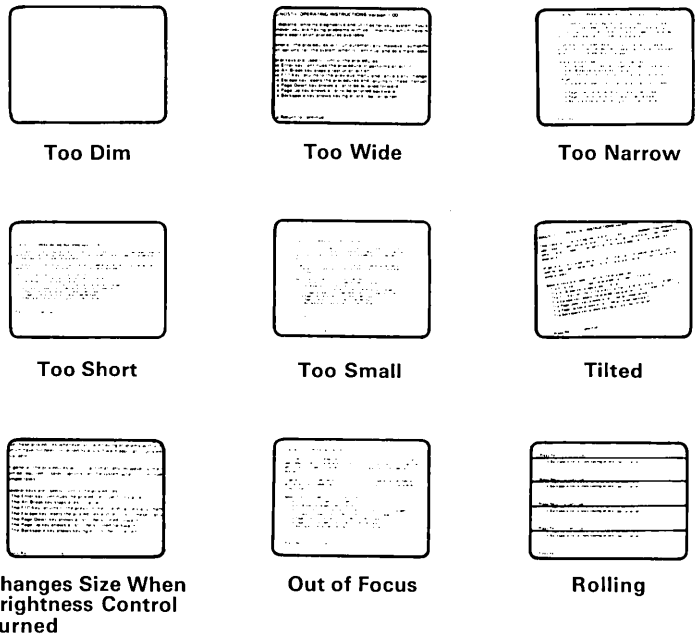
DID YOU FIND A PROBLEM?

YES This completes the repair.

NO Record SRN 26-600, then go to "Step 6" on page 3-6000-6.

Step 4

Look at the display screen.



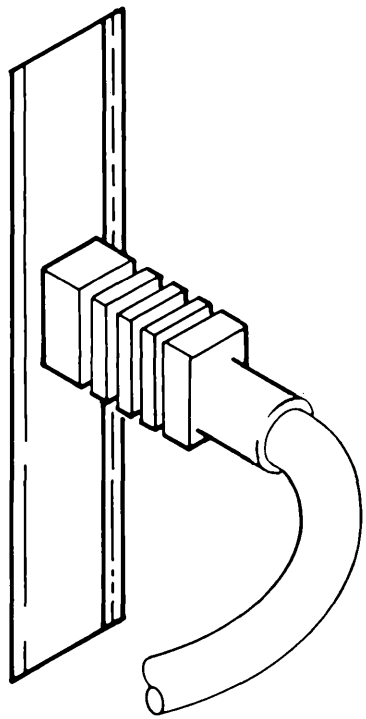
DOES YOUR DISPLAY HAVE A PROBLEM SIMILAR TO ANY OF THE DISPLAY SCREENS ABOVE?

YES Record SRN 26-600-430, then go to "Step 6" on page 3-6000-6.

NO Continue on the next page.

Step 5

Be sure the display signal cable is securely plugged into the system unit.



IS THE DISPLAY SIGNAL CABLE SECURELY PLUGGED INTO THE SYSTEM UNIT?

YES Record SRN 16-430-600, then go to "Step 6" on page 3-6000-6.

NO This completes the repair.

Step 6

You may have already analyzed all the SRAs in the SRN using PIC 0010.

4. Write the Service Request Number here:

13 - 234 - 100 - B34 - D64

HAVE YOU ANALYZED ALL OF THE SRAs IN THE SRN USING PIC 0010?

YES Go to "Unresolved Problem PIC 0060" on page 3-0060-1.

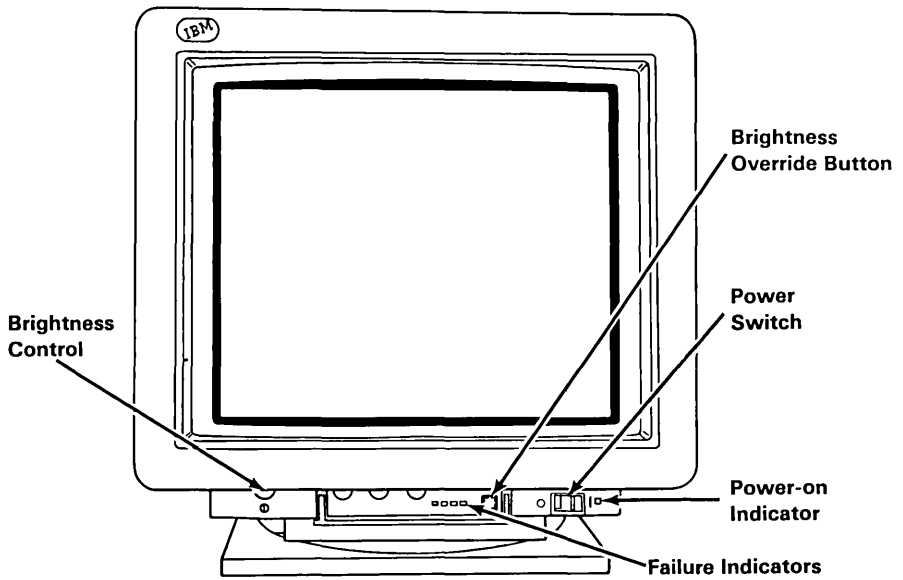
NO Go to "Step 3" on page 3-0010-4 and analyze the new SRAs.

IBM 5081 Display PIC 6100

Use this PIC to get an SRN when there is a problem that prevents you from reading the display screen easily, the two-digit display is blank, and the power-on indicator is on.

Step 1

1. Be sure the power switch on the IBM 5081 is set to On.
2. Look at the power-on indicator on the IBM 5081.



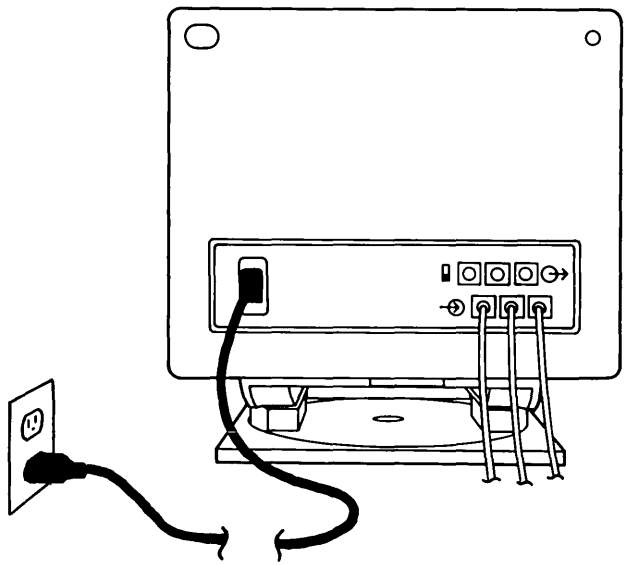
IS THE DISPLAY POWER-ON INDICATOR ON?

YES Go to "Step 3" on page 3-6100-3.

NO Continue on the next page.

Step 2

Be sure the display power cable is connected to the IBM 5081 and to an outlet. Be sure that the outlet has power.



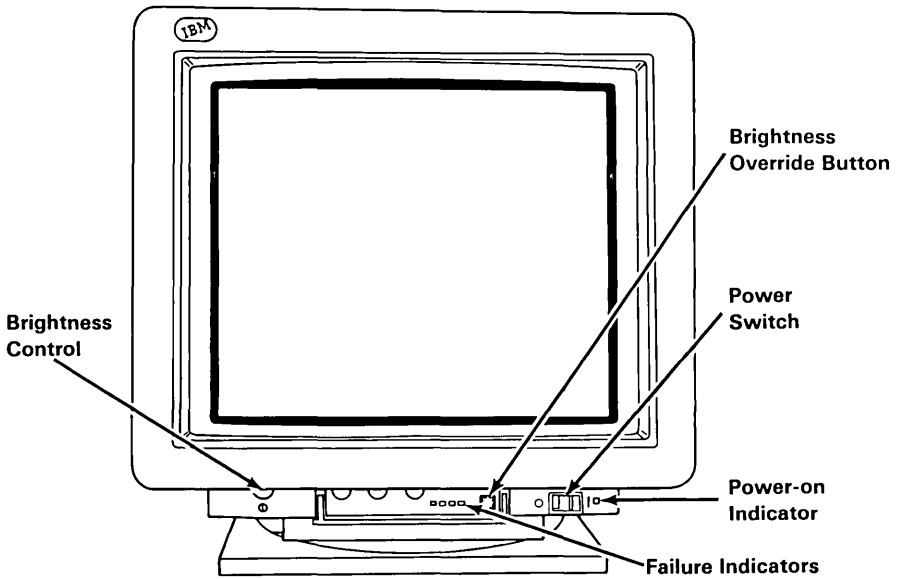
DID YOU FIND A PROBLEM?

YES This completes the repair.

NO Record SRN 26-610, then go to "Step 8" on page 3-6100-8.

Step 3

Look at the four red display-failure indicators.



ARE ANY OF THE FOUR RED DISPLAY FAILURE INDICATORS ON?

YES Record SRN 26-610, then go to "Step 8" on page 3-6100-8.

NO Continue on the next page.

Step 4

Be sure the display signal cable is securely plugged into the system unit.

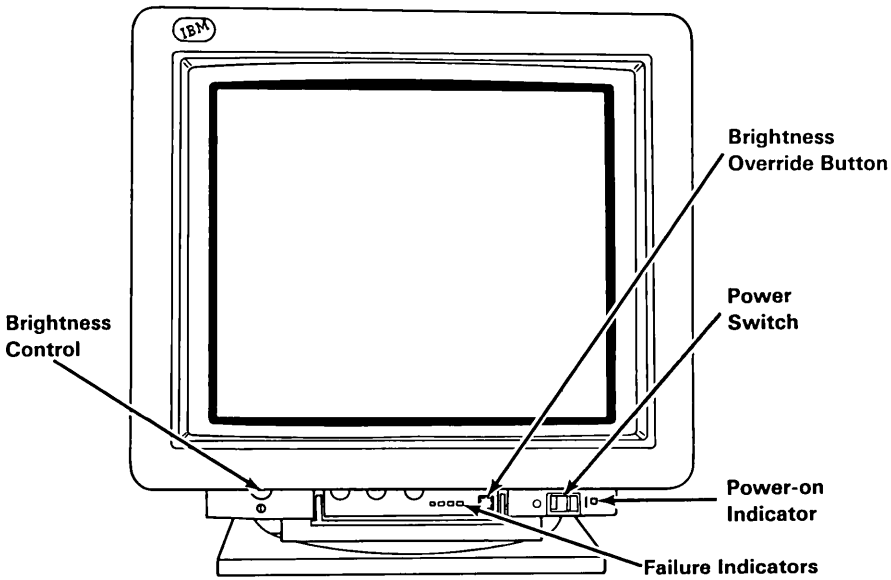
IS THE DISPLAY SIGNAL CABLE SECURELY PLUGGED INTO THE SYSTEM UNIT?

NO This completes the repair.

YES Continue on the next page.

Step 5

1. Set the power switch on the system unit to Off.
2. Open the customer access door on the front of the IBM 5081.
3. Press and hold the Brightness Override Button while answering the following question.



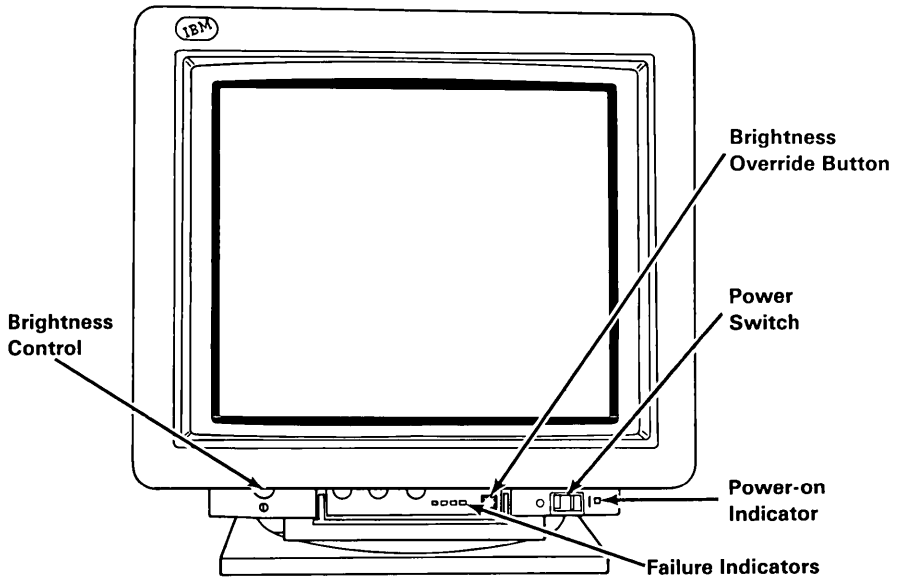
IS THE DISPLAY SCREEN LIGHTED?

NO Record SRN 26-610, then go to "Step 8" on page 3-6100-8.

YES Continue on the next page.

Step 6

1. Set the power switch on the system unit to On.
2. Wait about 4 minutes, then try to set the Brightness Control to the desired level before answering the following question.



WERE YOU ABLE TO SET THE BRIGHTNESS TO THE DESIRED LEVEL?

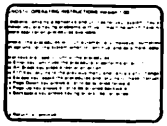
NO Record SRN 26-610, then go to "Step 8" on page 3-6100-8.

YES Continue on the next page.

Step 7

Look at the display to answer the following question.

Too Dim



Too Wide

Too Narrow

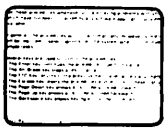
Blank

Too Short

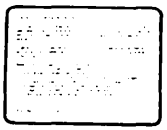
Too Small

Tilted

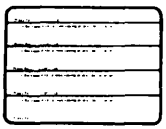
Split Screen



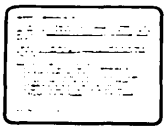
Changes Size When Brightness Control Turned



Out of Focus



Rolling



Text Smeared

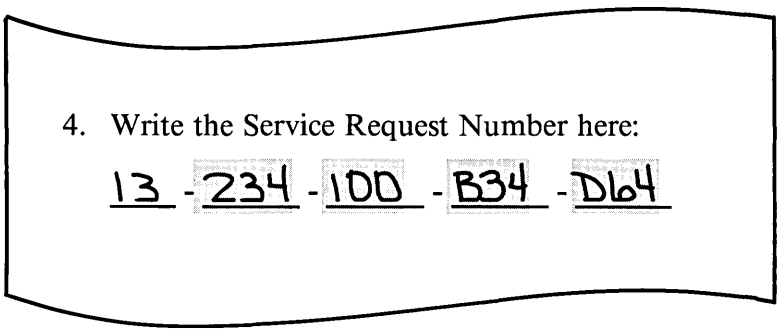
DOES YOUR DISPLAY HAVE A PROBLEM SIMILAR TO ANY OF THE DISPLAY SCREENS ABOVE OR HAS IT LOST A PRIMARY COLOR?

YES Record SRN 26-610-4B0, then go to the next page.

NO Record SRN 26-4A0-4B0-610, then go to the next page.

Step 8

You may have already analyzed all the SRAs in the SRN using PIC 0010.



HAVE YOU ANALYZED ALL OF THE SRAs IN THE SRN USING PIC 0010?

YES Go to "Unresolved Problem PIC 0060" on page 3-0060-1.

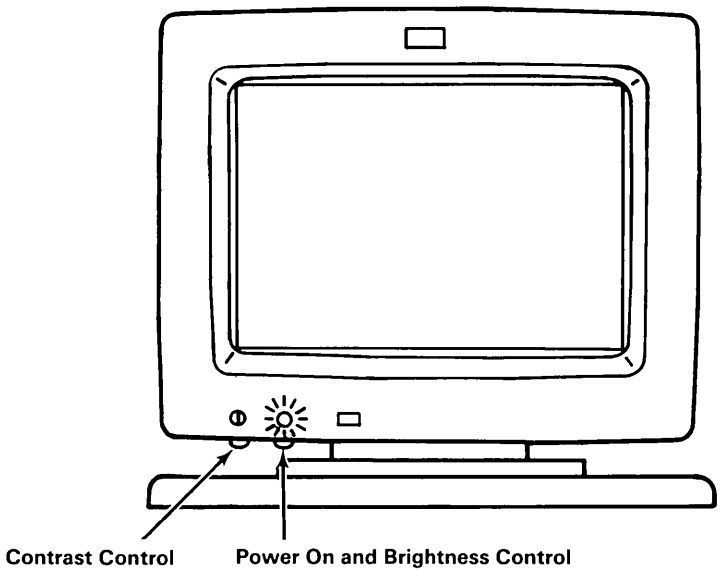
NO Go to "Step 3" on page 3-0010-4 and analyze the new SRAs.

IBM 6155 Extended Monochrome Graphics Display PIC 6200

Use this PIC to get an SRN when there is a problem that prevents you from reading the display screen easily, the two-digit display is blank, and the power-on indicator is on.

Step 1

Be sure the Power On and Brightness Control is set to On.



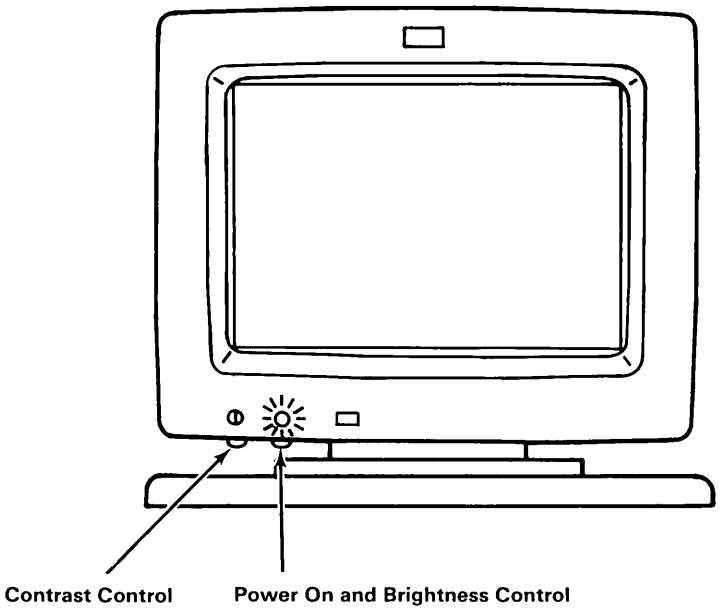
IS THE DISPLAY POWER-ON INDICATOR ON?

NO Go to "Step 4" on page 3-6200-4.

YES Continue on the next page.

Step 2

1. Set the power switch on the system unit to Off.
2. Turn the Power On and Brightness Control fully clockwise.
3. Wait about 1 minute.



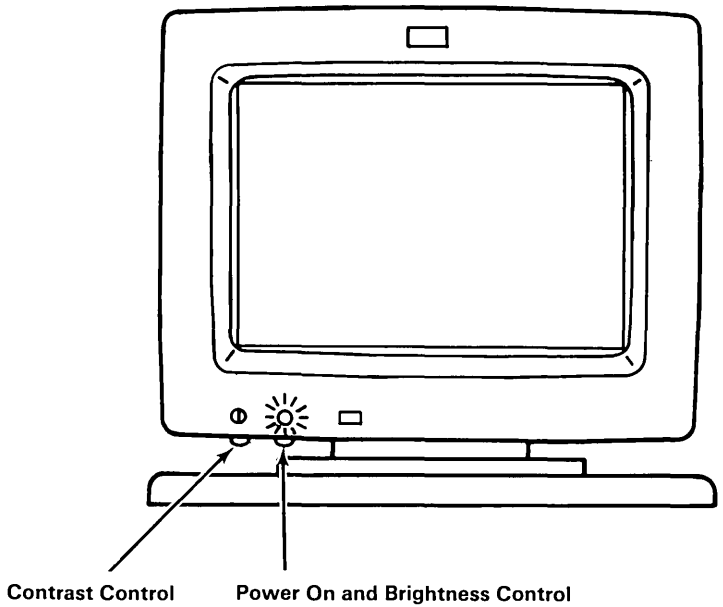
IS THE SCREEN COMPLETELY LIGHTED EXCEPT FOR THE BORDER?

NO Record SRN 26-620, then go to "Step 7" on page 3-6200-7.

YES Continue on the next page.

Step 3

1. Set the power switch on the system unit to On.
2. Wait about 4 minutes.
3. Try to set the Power On and Brightness Control to the desired level, then answer the following question.



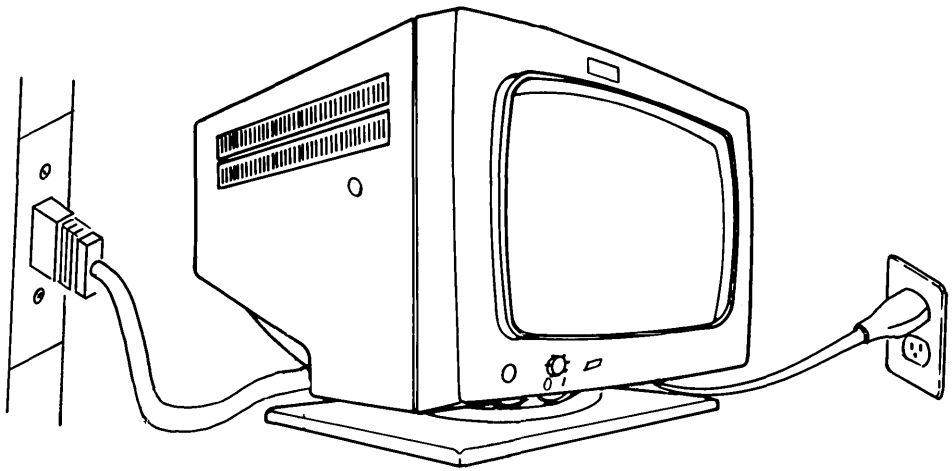
WERE YOU ABLE TO ADJUST THE DISPLAY TO THE DESIRED LEVEL?

YES Go to "Step 5" on page 3-6200-5.

NO Record SRN 26-620-470, the go to "Step 7" on page 3-6200-7.

Step 4

Be sure the display power cable is connected to an outlet and that the outlet has power.



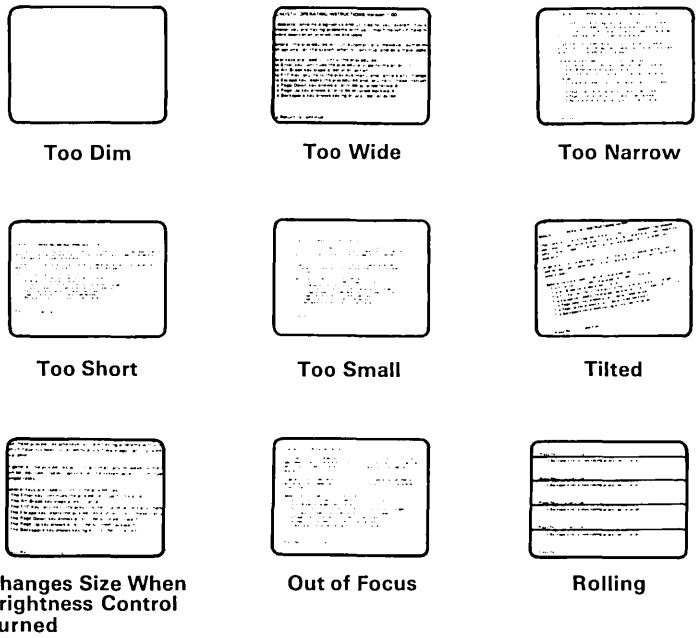
DID YOU FIND A PROBLEM?

YES This completes the repair.

NO Record SRN 26-620-470, then go to "Step 7" on page 3-6200-7.

Step 5

Look at the display screen.



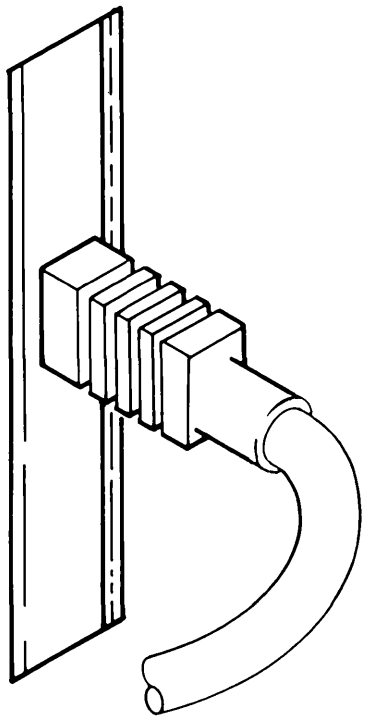
DOES YOUR DISPLAY HAVE A PROBLEM SIMILAR TO ANY OF THE DISPLAY SCREENS ABOVE?

YES Record SRN 26-620-470, then go to "Step 7" on page 3-6200-7.

NO Continue on the next page.

Step 6

Be sure the display signal cable is securely plugged into the system unit.



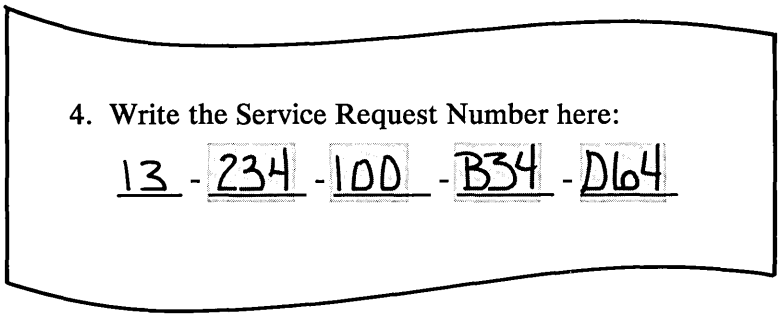
IS THE DISPLAY SIGNAL CABLE SECURELY PLUGGED INTO THE SYSTEM UNIT?

YES Record SRN 16-470-620, then go to the next page.

NO This completes the repair.

Step 7

You may have already analyzed all the SRAs in the SRN using PIC 0010.



HAVE YOU ANALYZED ALL OF THE SRAs IN THE SRN USING PIC 0010?

YES Go to "Unresolved Problem PIC 0060" on page 3-0060-1.

NO Go to "Step 3" on page 3-0010-4 and analyze the new SRAs.

Power Supply PIC 8800

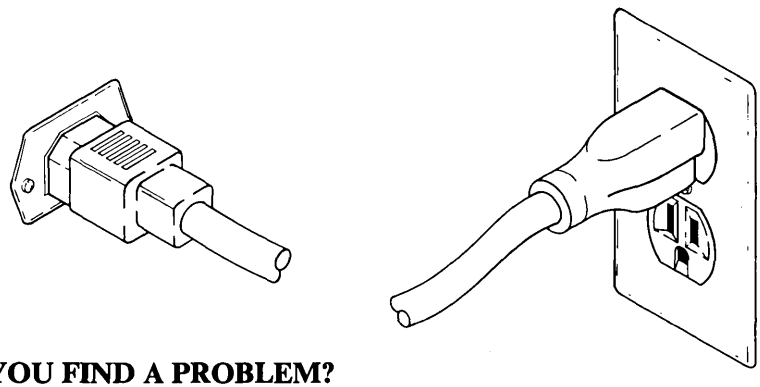
Notes:

1. Some system unit components do not cool correctly and may fail intermittently when the side cover is off. For this reason do not power the system unit on longer than 10 minutes with the side cover off.

2. 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 external power cable to the system unit is plugged into both the system unit and the outlet, and that the outlet has the correct voltage. If needed, see Section 5.



DID YOU FIND A PROBLEM?

YES Go to "Step 17" on page 3-8800-17.

NO Continue on the next page.

Step 2

1. Set the power switch on the system unit to Off.
2. Do the "Side Cover Removal" on page 4-14.
3. Remove the adapters from slots 1 and 2. Record the adapter type.
4. Without disconnecting the cooling fan power, remove the cooling fan assembly and lay it on top of the system unit.
5. Disconnect the power distribution cable from the top of the power supply and the three power cables from the system board.
6. Connect the external power cable to the power supply and the outlet.
7. Set the power switch on the system unit to On.
8. Look up under the power supply, then answer the following question.

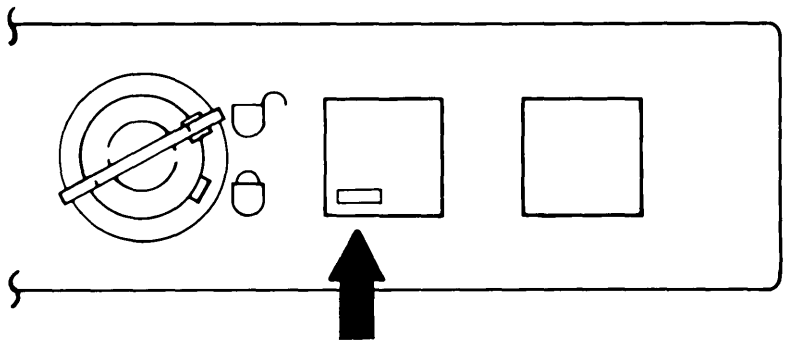
IS THE POWER SUPPLY FAN OPERATING?

NO Check the external power cable to the system unit for damage, if none, exchange the power supply or the external power cable, then go to "Step 17" on page 3-8800-17.

YES Continue on the next page.

Step 3

1. Set the power switch on the system unit to Off.
2. Connect the three power cables to 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, then answer the following question.



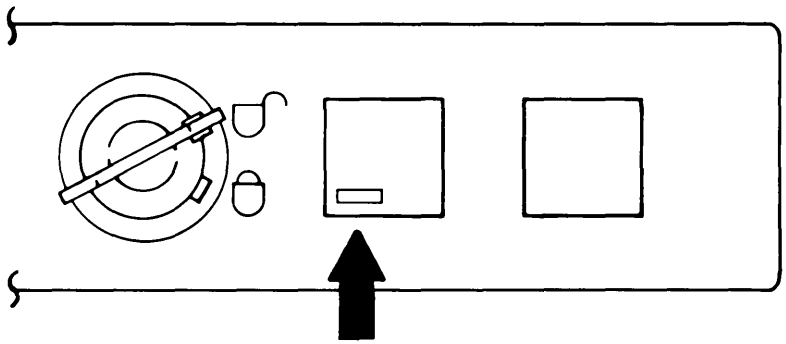
IS THE POWER-ON INDICATOR ON?

NO Go to "Step 5" on page 3-8800-5.

YES Continue on the next page.

Step 4

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



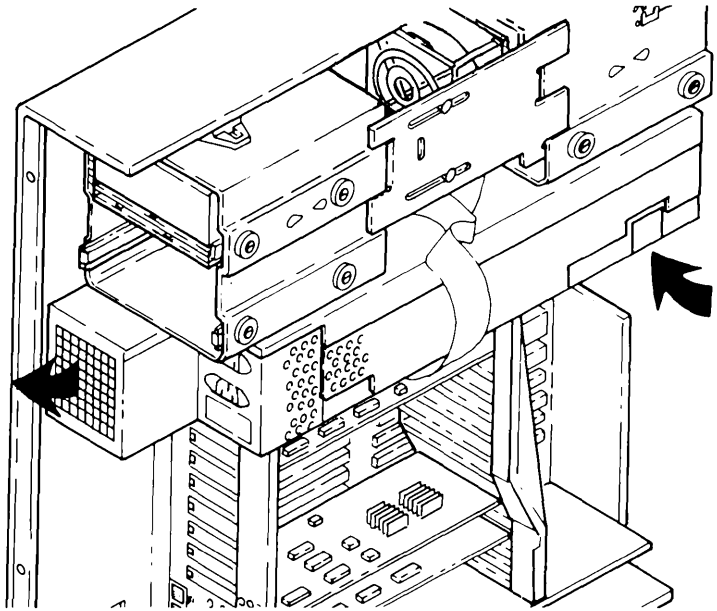
IS THE POWER-ON INDICATOR ON?

NO Go to "Step 9" on page 3-8800-9.

YES Go to "Step 10" on page 3-8800-10.

Step 5

1. Set the system unit power switch to Off.
2. Disconnect the operator panel cable 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, then answer the following question.



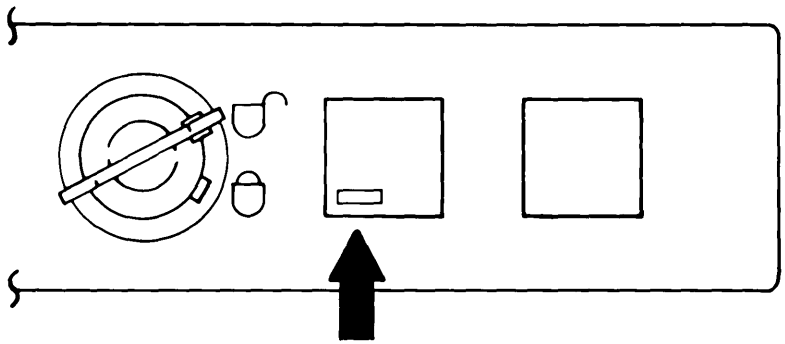
IS THE POWER SUPPLY FAN OPERATING?

YES Exchange the operator panel, then go to "Step 17" on page 3-8800-17.

NO Continue on the next page.

Step 6

1. Set the power switch on the system unit to Off.
2. Disconnect the keyboard and mouse cables.
3. Disconnect all external cables to the adapters.
4. Connect the operator panel cable to the system board.
5. Set the power switch to the system unit to On.
6. Wait 15 seconds, then answer the following question.



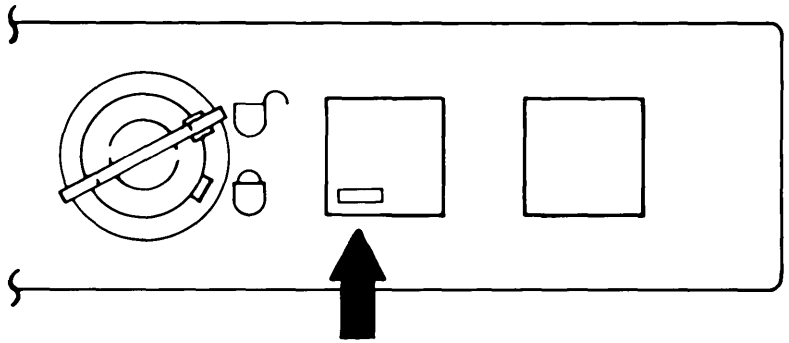
IS THE POWER-ON INDICATOR ON?

NO Go to "Step 8" on page 3-8800-8.

YES Continue on the next page.

Step 7

1. Set the power switch on the system unit to Off.
2. Connect one of the cables to the system unit.
3. Set the power switch to the system unit to On.
4. Wait 15 seconds, then answer the following question.



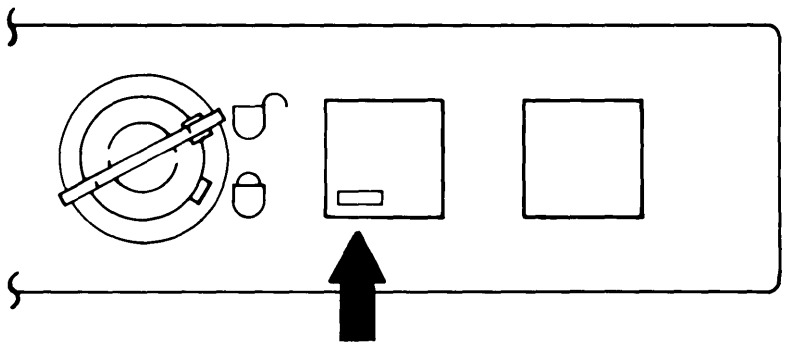
IS THE POWER-ON INDICATOR ON?

YES Repeat this procedure.

NO The last device or cable attached is failing. Exchange the failing device or cable, then go to "Step 17" on page 3-8800-17.

Step 8

1. Set the power switch on the system unit to Off.
2. Remove an adapter or board from the system board. Record the type and location.
3. Be sure the power has been off 30 seconds, then set the system unit power switch to On.
4. Wait 15 seconds, then answer the following question.



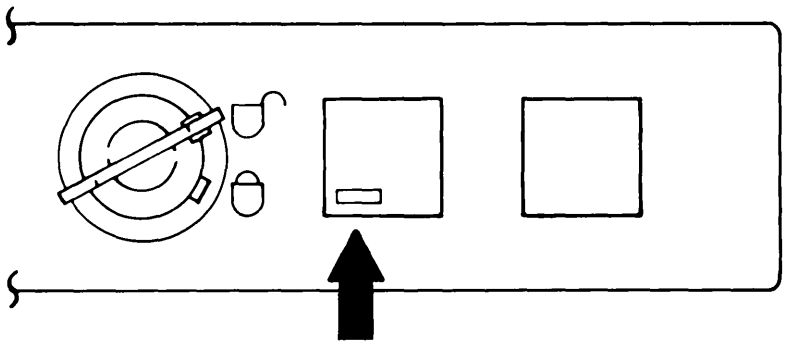
IS THE POWER-ON INDICATOR ON?

YES Go to "Step 12" on page 3-8800-12.

NO If all boards and adapters have not been removed, repeat this procedure. If all boards and adapters have been removed, exchange the system board, then go to "Step 17" on page 3-8800-17.

Step 9

1. Set the system unit power switch to Off.
2. Disconnect the power connector from one of the fixed-disk drives, diskette drives, or the cooling fan.
3. Be sure the power has been off 30 seconds, then set the system unit power switch to On.
4. Wait 15 seconds, then answer the following question.



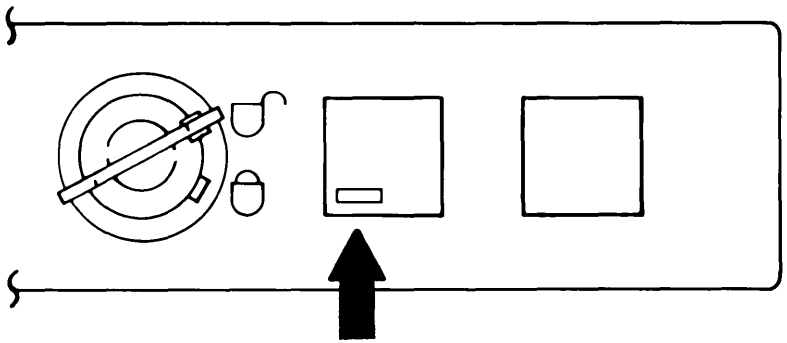
IS THE POWER-ON INDICATOR ON?

NO If all of the drives and the cooling fan have not been disconnected, repeat this procedure. If all of the drives and the cooling fan have been disconnected, exchange the power distribution cable, then go to "Step 17" on page 3-8800-17.

YES The last FRU disconnected is the failing FRU. Exchange the failing drive or cooling fan, then go to "Step 17" on page 3-8800-17.

Step 10

1. Set the system unit power switch to Off.
2. Install the adapter removed from slot 1.
3. Be sure the power has been off 30 seconds, then set the system unit power switch to On.
4. Wait 15 seconds, then answer the following question.



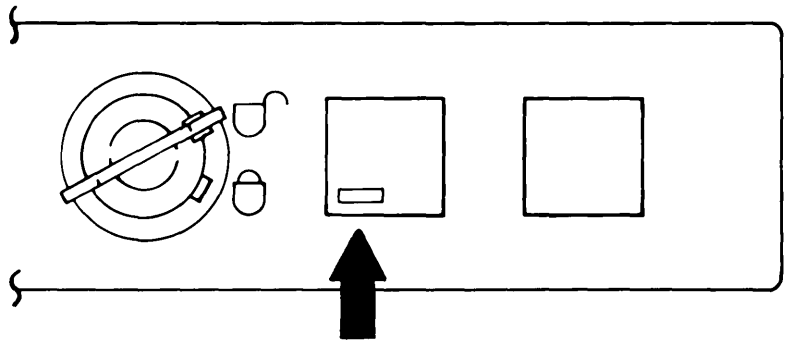
IS THE POWER-ON INDICATOR ON?

NO Go to "Step 12" on page 3-8800-12.

YES Continue on the next page.

Step 11

1. Set the system unit power switch to Off.
2. Install the adapter removed from slot 2.
3. Be sure the power has been off 30 seconds, then set the system unit power switch to On.
4. Wait 15 seconds, then answer the following question.



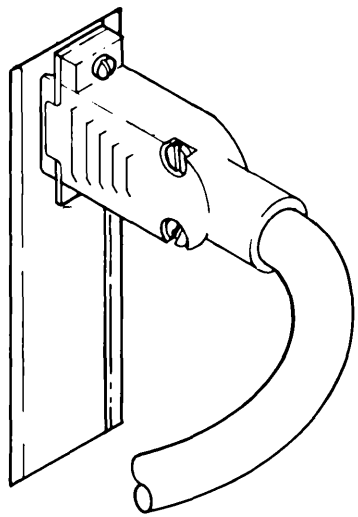
IS THE POWER-ON INDICATOR ON?

YES The problem may be a thermal problem or an intermittent problem. Check the air inlets and outlets for obstructions, then go to "Step 17" on page 3-8800-17.

NO Continue on the next page.

Step 12

Look at the adapter.



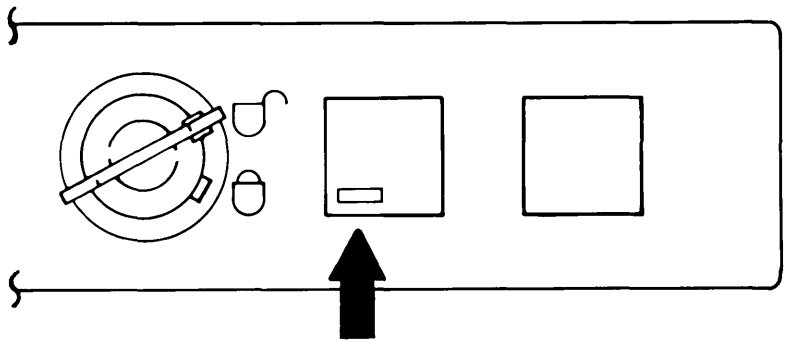
ARE THERE CABLES ATTACHED TO THE ADAPTER?

NO Go to "Step 15" on page 3-8800-15.

YES Continue on the next page.

Step 13

1. Set the system unit power switch to Off.
2. Disconnect all cables attached to the adapter.
3. Install the adapter in the correct slot.
4. Be sure the power has been off 30 seconds, then set the system unit power switch to On.
5. Wait 15 seconds, then answer the following question.



IS THE POWER-ON INDICATOR ON?

NO Go to "Step 15" on page 3-8800-15.

YES Continue on the next page.

Step 14

1. Set the system unit power switch to Off.
2. Connect one cable to the adapter.
3. Be sure the power has been off 30 seconds, then set the system unit power switch to On.
4. Wait 15 seconds, then answer the following question.

IS THE POWER-ON INDICATOR ON?

YES Repeat this procedure.

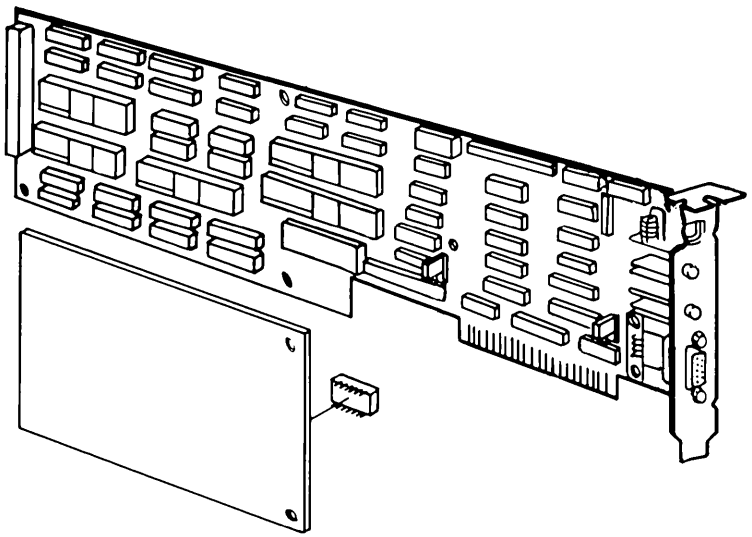
NO The last cable connected or the device connected to it is failing. Do the following:

1. Set the power switch on the system unit to Off.
2. Starting with the devices, disconnect one of the devices or a cable.
3. Set the power switch on the system unit to On.
4. If the power-on indicator is off, repeat these steps.

   If the power-on indicator is on, exchange the last FRU, then go to "Step 17" on page 3-8800-17.

Step 15

Some options and adapters contain more than one FRU.



DOES THE FAILING ADAPTER HAVE ADDITIONAL FRUs?

NO Exchange the failing adapter or board, then go to "Step 17" on page 3-8800-17.

YES Continue on the next page.

Step 16

1. Set the power switch on the system unit to Off.
2. Remove the failing option or adapter from the system unit.
3. Remove the additional FRUs.
4. Install the failing option or adapter back in the system unit.
5. Set the power switch on the system unit to On, then wait 15 seconds before answering the following question.

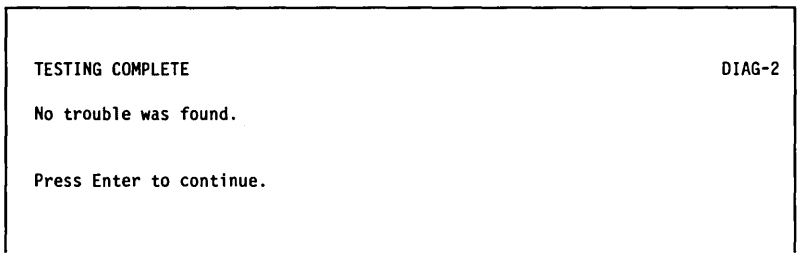
IS THE POWER-ON INDICATOR ON?

NO Exchange the failing option or adapter, then continue on the next page.

YES One of the additional FRUs you removed is failing. If only one FRU was removed, exchange it. Otherwise, install the failing FRUs one at a time until you identify the failing FRU, then exchange it and continue on the next page.

Step 17

1. Set the power switch on the system unit to Off.
2. If any, look at the type and slot positions you recorded, then install the boards and adapters you removed
3. Connect any connectors that are disconnected.
4. If removed, do the "Side Cover Replacement" on page 4-15.
5. Set the power switch on the system unit to On.
6. Run the System Checkout. If needed, see page 2-16.



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

NO Go to "Problem Determination Procedure PIC 0030" on page 3-0030-1.

YES This completes the repair.

POST Errors 03 or 05 PIC 9810

Step 1

1. Do the "Side Cover Removal" on page 4-14.
2. Plug the external power cable to the power supply and outlet.
3. If present, remove the adapter for the fixed-disk and diskette drives adapter from slot 2.
4. Remove the adapter for the fixed-disk and diskette drives from slot 1 and 2.

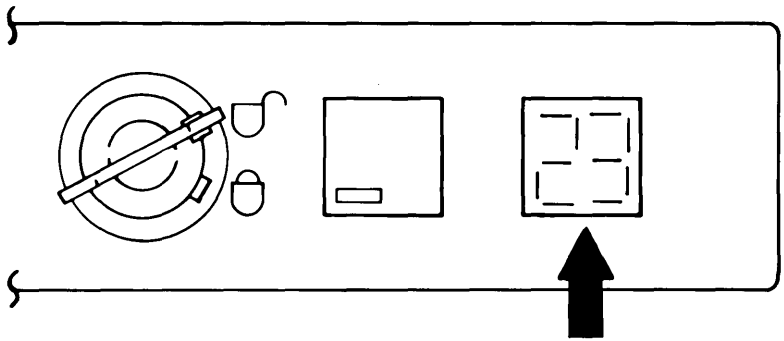
IS THERE A BOARD IN SLOT B OR D?

NO Go to "Step 5" on page 3-9810-5.

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 2 minutes, then answer the following question.



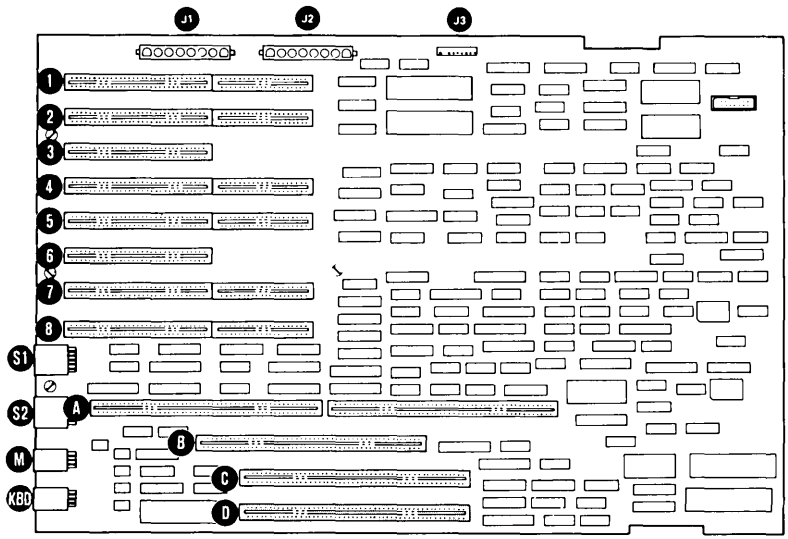
IS "23" DISPLAYED IN THE TWO-DIGIT DISPLAY?

YES Go to "Step 7" on page 3-9810-7.

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 3-9810-5.

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 2 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.

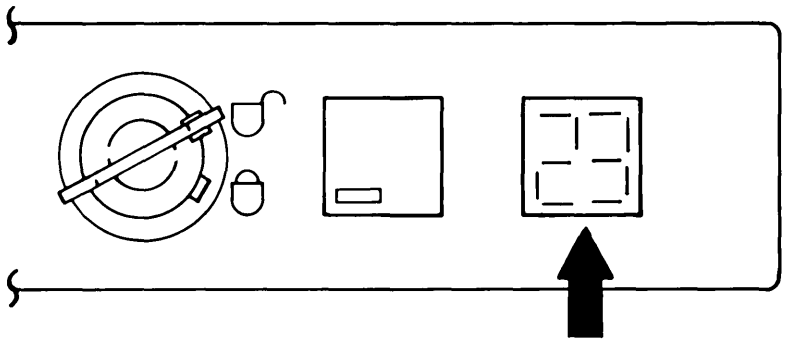
1. Move the memory board now in slot C to slot D.
2. Exchange the memory board that was in slot C.
3. Go to "Step 8" on page 3-9810-8.

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 3-9810-6.

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 2 minutes, then answer the following question.



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

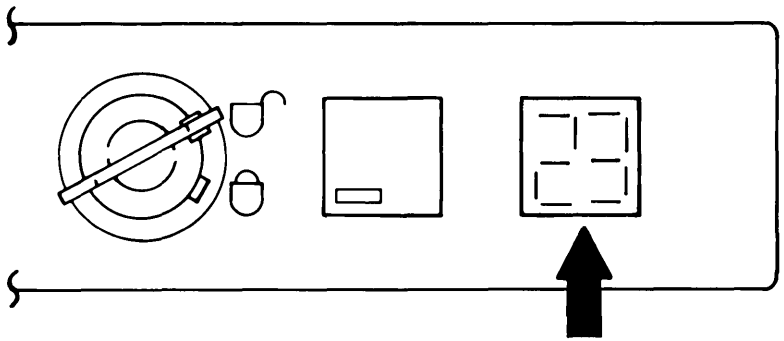
YES Set the power switch on the system unit to Off, then go to "Step 8" on page 3-9810-8.

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 2 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 3-9810-8.

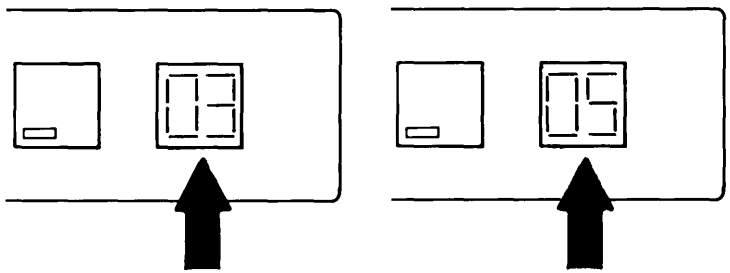
NO Set the power switch on the system unit to Off.

1. Remove the processor board from slot A.
2. Exchange the system board.
3. Go to "Step 8" on page 3-9810-8.

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 2 minutes, then answer the following question.



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

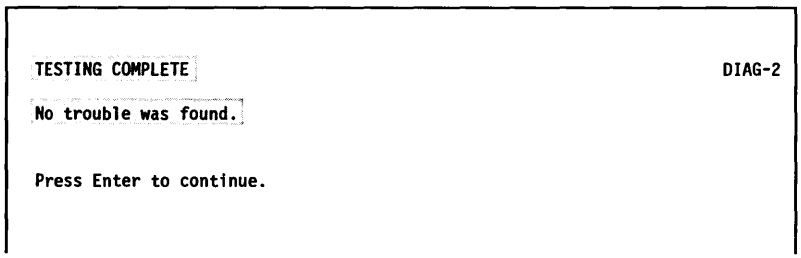
NO Repeat this procedure.

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 3-9810-8.

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 "Side Cover Replacement" on page 4-15.
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 2-16.



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

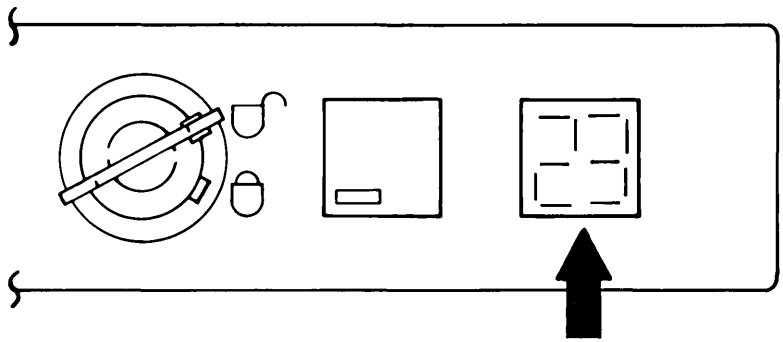
NO If you were unable to run the System Checkout because the system stopped with 03 or 05 displayed in the two-digit display, go to "Unresolved Problem PIC 0060" on page 3-0060-1 otherwise, go to "Problem Determination Procedure PIC 0030" on page 3-0030-1.

YES This completes the repair.

POST Error 23 PIC 9840

Step 1

1. Do the "Side Cover Removal" on page 4-14.
2. Remove the adapters from slots 2 through 8 and record the type and slot position of each.
3. Plug the external power cable to the power supply and outlet.
4. Set the power switch on the system unit to On.
5. Wait 2 minutes, then answer the following question.



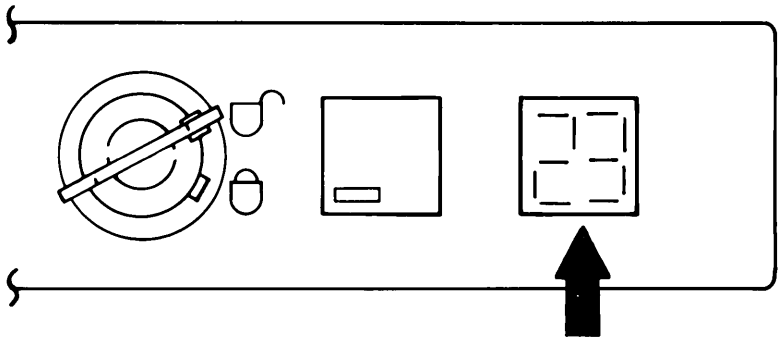
IS "23" DISPLAYED IN THE TWO-DIGIT DISPLAY?

NO Go to "Step 3" on page 3-9840-3.

YES Continue on the next page.

Step 2

1. Set the power switch on the system unit to Off.
2. Exchange the adapter for the fixed-disk and diskette drives.
3. Be sure the power has been off 30 seconds, then set the power switch on the system unit to On.
4. Wait 2 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 3-9840-4.

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

1. Exchange the system board.
2. Go to "Step 4" on page 3-9840-4.

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 beginning with the display adapter.
3. Insert the Diagnostics 1 (DIAG-1) diskette in diskette drive A and close the drive.
4. Be sure the power has been off 30 seconds, then set the power switch on the system unit to On.
5. Wait 4 minutes, then answer the following question.

ARE THE "DIAGNOSTIC OPERATING INSTRUCTIONS" DISPLAYED?

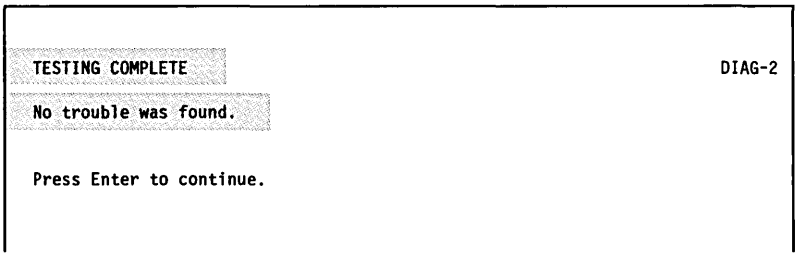
YES Repeat the above steps.

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

1. The last adapter installed or a FRU attached to it is failing. Use the removal and replacement procedures in the section for the type adapter and exchange the adapter or FRU attached to it.
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 "Side Cover Replacement" on page 4-15.
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 2-16.



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

NO If you were unable to run the System Checkout because the system stopped with 23 displayed in the two-digit display, go to "Unresolved Problem PIC 0060" on page 3-0060-1 otherwise, go to "Problem Determination Procedure PIC 0030" on page 3-0030-1.

YES This completes the repair.

Undetermined Problem PIC 9860

Use this PIC to analyze the following symptoms:

- SRA number 986.
- Diagnostic error messages displayed while running diagnostics.
- Numbers are displayed in the two-digit display after the DIAGNOSTIC OPERATING INSTRUCTIONS menu has displayed.
- Diagnostic loops and hangs with nothing displayed in the two-digit display.
- The keyboard will not respond while running diagnostics.
- You cannot exit or end a test.

Step 1

Look at the bottom of the display.

DID THE "DIAGNOSTIC ERROR" MESSAGE DISPLAY?

YES Go to "Step 3" on page 3-9860-3.

NO Continue on the next page..

Step 2

A failing keyboard may cause one of the following conditions:

- Unable to exit the keyboard test by pressing the n and Enter keys
- Unable to select a certain item from a menu
- Unable to stop or exit a test by pressing the End key.

IS THE PROBLEM ONE OF THE ABOVE?

NO Go to "Step 6" on page 3-9860-6.

YES Record SRN 16-780, then go to "Step 3" on page 3-0010-4.

Step 3

Look at the bottom of the display.

DID THE MESSAGE "DIAGNOSTIC ERROR - Diskette error" DISPLAY?

NO Go to "Step 6" on page 3-9860-6.

YES Continue on the next page..

Step 4

The problem may be the diskettes.

1. Get a different set of diagnostic diskettes.
2. Try to run the failing diagnostic test.
3. When the test completes or stops, look at the bottom of the display.

DID THE MESSAGE "DIAGNOSTIC ERROR - Diskette error" DISPLAY?

NO Replace the failing set of diagnostic diskettes. Go to "Problem Determination Procedure PIC 0030" on page 3-0030-1 and get another SRN.

YES Continue on the next page..

Step 5

Some Diagnostic Error messages occur when the Run Test Multiple Times option is selected.

WERE YOU RUNNING THE DIAGNOSTIC PROGRAMS WHILE USING THE "RUN TEST MULTIPLE TIMES" OPTION?

YES Disregard the Diagnostic Error message and start the test again.

NO Continue on the next page..

Step 6

Some tests require that specific FRUs be installed before the test is displayed in the ADVANCED DIAGNOSTIC SELECTION menu.

Look at the test that failed.

IS A SPECIFIC ADAPTER REQUIRED TO RUN THE FAILING TEST?

NO Go to "Step 8" on page 3-9860-8.

YES Continue on the next page.

Step 7

If any, exchange the FRUs that are required to run the failing diagnostic test. Use the removal and replacement procedures in the section for that FRU.

Try the failing diagnostic test again.

DID THE SAME PROBLEM OCCUR?

NO Go to "Step 11" on page 3-9860-11.

YES Remove the new FRU and install the old FRU again, then continue on the next page.

Step 8

1. Do the "Side Cover Replacement" on page 4-15.
2. Remove the boards from system board slots B and D.
3. Remove the adapters from adapter slots 2 through 8 except the display adapter and any specific FRUs required to run the failing test.
4. Plug the external power cable into the outlet.
5. Insert the Diagnostics 1 (DIAG-1) diskette in diskette drive A and close the drive.
6. Set the power switch on the system unit to On.
7. Try the failing procedure again.

If you get any SRN other than SRN number 16-986, go to "Start of Call PIC 0010" on page 3-0010-1.

DID THE SAME PROBLEM OCCUR?

NO Go to "Step 10" on page 3-9860-10.

YES Continue on the next page.

Step 9

One of the remaining FRUs is failing.

1. Set the power switch on the system unit to Off.
2. Exchange and test the FRUs one at a time in the following order; the processor board, the system board, the adapter for the fixed-disk and diskette drives, the display adapter, the diskette drive, 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. Otherwise, go to "Step 11" on page 3-9860-11.

YES Go to "Step 11" on page 3-9860-11.

Step 10

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?

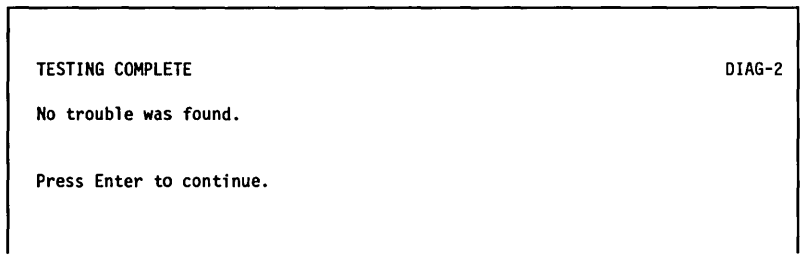
NO Repeat the above steps.

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

1. The last adapter you installed or a FRU attached to that adapter is failing. Use the removal and replacement procedures in the section for that adapter and exchange the adapter or the attached FRU.
2. Continue on the next page.

Step 11

1. Look at the type and slot positions you recorded, and if any, install the boards and adapters you removed.
2. Unplug the external power cable from the outlet.
3. Do the "Side Cover Replacement" on page 4-15.
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 2-16.



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

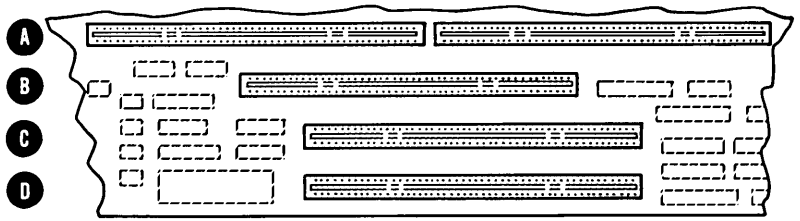
NO If the same failure occurs, contact your service support person, otherwise, go to "Problem Determination Procedure PIC 0030" on page 3-0030-1.

YES This completes the repair.

POST Errors 5c PIC 9870

Step 1

1. Do the Side Cover Removal for an IBM 6150 or the Top Cover Removal for an IBM 6151.
2. Plug the external power cable to the power supply and outlet.



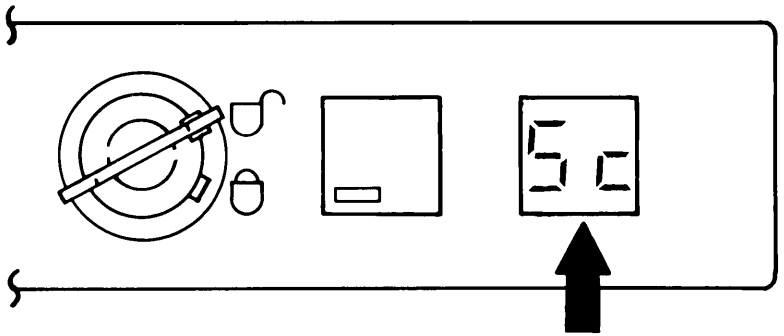
IS THERE A BOARD IN SLOT B, C, OR D?

NO Go to "Step 3" on page 3-9870-3.

YES Continue on the next page.

Step 2

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



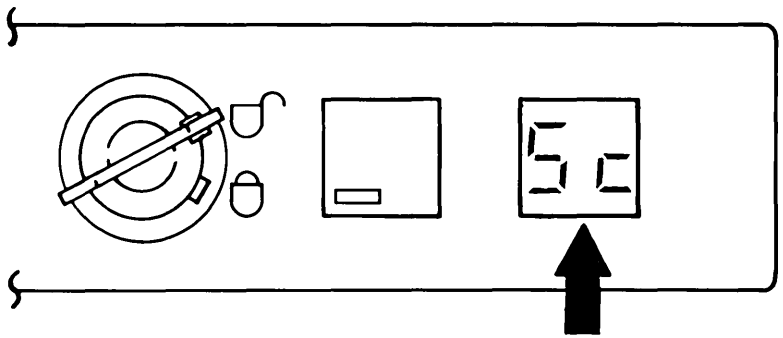
IS "5c" DISPLAYED IN THE TWO-DIGIT DISPLAY?

NO Go to "Step 4" on page 3-9870-4.

YES Continue on the next page.

Step 3

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 2 minutes, then answer the following question.



IS "5c" DISPLAYED IN THE TWO-DIGIT DISPLAY?

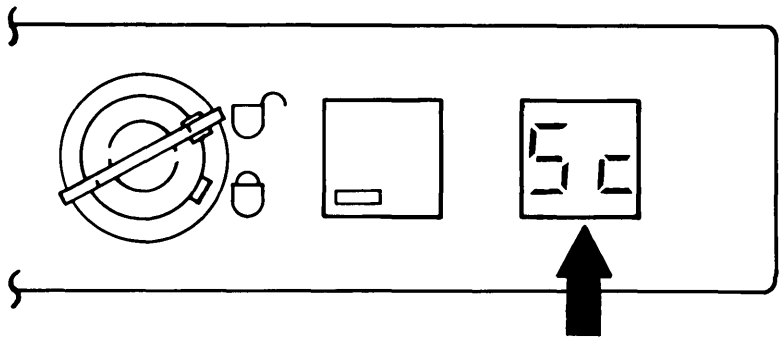
YES Set the power switch on the system unit to Off, then go to "Unresolved Problem PIC 0060" on page 3-0060-1.

NO Set the power switch on the system unit to Off, then go to "Step 5" on page 3-9870-5.

Step 4

One of the boards removed from slots B, C, 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, C, 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 2 minutes, then answer the following question.



IS "5c" DISPLAYED IN THE TWO-DIGIT DISPLAY?

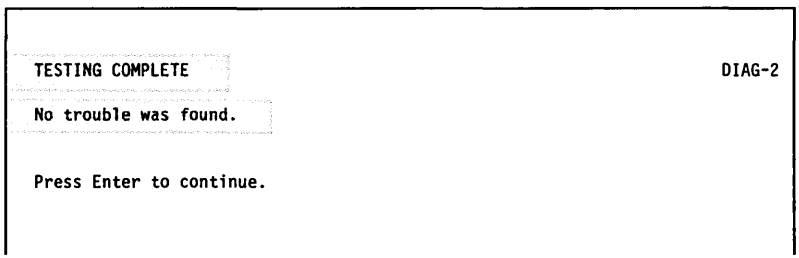
NO Repeat this procedure.

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 5" on page 3-9870-5.

Step 5

1. Look at the type and slot positions you recorded, and install the boards and adapters you removed.
2. Do the Side Cover Replacement or the Top Cover Replacement in Section 4.
3. Set the power switch on the system unit to On.
4. Follow the instructions on the menus to run the System Checkout. If needed, see page 2-16.



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

NO If you were unable to run the System Checkout because the system stopped with 5c displayed in the two-digit display, go to "Unresolved Problem PIC 0060" on page 3-0060-1 otherwise, go to "Problem Determination Procedure PIC 0030" on page 3-0030-1.

YES This completes the repair.

Section 4. Removal and Replacement Procedures

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About this Section

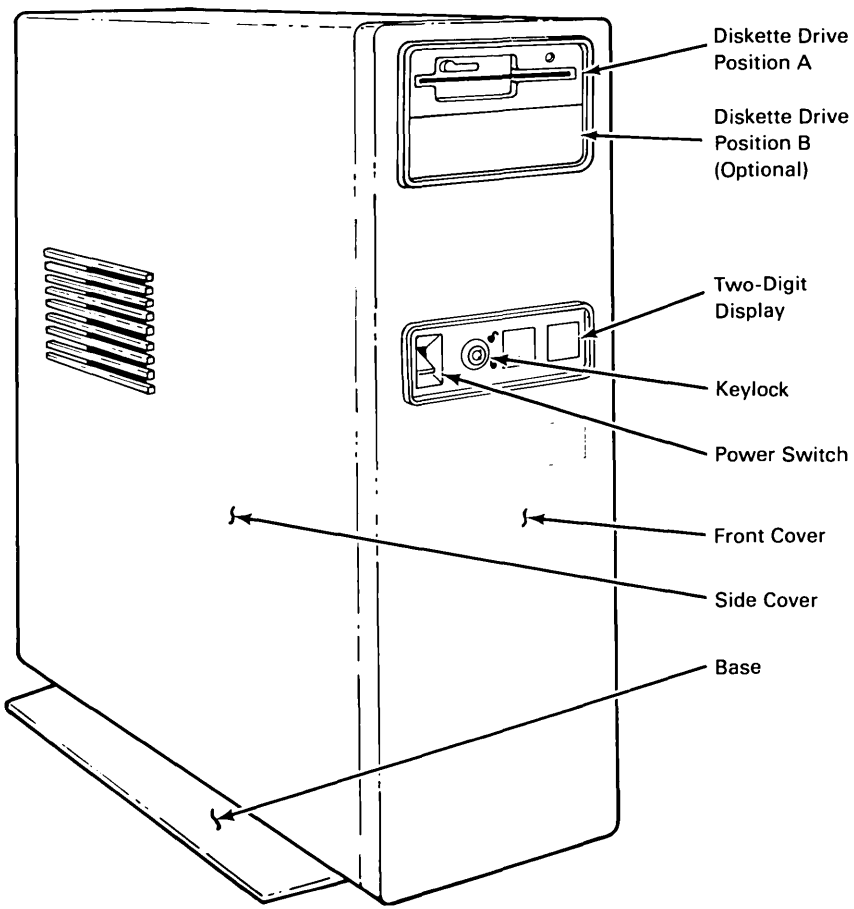
This section contains removal and replacement procedures that are not specific to one adapter, diskette drive, fixed-disk drive, system memory board, or processor board. Follow these procedures for the type of device you are removing or installing. Use the contents list on the preceding page to select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

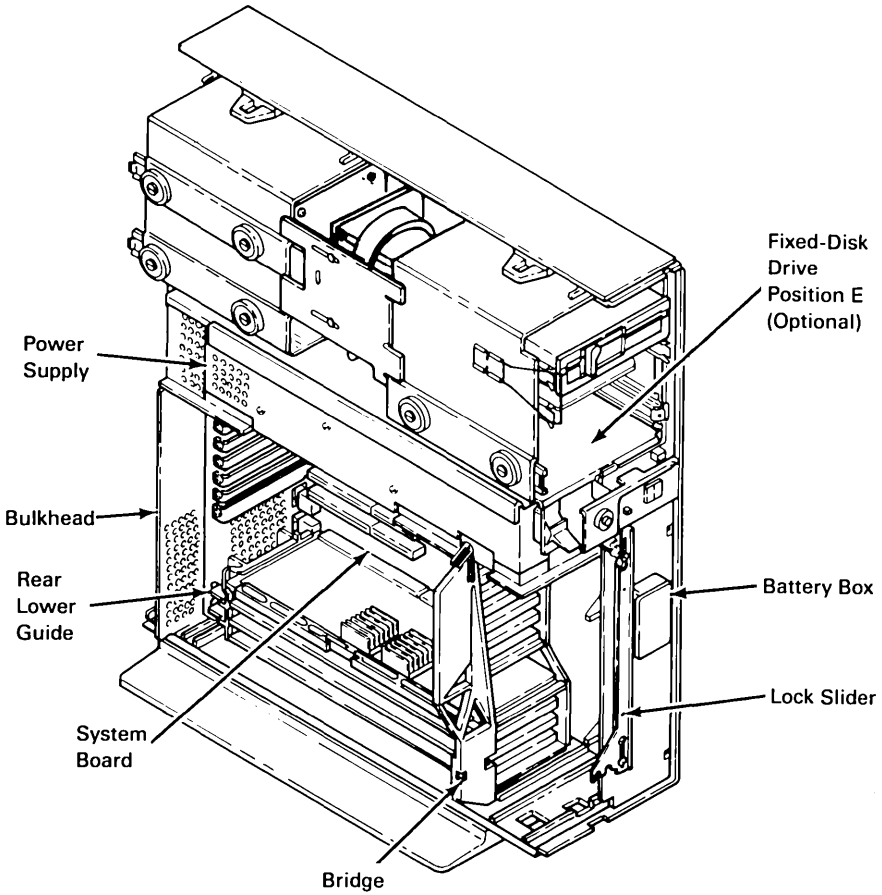
System Unit Locations

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

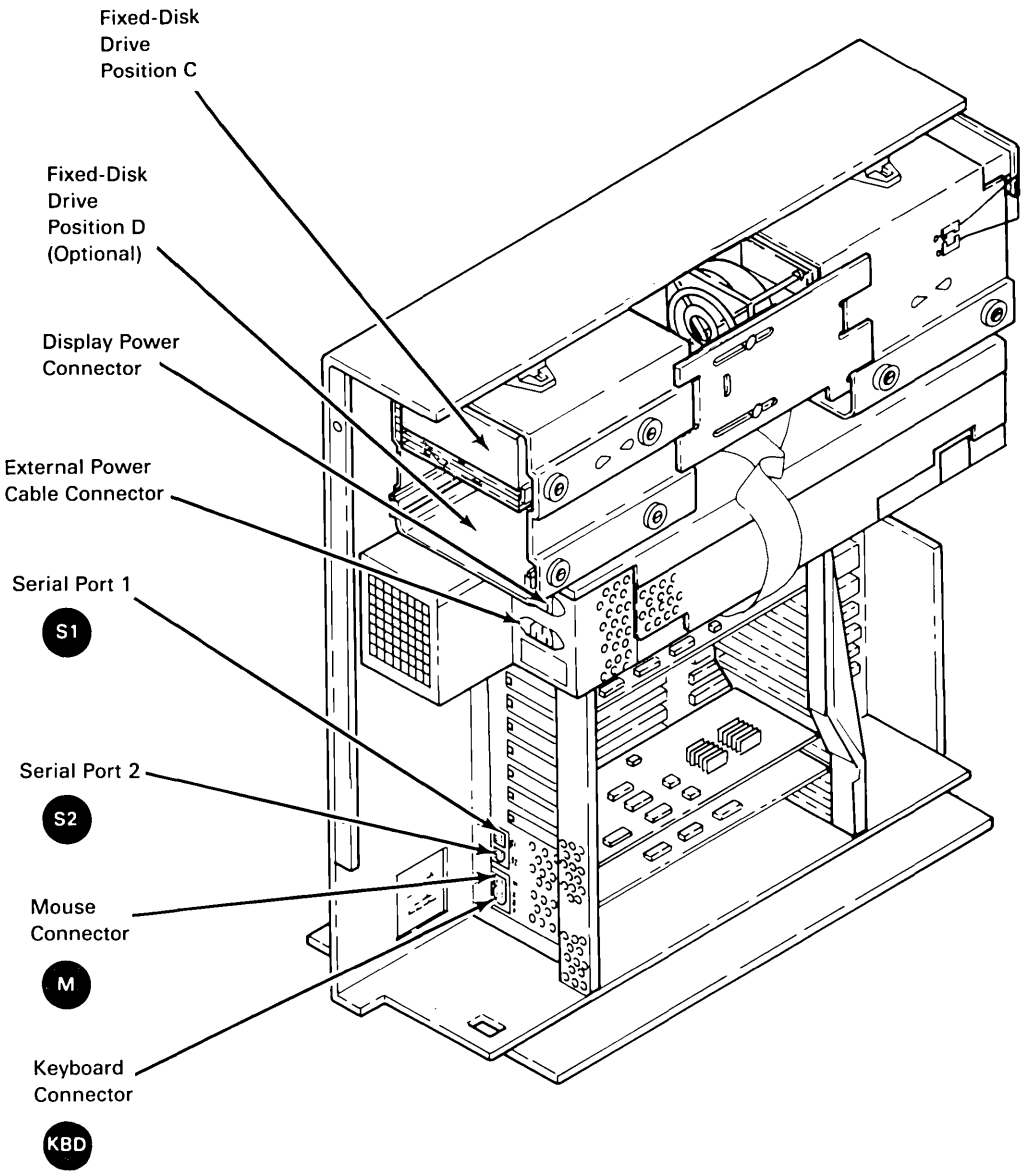
Front View With Covers



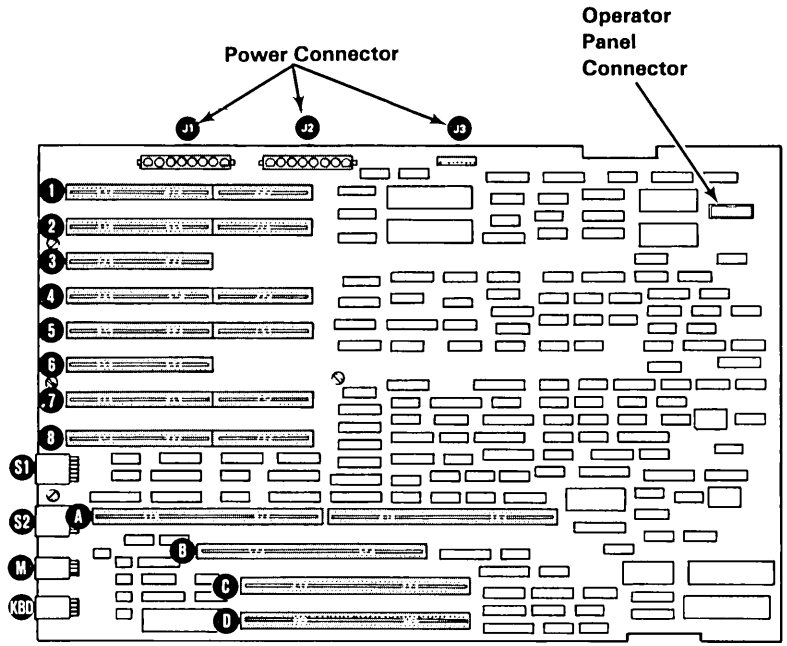
Front View Without Covers



Rear View Without Covers



System Board



1 Fixed-Disk and Diskette Drive Adapter

2 Fixed-Disk and Diskette Drive Adapter

8 Coprocessor (Optional)

A Processor Board

B Floating-Point Board (Optional)

C Memory Option

D Memory Option

2 – 8 Adapter Slots

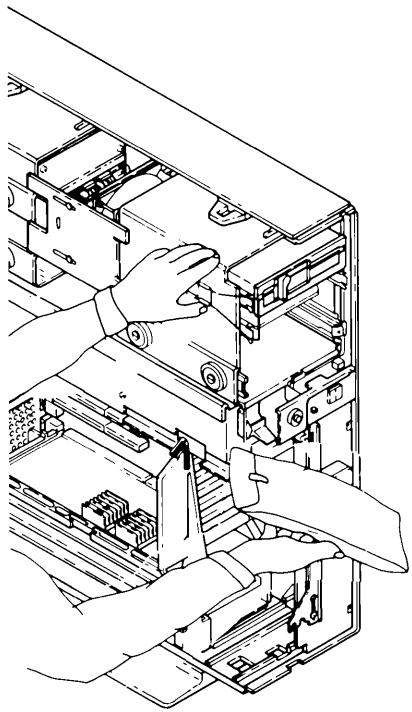
Handling Static-Sensitive Devices

Some devices that make up your IBM 6150 System Unit 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.

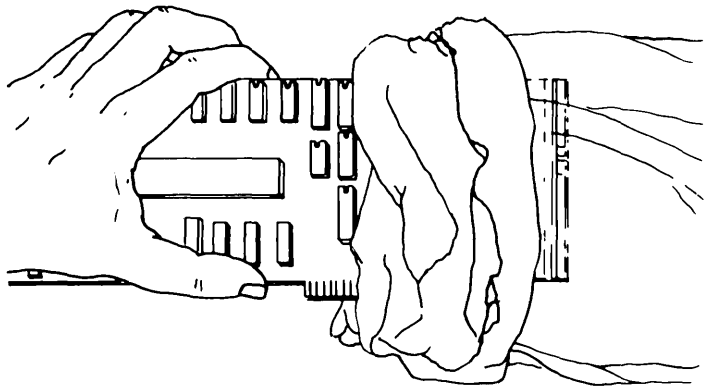
Note: The adapters, processor board, floating-point board, system board, system memory boards, diskette drives, and the fixed-disk drives are static-sensitive devices.

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

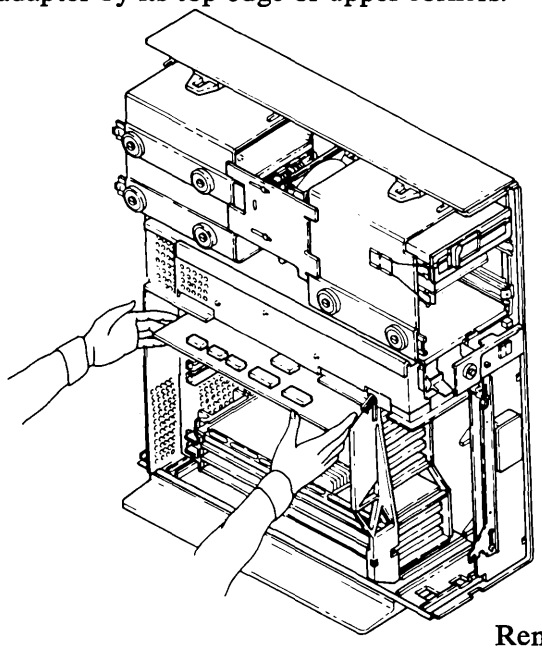
1. Hold the option (still wrapped in its antistatic bag) in one hand and touch a metal part of your system unit with the other hand. This will place your body, the option, and the system unit at the same ground potential, thus preventing an accidental static discharge.



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.

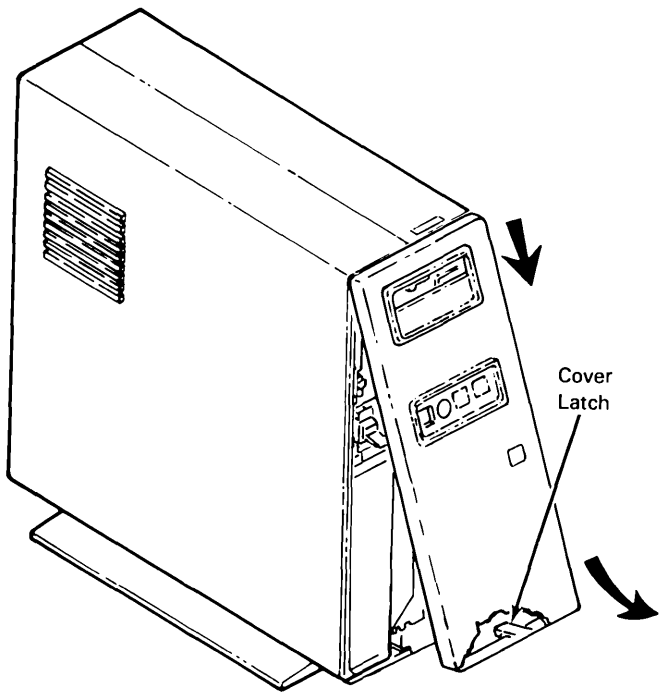


Removal and Replacement Procedures

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.

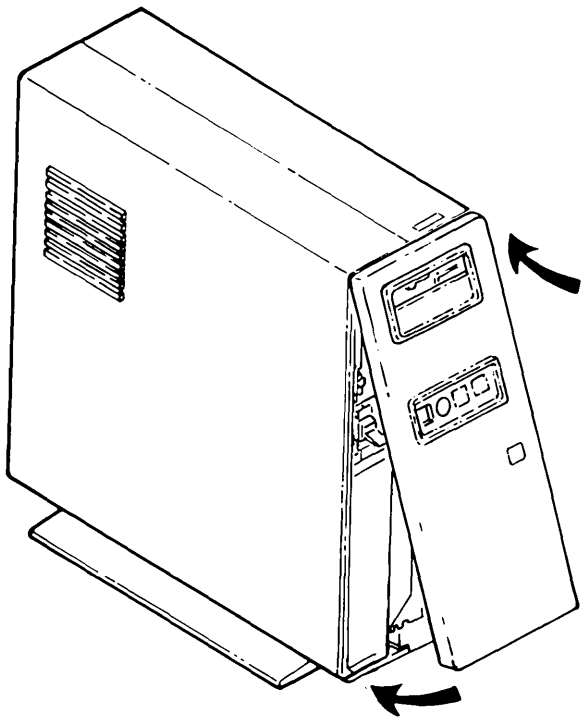
Front Cover Removal

1. Set the power switches of the attached devices to Off.
2. Set the power switch of the system unit to Off.
3. Set the keylock to Unlock, then remove the key.
4. Press up on the cover latch, then pull the lower end of the cover out from the system unit. Lower the cover to remove it.



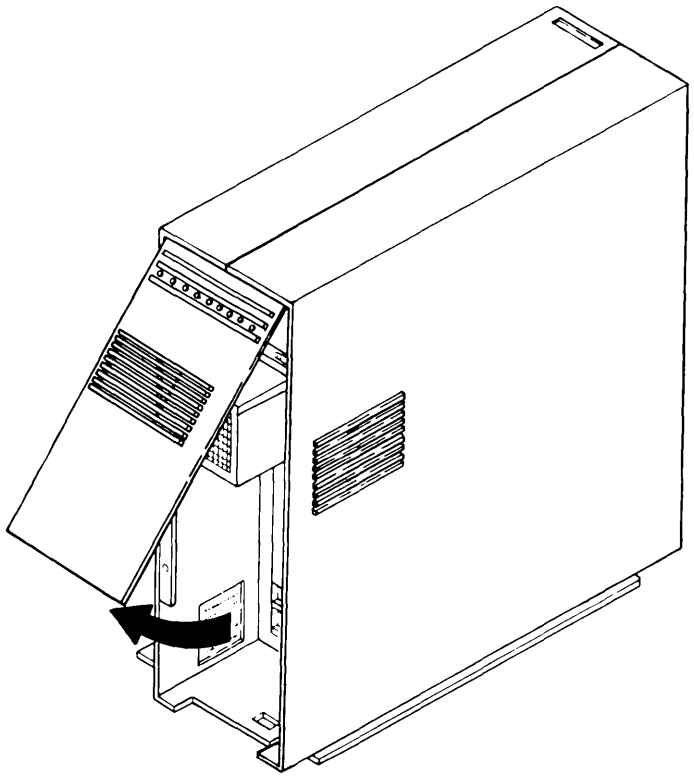
Front Cover Replacement

1. Hook the upper cover arms under the edge of the system unit. Push the lower end of the cover into position.
2. Set the power switches of the attached devices to On.
3. Set the power switch of the system unit to On.



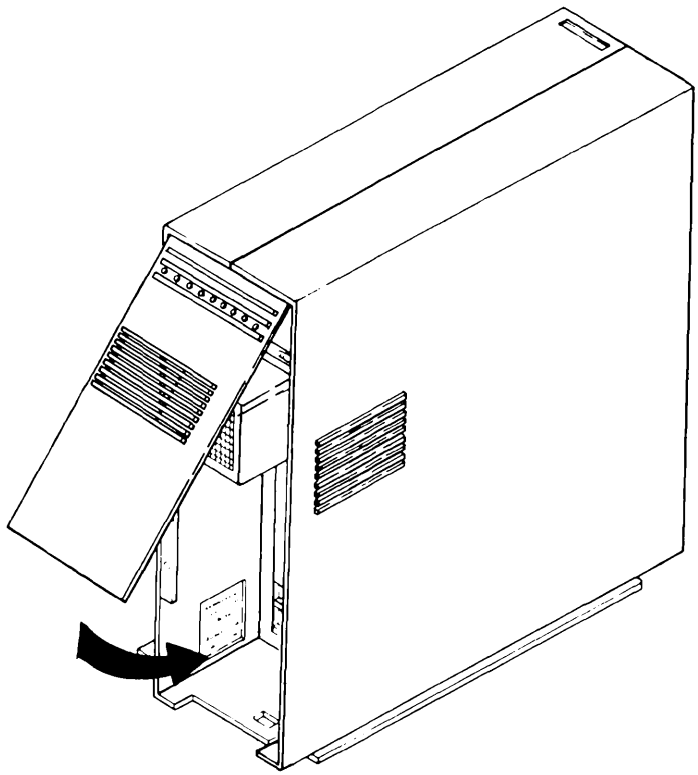
Rear Cover Removal

1. Set the power switches of the attached devices to Off.
2. Set the power switch of the system unit to Off.
3. Pull the lower end of the cover out from the system unit. Lower the cover to remove it.



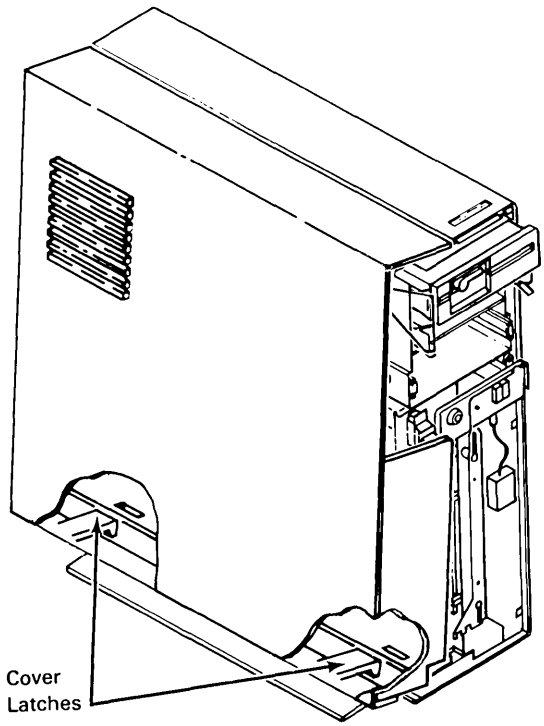
Rear Cover Replacement

1. Hook the upper cover arms under the edge of the system unit. Push the lower end of the cover into position.
2. Set the power switches of the attached devices to On.
3. Set the power switch of the system unit to On.



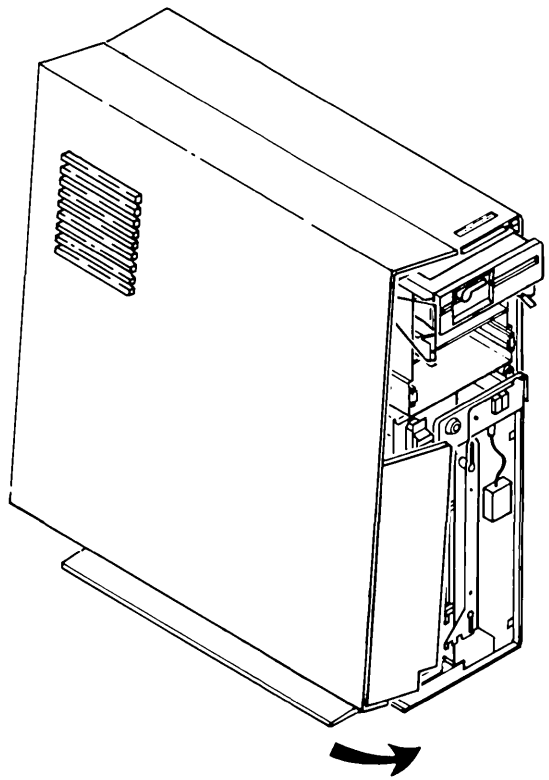
Side Cover Removal

1. Do the "Front Cover Removal" on page 4-10.
2. Do the "Rear Cover Removal" on page 4-12.
3. Unplug the external power cable from the outlet.
4. Disconnect the external power cable and display power cable from the power supply.
5. Press up on the two cover latches, then pull the lower end of the cover out from the system unit. Raise the cover to remove it.



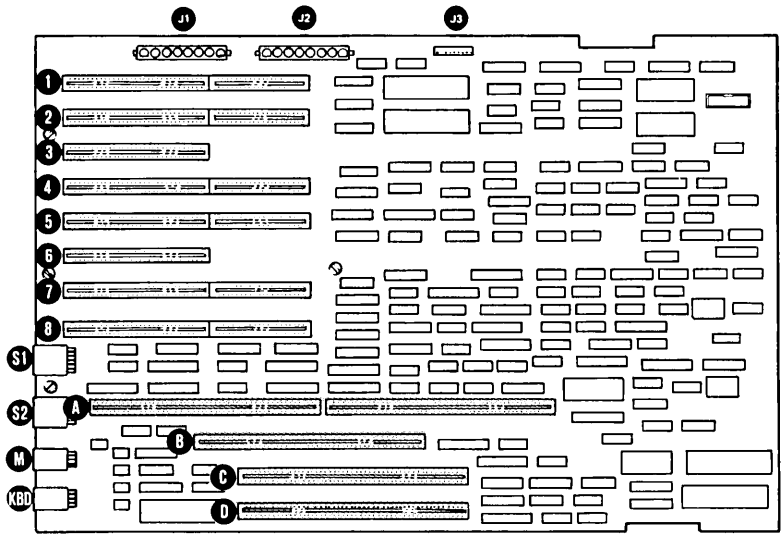
Side Cover Replacement

1. Hook the upper cover arms under the edge of the system unit. Push the lower end of the cover into position.
2. Connect the external power cable and the display power cable to the power supply.
3. Do the "Rear Cover Replacement" on page 4-13.
4. Do the "Front Cover Replacement" on page 4-11.
5. Plug the external power cable into the outlet.



Processor, Floating-Point, or System Memory Removal

1. Do the "Side Cover Removal" on page 4-14.
2. Remove the desired board.
3. Record the type and slot position.



A Processor Board

B Floating-Point Board (Optional)

C Memory Option

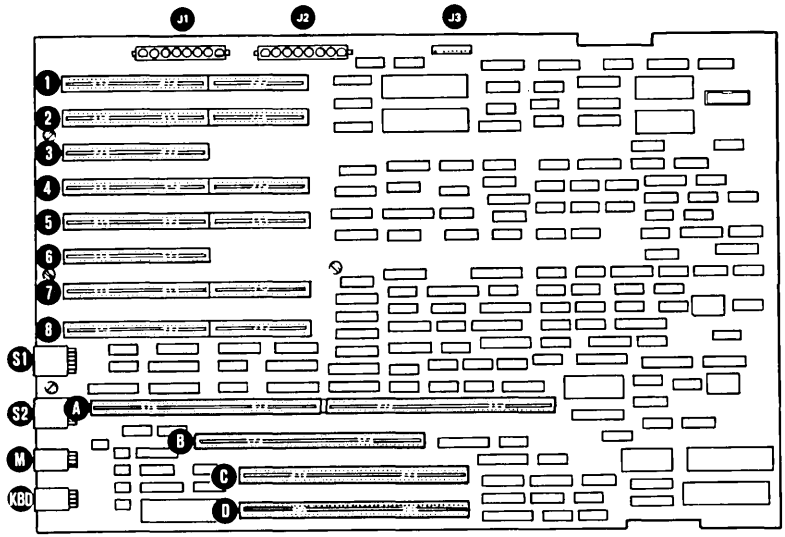
D Memory Option

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. Do the "Side Cover Replacement" on page 4-15.

   Reminder to Service Representative: After you exchange the Processor Board, notify the customer that the unique identification number of the system unit has changed. The customer needs to update the authorization for any program that uses the identification number for access.



A Processor Board

B Floating-Point Board (Optional)

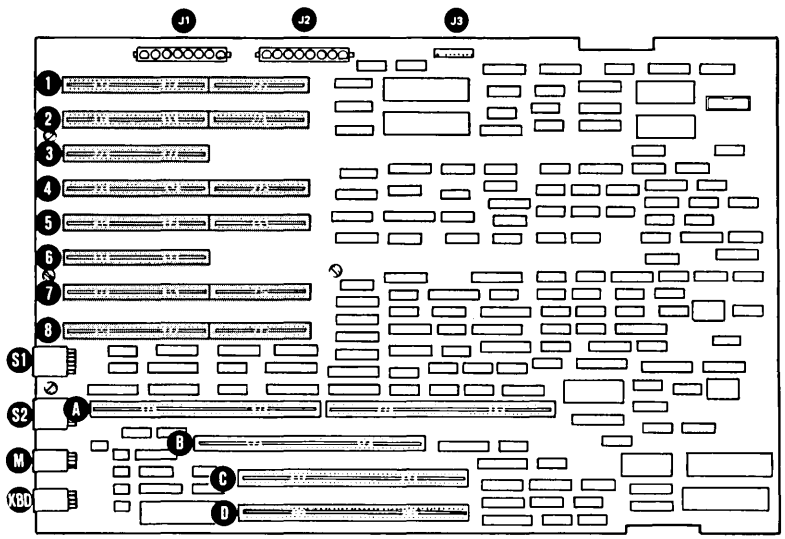
C Memory Option

D Memory Option

Adapter Removal

1. Do the "Side Cover Removal" on page 4-14.
2. Record the adapter slot position.
3. Disconnect any external cables from the desired adapter.
4. Remove the adapter mounting screw.
5. Remove the adapter.
6. Disconnect any internal cables from the adapter.
7. If the adapter has jumpers or switches, record the settings. If needed, refer to the jumper or switch settings information for the adapter in Section 9.

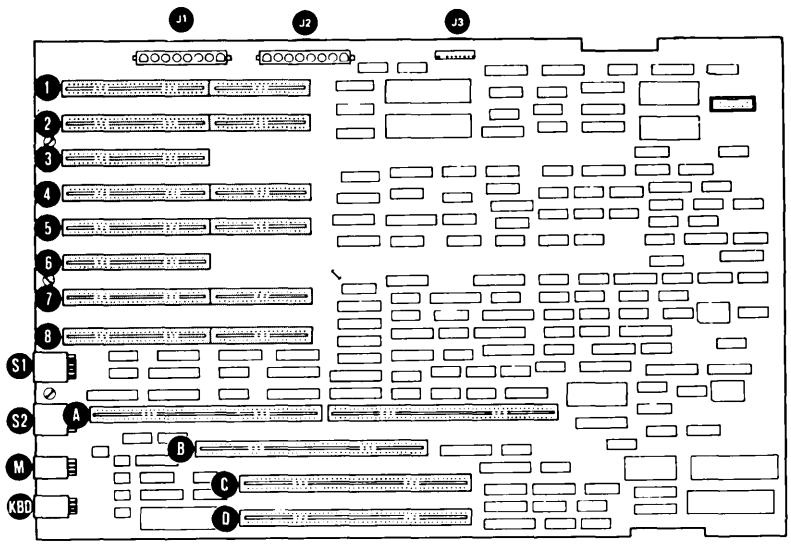
Note: Some options and adapters have optional pluggable features. You can either move the optional pluggable feature to the new FRU or be sure the new option or adapter has it installed.



Adapter Replacement

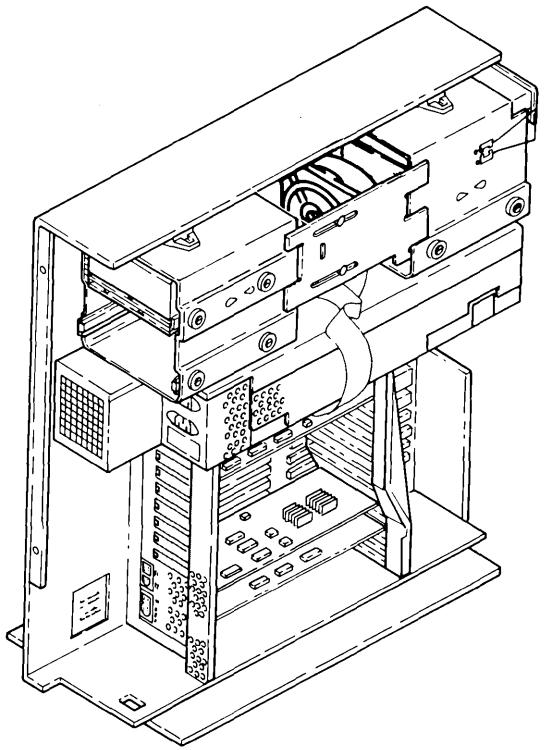
Note: Some options and adapters have optional pluggable features. You can either move the optional pluggable feature to the new FRU or be sure the new option or adapter has it installed.

1. Look at the jumper or switch settings you recorded, then set the jumpers or switches. If needed, refer to Section 9.
2. Connect any internal cables removed from the adapter.
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.
5. Connect any external cables removed from the adapter.
6. Do the "Side Cover Replacement" on page 4-15.



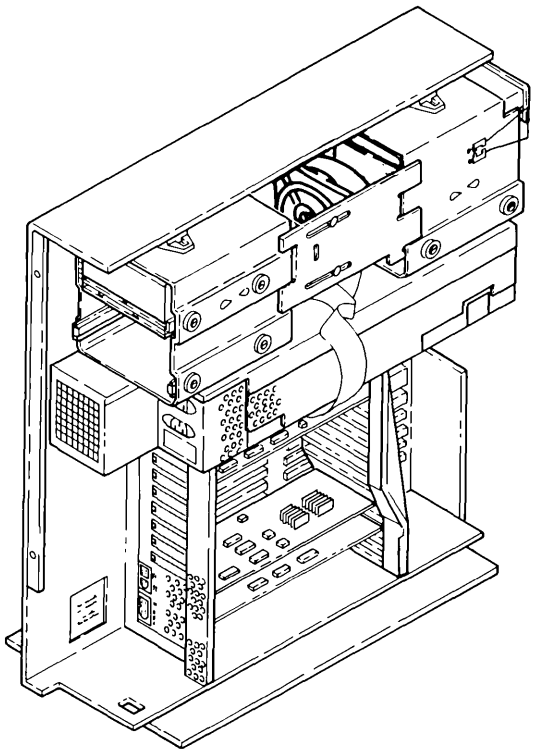
Attached Device Removal

1. Do the "Rear Cover Removal" on page 4-12.
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 4-13.



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 6150 System Unit and is so marked to indicate such classification. Use of another may present risk of fire or explosion.

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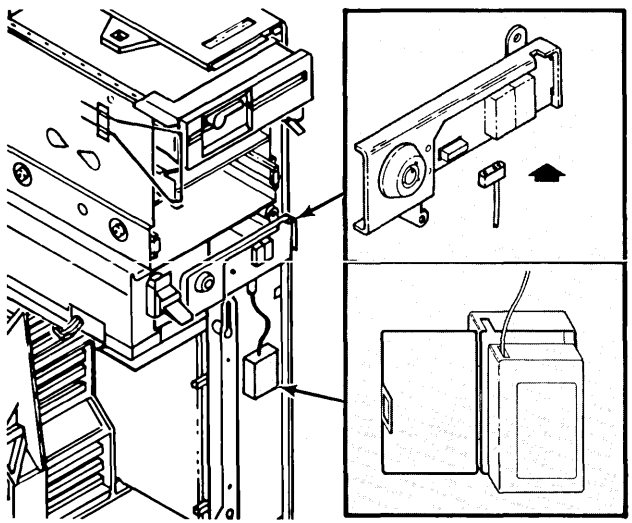
1. Do the "Front Cover Removal" on page 4-10.
2. Disconnect the battery cable from the operator panel board.
3. Open the battery box and remove the battery.



Battery Replacement

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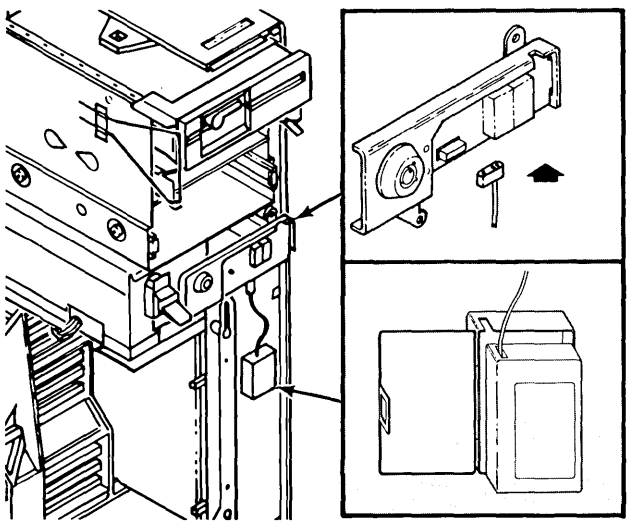
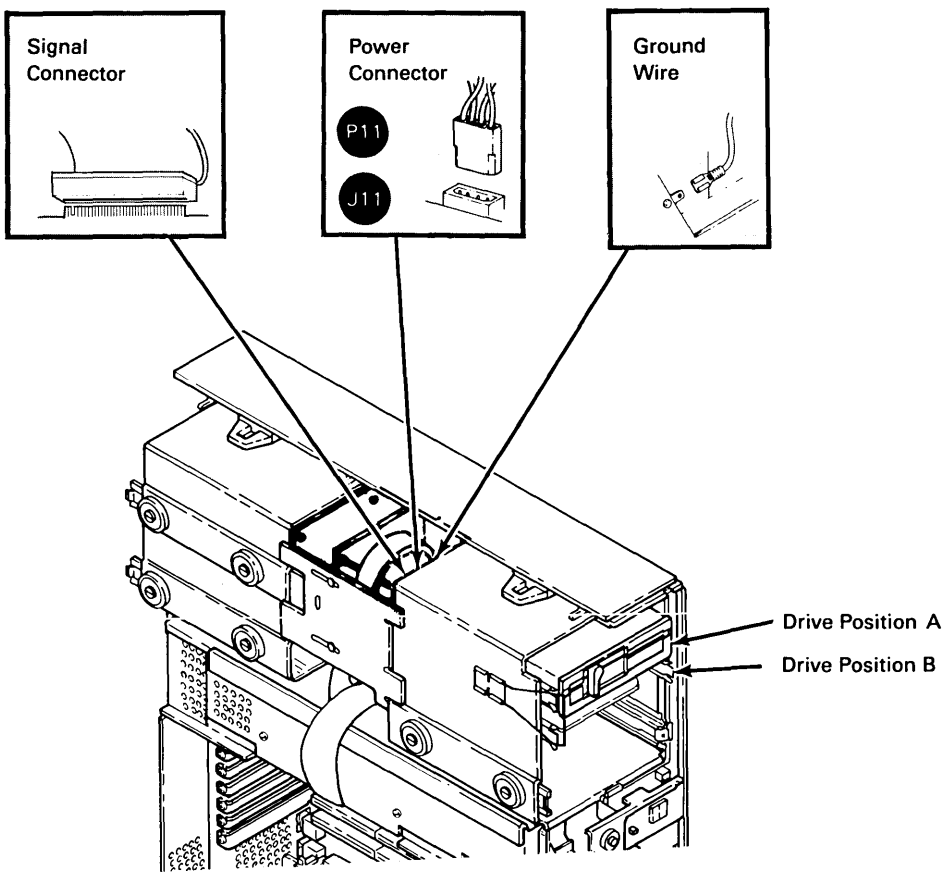
1. Place the battery in the battery box and close it.
2. Connect the battery cable to the operator panel board.
3. Do the "Front Cover Replacement" on page 4-11.



Diskette Drive Removal

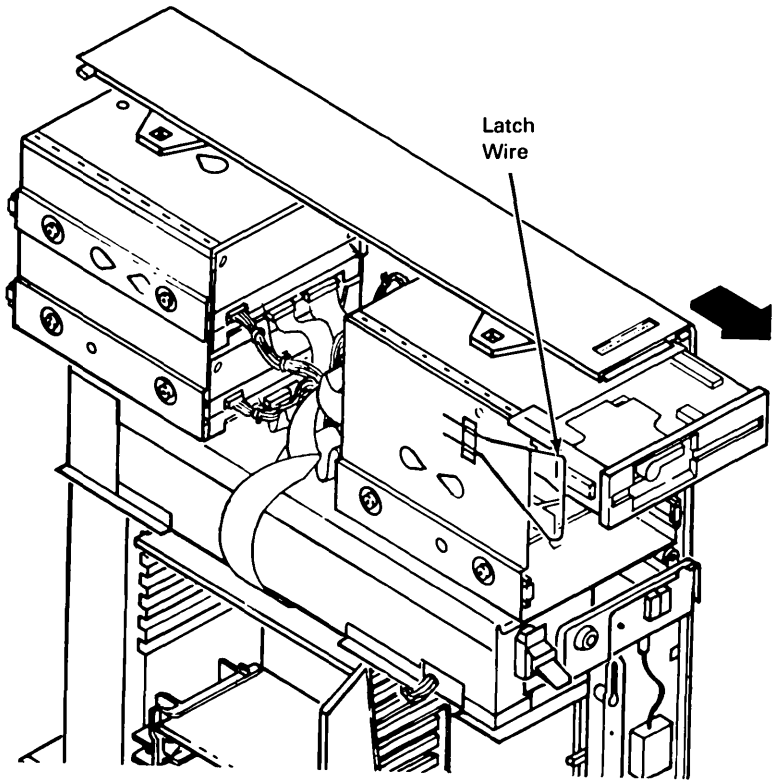
Follow the Handling a Diskette Drive procedures. If needed, see Section 7.

1. Do the "Side Cover Removal" on page 4-14.
2. Do the "Cooling Fan Assembly Removal" on page 4-50.
3. Disconnect the signal connector.
4. Disconnect the power connector.
5. Disconnect the ground wire.



6. Pull on the latch wire, then slide the drive out of the system unit.

7. Check to see if the terminating resistor is installed on the drive. Record your results. If needed, refer to Section 7.

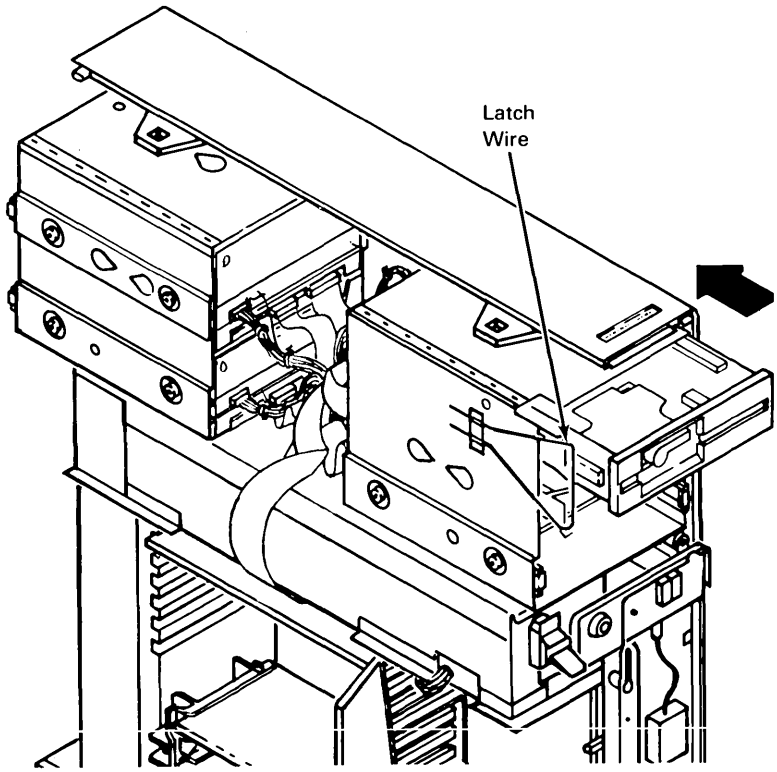


Diskette Drive Replacement

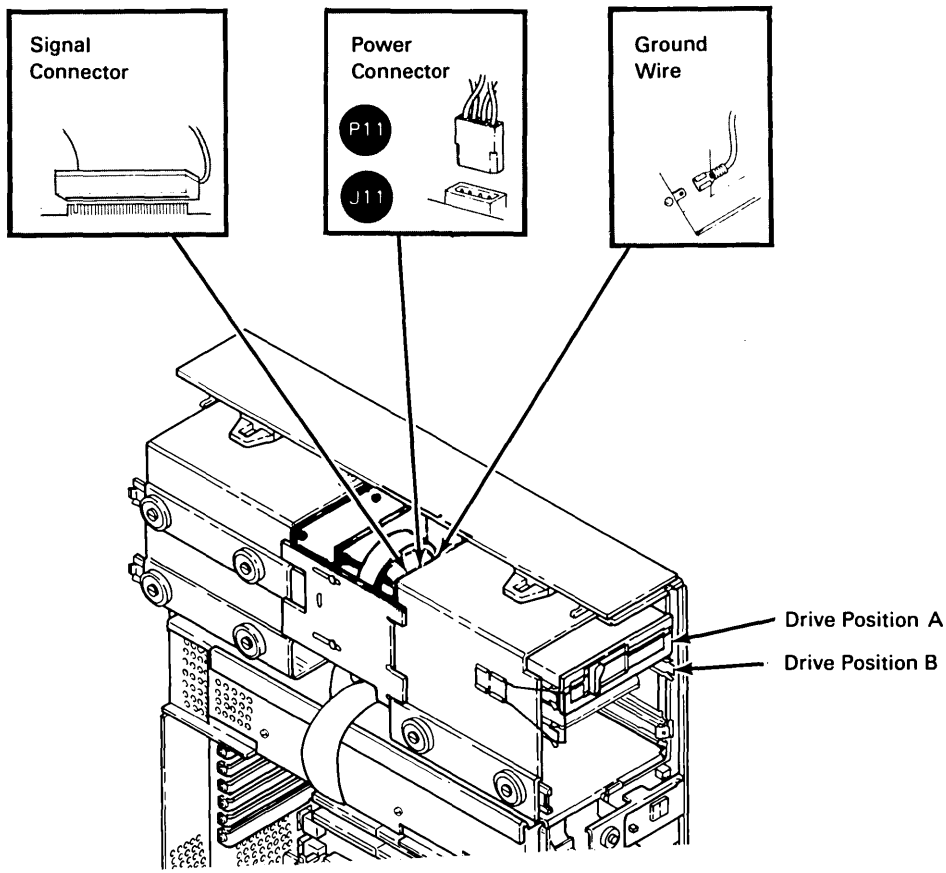
Follow the Handling a Diskette Drive procedures. If needed, see Section 7.

1. Look at the terminator resistor results you recorded, then install or remove the terminator resistor. If needed, refer to Section 7.

2. Align the drive, then push it into the system unit until the latch wire clicks.



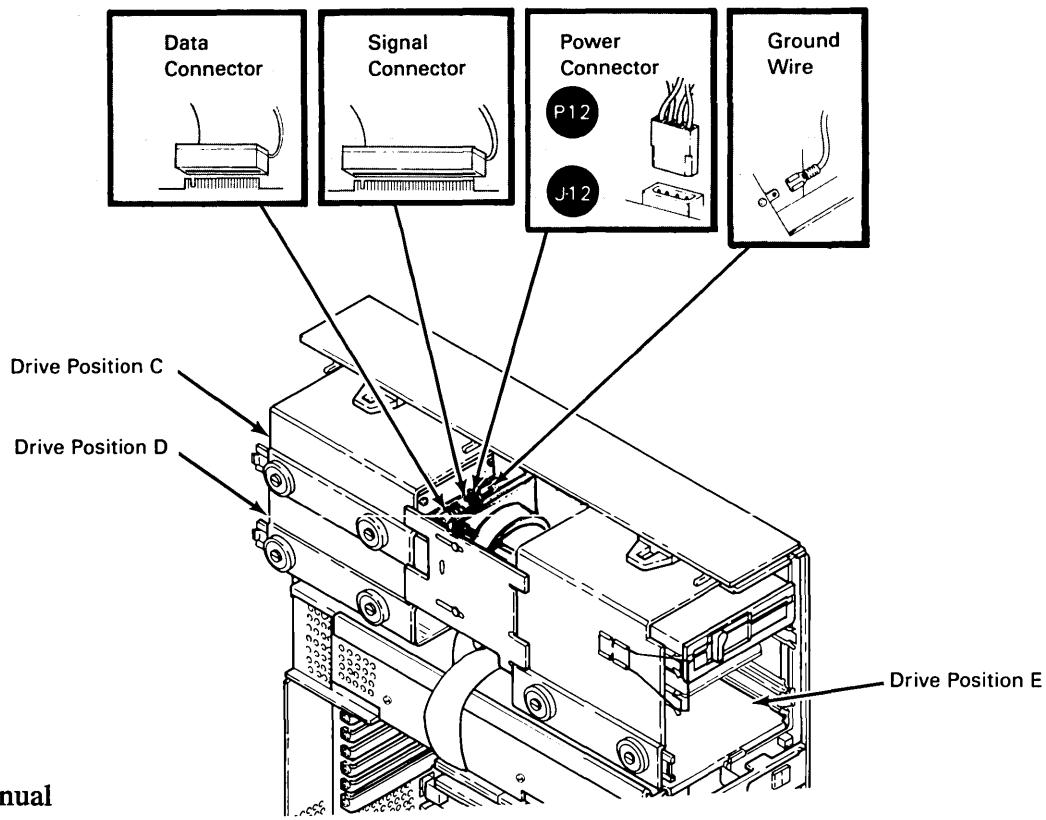
3. Connect the ground wire.
4. Connect the power connector.
5. Connect the signal connector.
6. Do the "Cooling Fan Assembly Replacement" on page 4-51.
7. Do the "Side Cover Replacement" on page 4-15.



Fixed-Disk Drive Removal

Follow the Handling a Fixed-Disk Drive procedures. If needed, see Section 8.

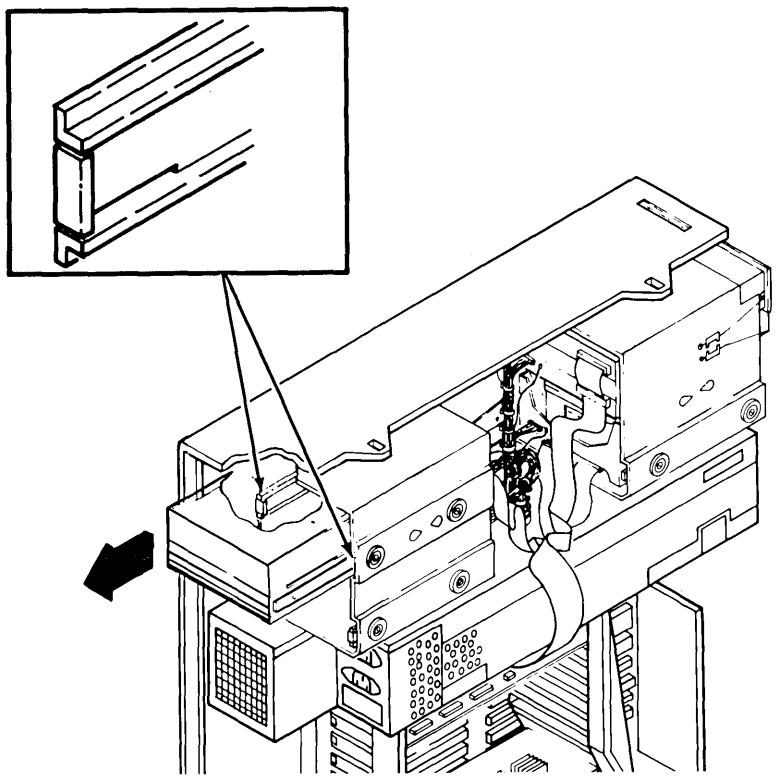
1. Do the "Side Cover Removal" on page 4-14.
2. Do the "Cooling Fan Assembly Removal" on page 4-50.
3. Disconnect the ground wire.
4. Disconnect the power cable.
5. Disconnect the signal cable.
6. Disconnect the data cable.



7. Push out on the latches to release the drive, then slide the drive out of the system unit.

8. Record the drive type and position.

9. Check to see if the terminating resistor is installed on the drive. Record your results. If needed, refer to Section 8.

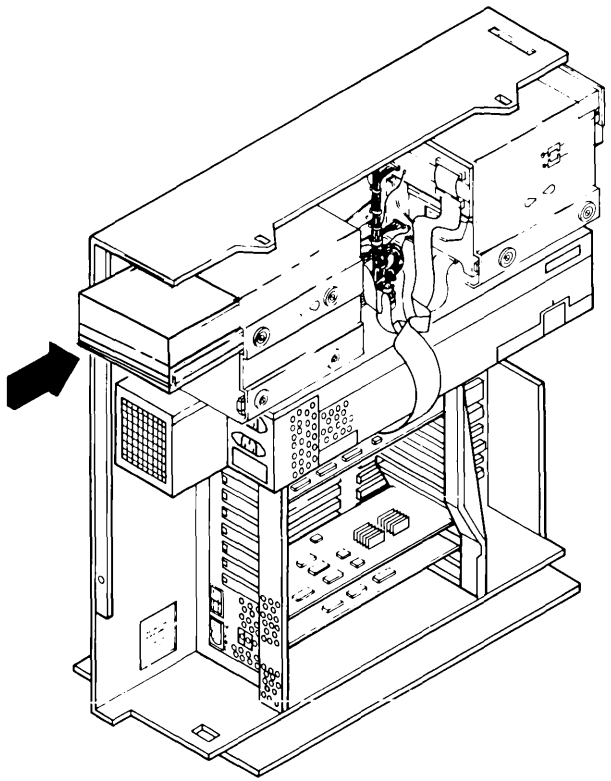


Fixed-Disk Drive Replacement

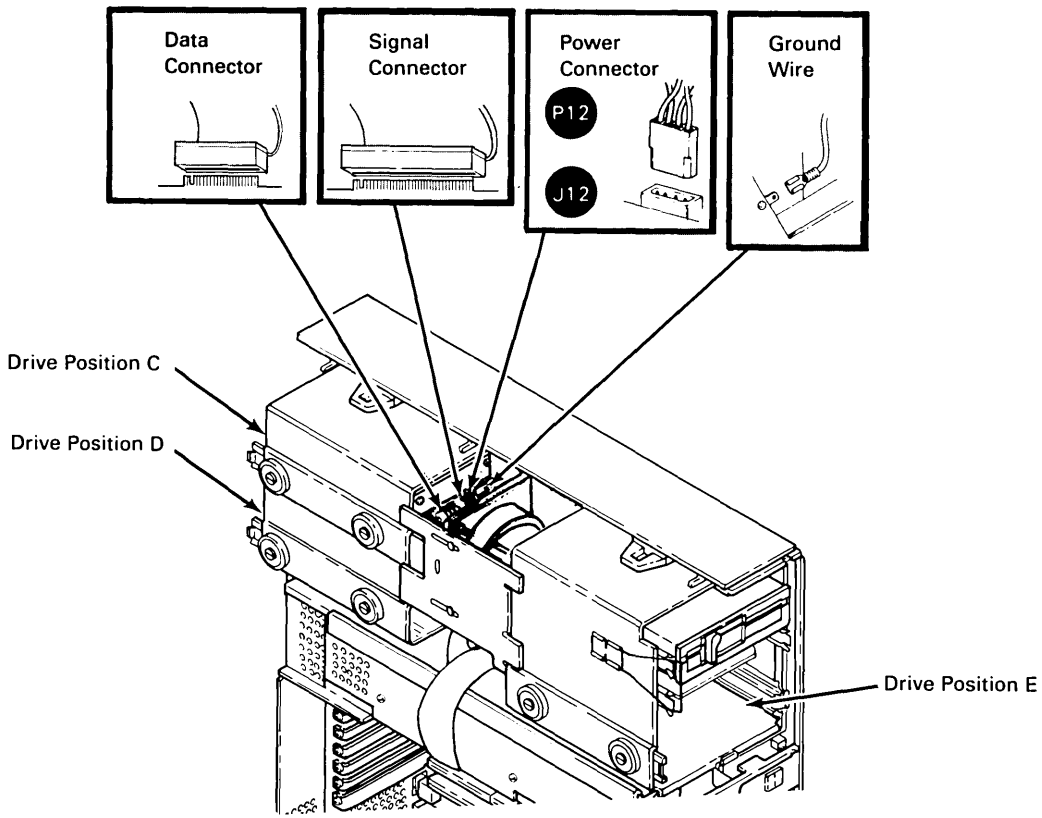
Follow the Handling a Fixed-Disk Drive procedures. If needed, see Section 8.

1. Look at the terminator resistor results you recorded, then install or remove the terminator resistor. If needed, refer to Section 8.

2. Look at the drive position you recorded, then slide the drive into the system unit until both latches click.

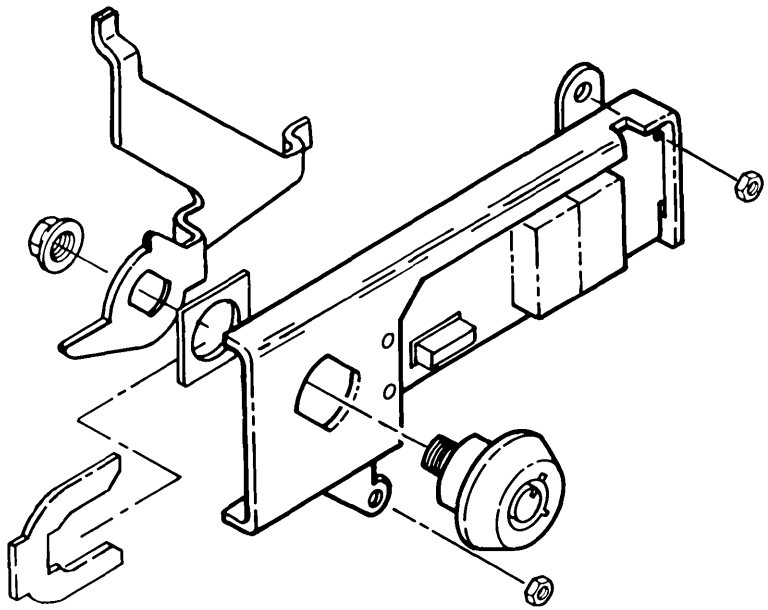


3. Connect the signal cable.
4. Connect the data cable.
5. Connect the power cable.
6. Connect the ground wire.
7. Do the "Cooling Fan Assembly Replacement" on page 4-51.
8. Do the "Side Cover Replacement" on page 4-15.



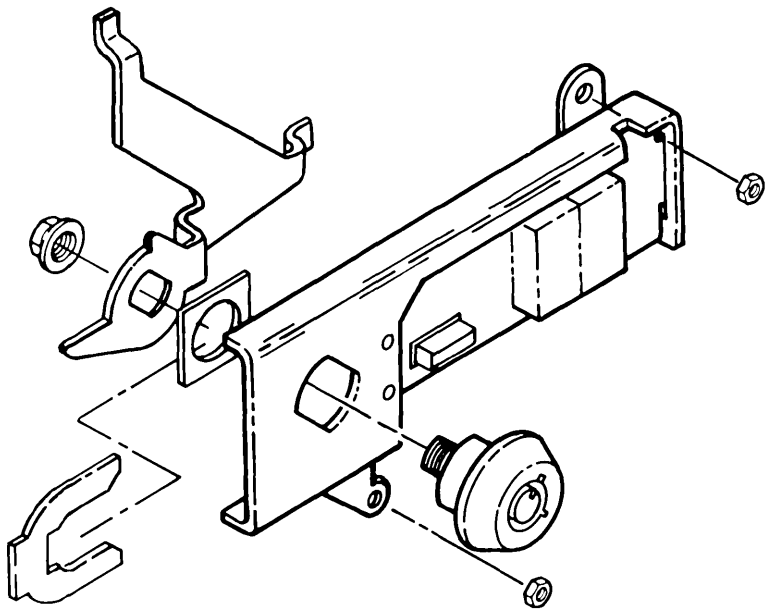
Keylock Removal

1. Do the "Front Cover Removal" on page 4-10.
2. Set the keylock to Locked.
3. Remove the operator panel mounting nuts and operator panel assembly.
4. Set the keylock to Unlocked.
5. Remove the locknut and lock arm.
6. Slide the mounting clip off, then remove the keylock and spacer.



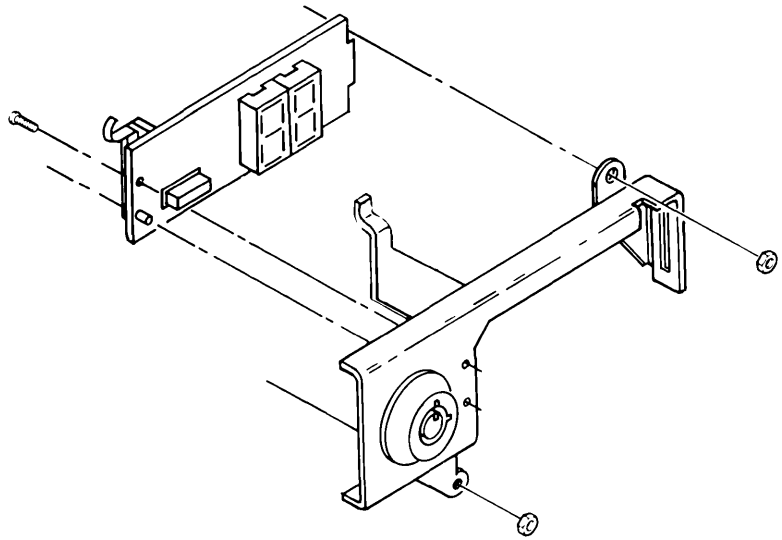
Keylock Replacement

1. Set the keylock to Unlocked.
2. Install the keylock and spacer, then slide the mounting clip on.
3. Install the lock arm and locknut.
4. Set the keylock to Locked.
5. Install the operator panel and mounting nuts.
6. Set the keylock to Unlocked.
7. Do the "Front Cover Replacement" on page 4-11.



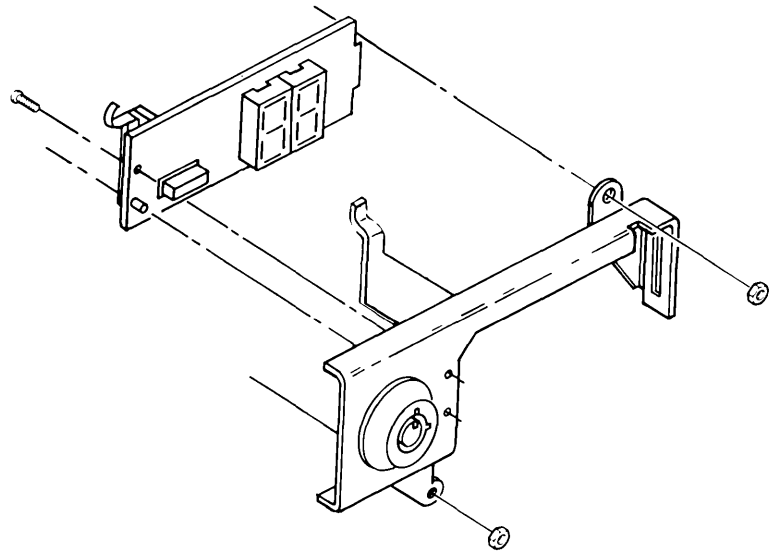
Operator Panel Board Removal

1. Do the "Side Cover Removal" on page 4-14.
2. Disconnect the battery cable from the operator panel board.
3. Disconnect the operator panel cable from the system board.
4. Remove the two mounting nuts and the operator panel assembly.
5. Remove the mounting screw and the operator panel board.



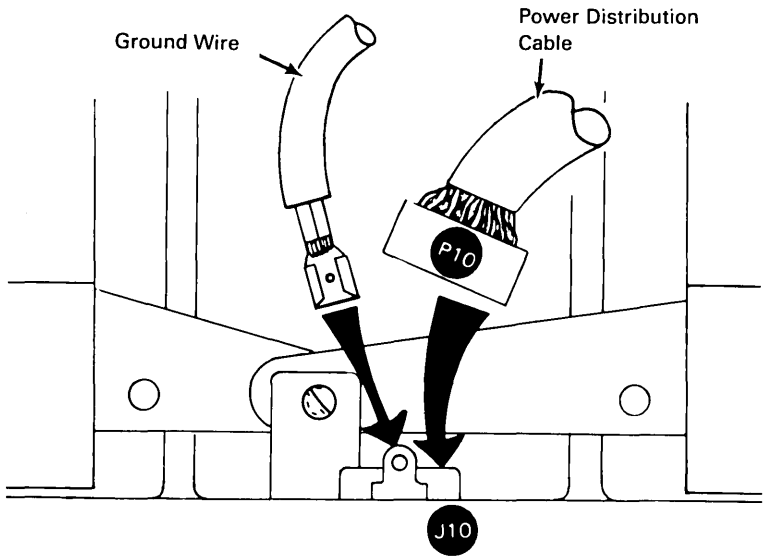
Operator Panel Board Replacement

1. Install the operator panel board and mounting screw.
2. Install the operator panel assembly and two mounting nuts.
3. Connect the operator panel cable to the system board.
4. Connect the battery cable to the operator panel board.
5. Do the "Side Cover Replacement" on page 4-15.



Power Supply Removal

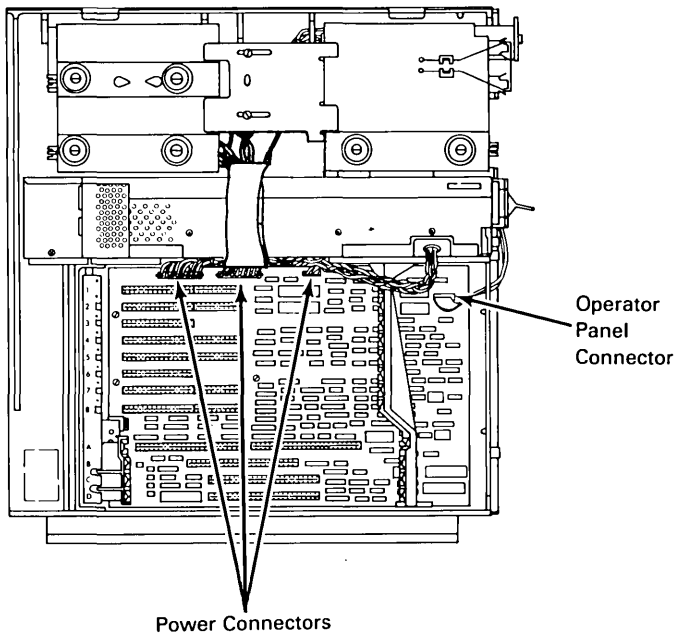
1. Do the "Side Cover Removal" on page 4-14.
2. Do the "Cooling Fan Assembly Removal" on page 4-50.
3. Disconnect the ground wire from the top of the power supply.
4. Disconnect the power distribution cable from the top of the power supply.



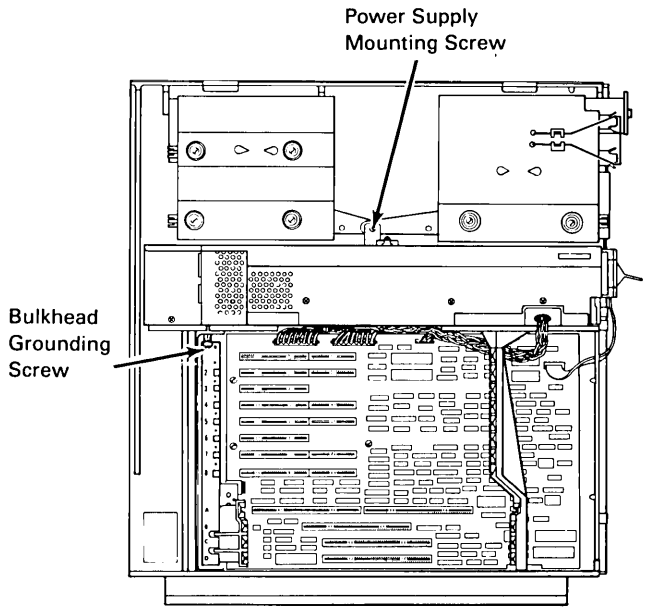
5. If adapter slot 2 contains a fixed disk and diskette adapter, remove the adapter and place it on top of the system unit with the cables attached.

6. Remove the fixed disk and diskette-drive adapter from slot 1, then place the adapter on top of the system unit with the cables attached.

7. Disconnect the three power connectors from the system board. Look at the cable routing and where it attaches to the power supply. You will need to change the cable attachment and cable routing on the new power supply.

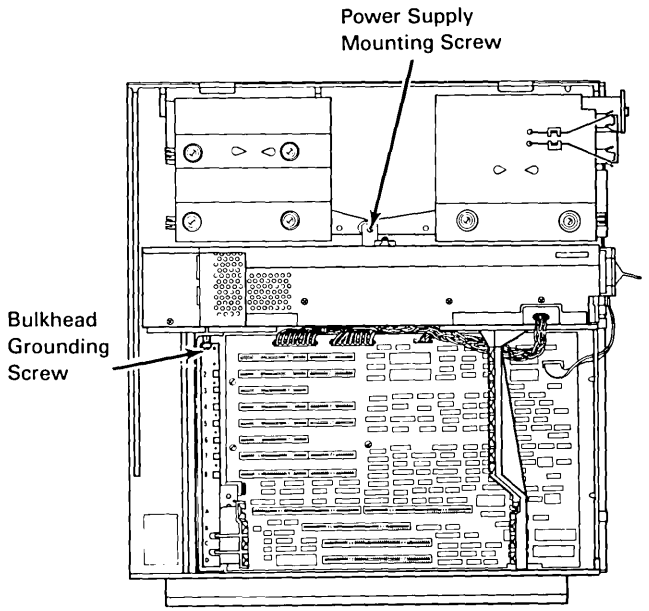


8. Remove the bulkhead grounding screw.
9. Remove the power supply mounting screw.
10. Slide the power supply out of system unit.

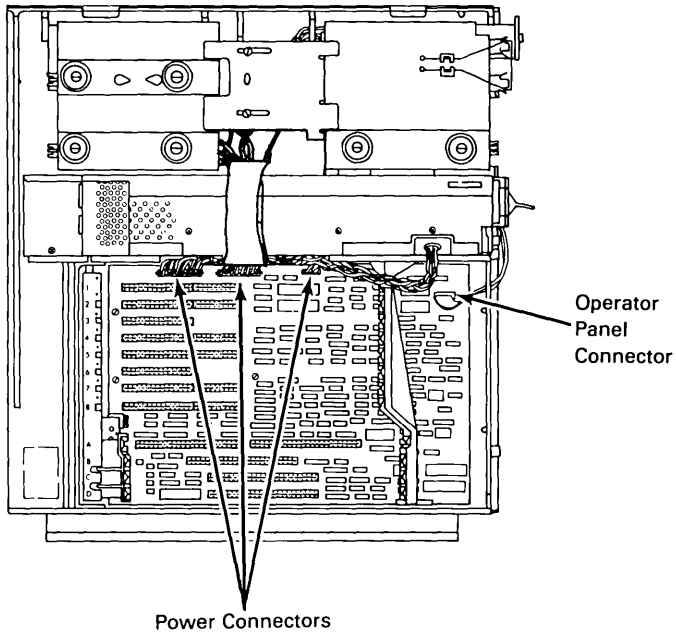


Power Supply Replacement

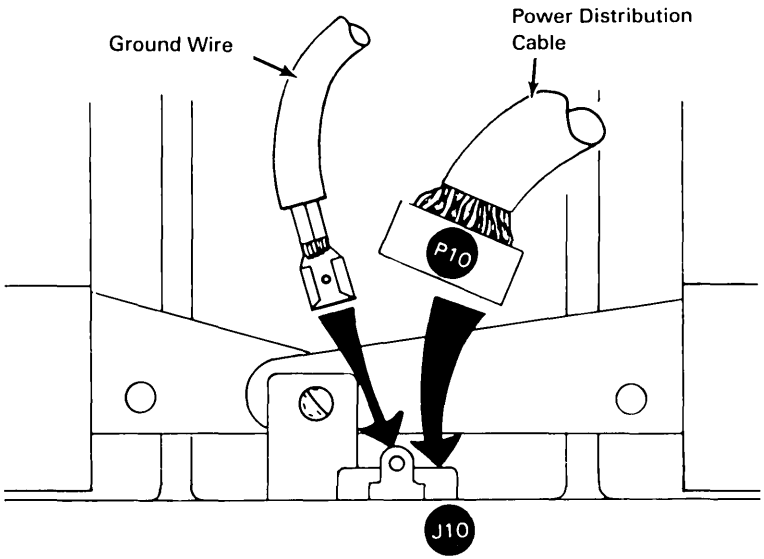
1. Remove the cable clips from the side of the power supply, then route the cable down from the cable exit under the power supply and attach it with one clip. Ensure that no wires are between the side of the power supply and the left side cover.
2. Align the power supply and slide into position.
3. Install the power supply mounting screw.
4. Install the bulkhead grounding screw.



5. Connect the three power connectors to the system board.
6. Install the fixed disk and diskette-drive adapter in adapter slot 1.
7. If removed, install the adapter in adapter slot 2.

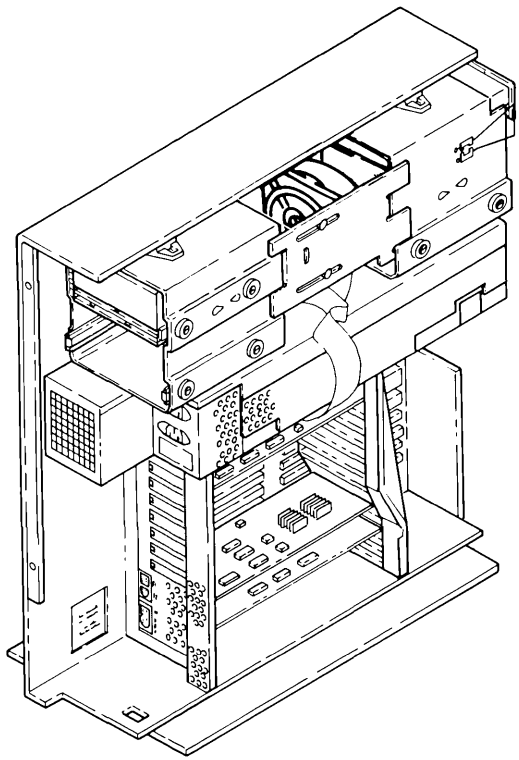


8. Connect the power distribution cable to the top of the power supply.
9. Connect the ground wire on top of the power supply.
10. Do the "Cooling Fan Assembly Replacement" on page 4-51.
11. Do the "Side Cover Replacement" on page 4-15.



System Board Removal

1. Do the "Side Cover Removal" on page 4-14.
2. Disconnect all the external cables attached to the system board and the adapters. Record the slot number and connector position of each cable.

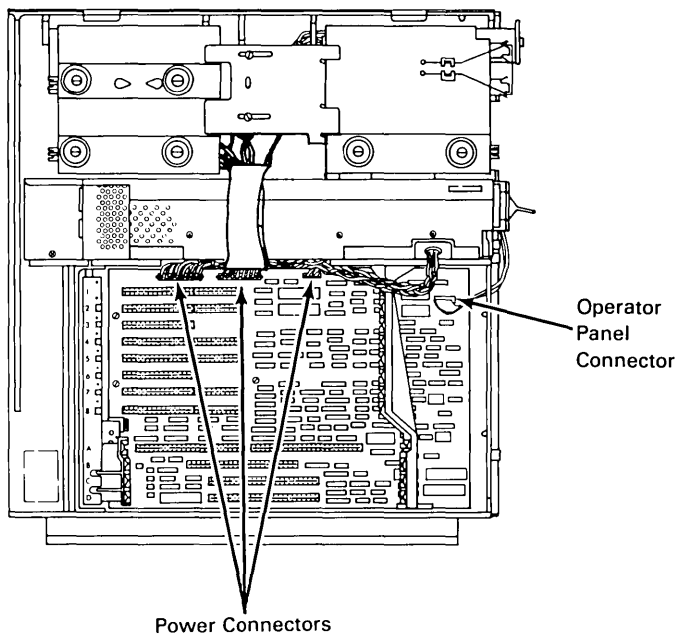


3. If adapter slot 2 contains a fixed disk and diskette-drive adapter, remove the adapter and place it on top of the system unit with the cables attached.

4. Remove the fixed disk and diskette-drive adapter from slot 1, then place the adapter on top of the system unit with the cables attached.

5. Disconnect the three power cable connectors from the system board.

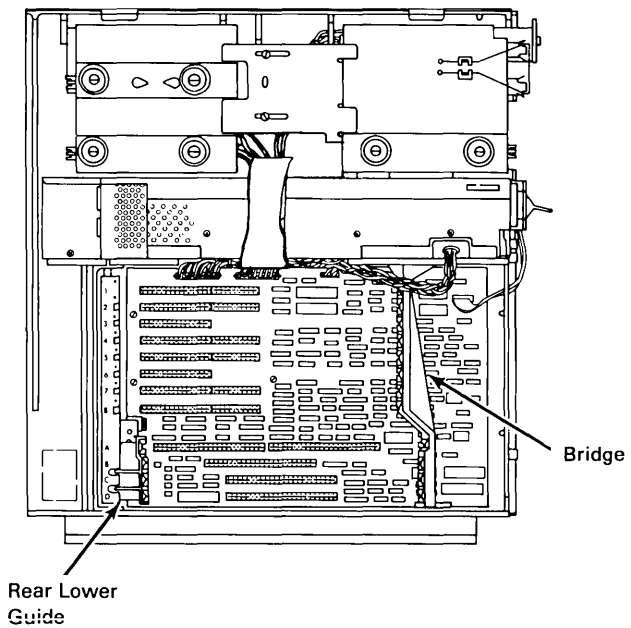
6. Disconnect the operator panel cable from the system board.



7. Remove all the remaining adapters and boards. Record the type and slot position of each.

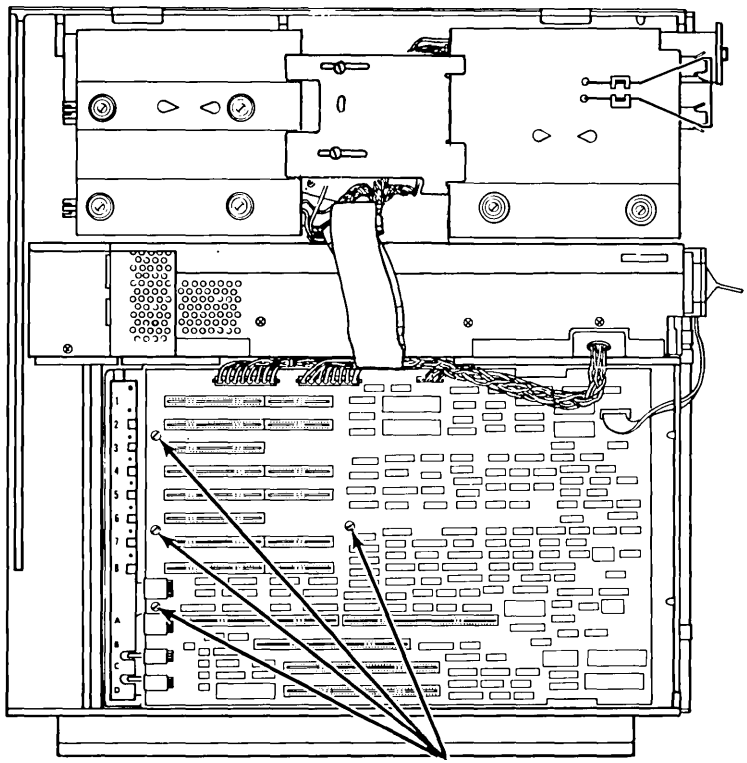
8. Raise up and pull out on the bridge to remove it.

9. Grasp the rear lower guide and pull out to remove it.



10. Remove the four system board mounting screws.

11. Press down on the latches, then remove the system board.

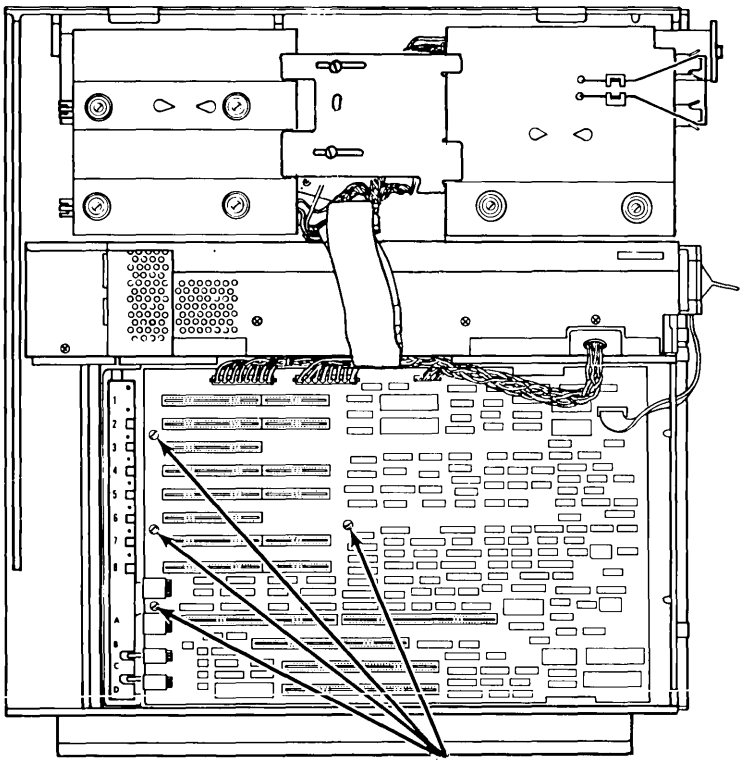


Mounting Screws

System Board Replacement

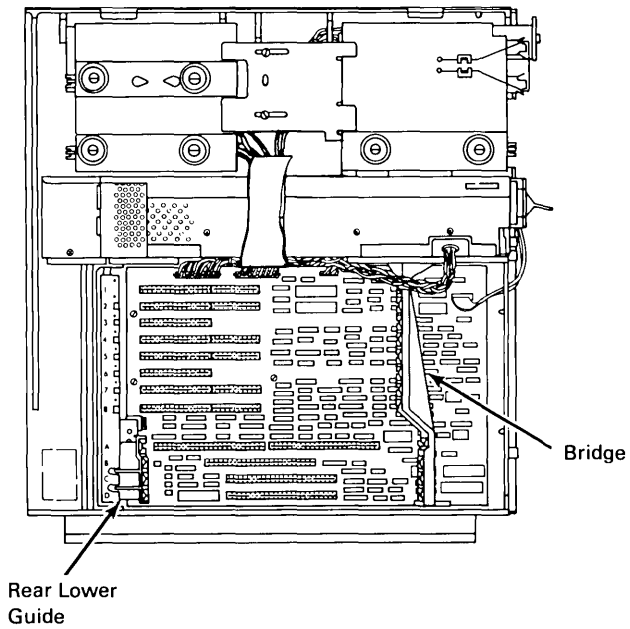
1. Insert the top of the system board in the three holders, then push the lower end into position.

2. Install the four system board mounting screws.

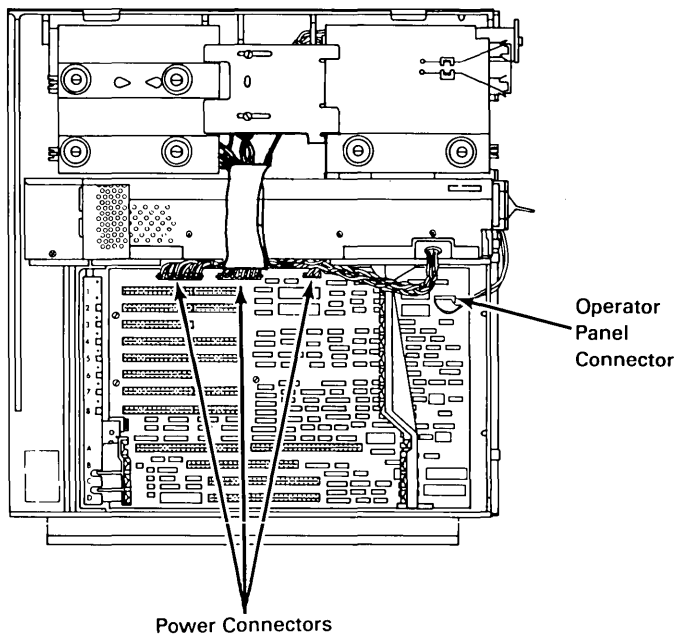


3. Align the bridge and press it into position.

4. Align the rear lower guide with the slots in the bulkhead and push it into position.

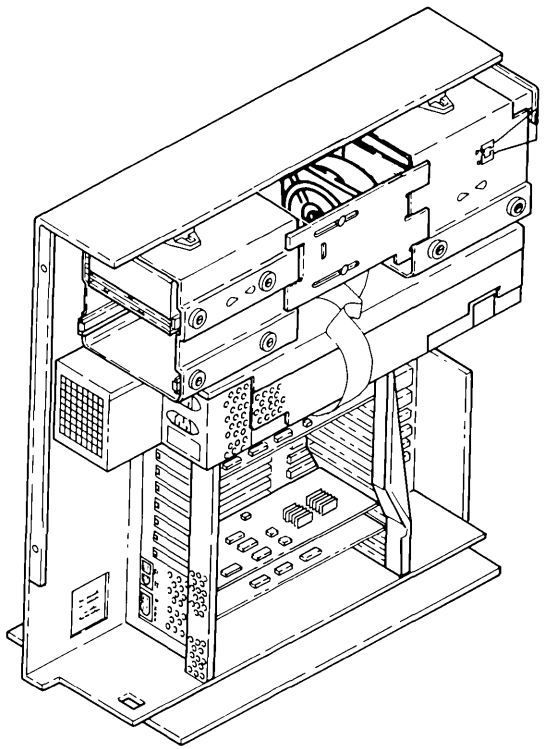


5. Connect the three power cable connectors to the system board.
6. Connect the operator panel cable to the system board.
7. Install the fixed disk and diskette-drive adapter in adapter slot 1.
8. If removed, install the adapter in adapter slot 2.
9. Look at the types and positions you recorded, then install each adapter and board.



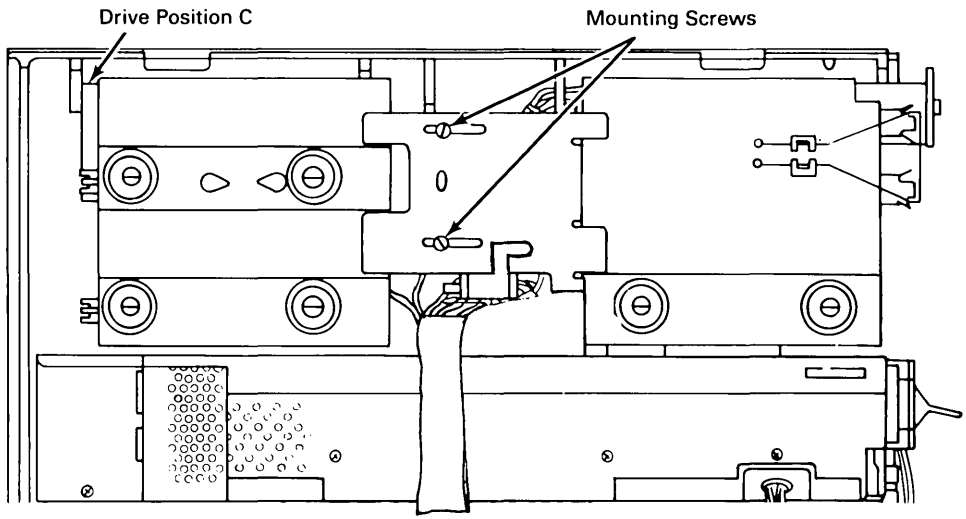
10. Look at the slot number and connector position you recorded, then connect the external cables to the system board and adapters.

11. Do the "Side Cover Replacement" on page 4-15.



Cooling Fan Assembly Removal

1. Do the "Side Cover Removal" on page 4-14.
2. Look at the cable routing before removing the fan assembly.
3. Loosen the two mounting screws and slide the fan bracket to the right, then remove cooling fan assembly.
4. Disconnect the fan power connector at drive position C.



Cooling Fan Assembly Replacement

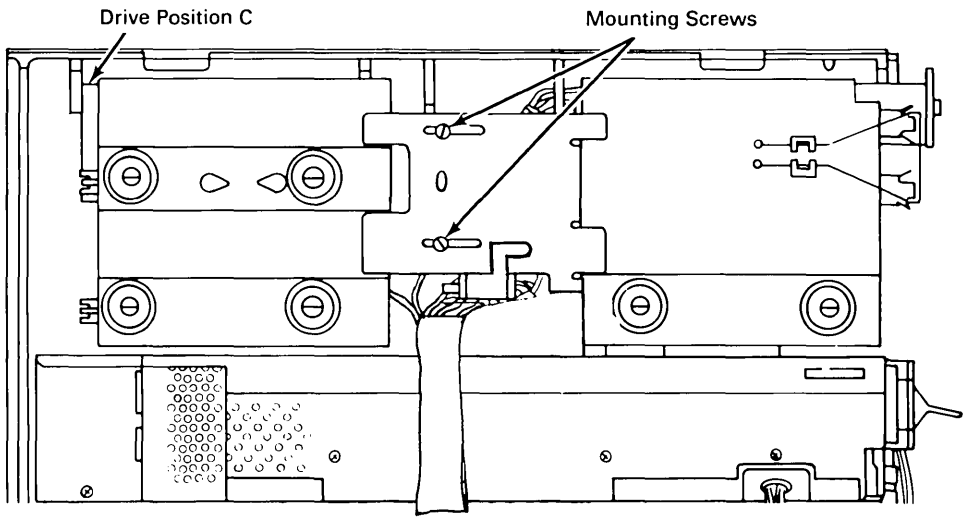
1. Connect the fan power connector at drive position C. Be sure to connect drive C also.

2. Insert the right end of the cooling fan assembly onto the front cage, then slide the fan bracket to the left behind the rear cage until the alignment holes, between the two screw slots, align.

3. Tighten the two mounting screws.

   Note: Be sure the cooling fan assembly is mounted as shown and that the cables are routed properly. If needed, see Section 5.

4. Do the "Side Cover Replacement" on page 4-15.



Section 5. Base System Unit

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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. It is included in this section because it improves the numerical processing ability of the 32-bit processor during a floating-point operation.

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

Some pages in this section contain a 3-digit product code in the page number to make future updating easier.

Base System Unit

The Base System Unit of the IBM 6150 System Unit consists of the system board, processor board, floating-point board, power supply, operator panel, covers, and hardware.

Specifications

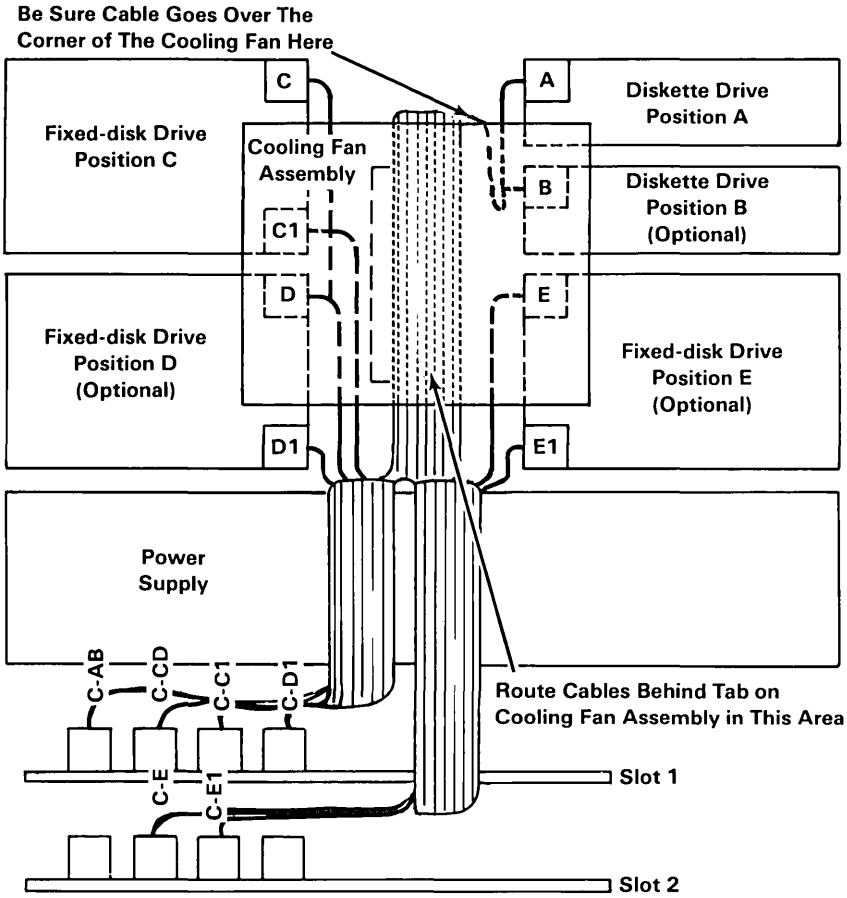
Height	635 mm (25 inches)
Width	300 mm (12 inches)
Depth	614 mm (24 1/4 inches)
Weight	42 kg (92 pounds)
Temperature	15.6 to 32.2°C (60 to 90°F)
Humidity	8 - 80 percent, noncondensing
Input voltages	U.S., 90 - 137 V ac
	WT low, 90 - 137 V ac
	WT high, 180 - 259 V ac
Power (includes attached display)	U.S., 1.0 kVA
	WT low voltage, 1.0 kVA
	WT high voltage, 1.2 kVA
Hertz	48 to 62
Heat output	700 W (2400 BTU/hr)
Altitude	0 to 2135 m (0 to 7000 feet)

Removal and Replacement Procedures

See Section 4 for your type unit or device.

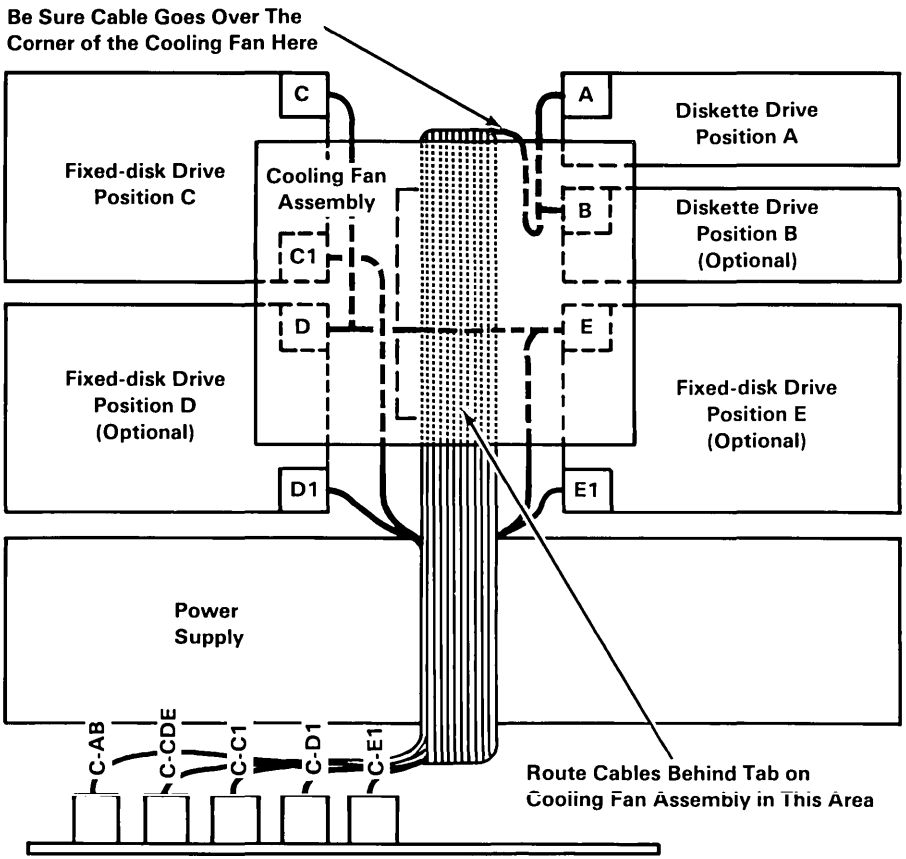
Internal Signal Cable Routing Diagram (Early Systems)

Use this Internal Signal Cable Routing Diagram to correctly route the internal cables using the Personal Computer AT Fixed-Disk and Diskette Drive Adapter or the ESDI Magnetic Media Adapter. The internal cables can interfere with the flow of the cooling air if they are not routed as shown below.



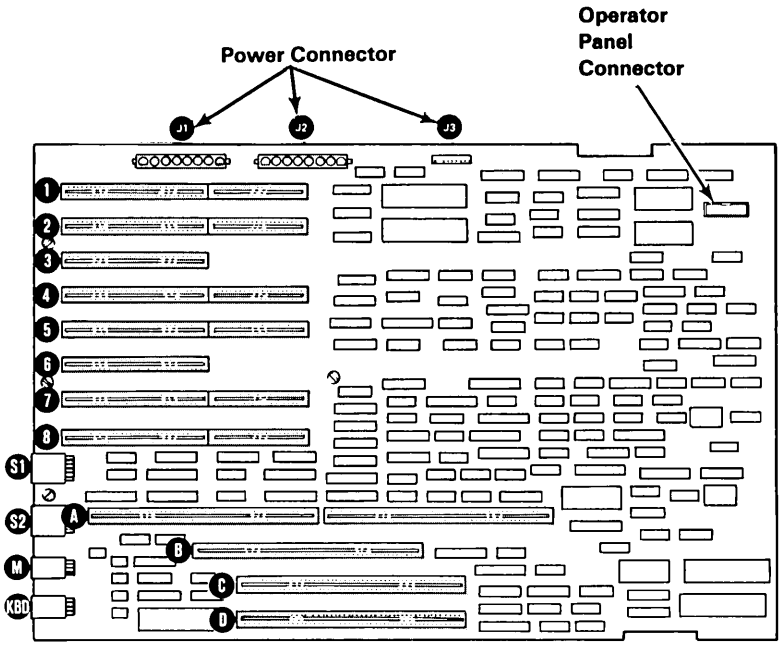
Internal Signal Cable Routing Diagram (Later Systems)

Use this Internal Signal Cable Routing Diagram to correctly route the internal cables using the Extended ESDI Magnetic Media Adapter. The internal cables can interfere with the flow of the cooling air if they are not routed as shown below.



System Board

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



1 Fixed-Disk and Diskette Drive Adapter

2 Fixed-Disk and Diskette Drive Adapter

3 Coprocessor (Optional)

A Processor Board

B Floating-Point Board (Optional)

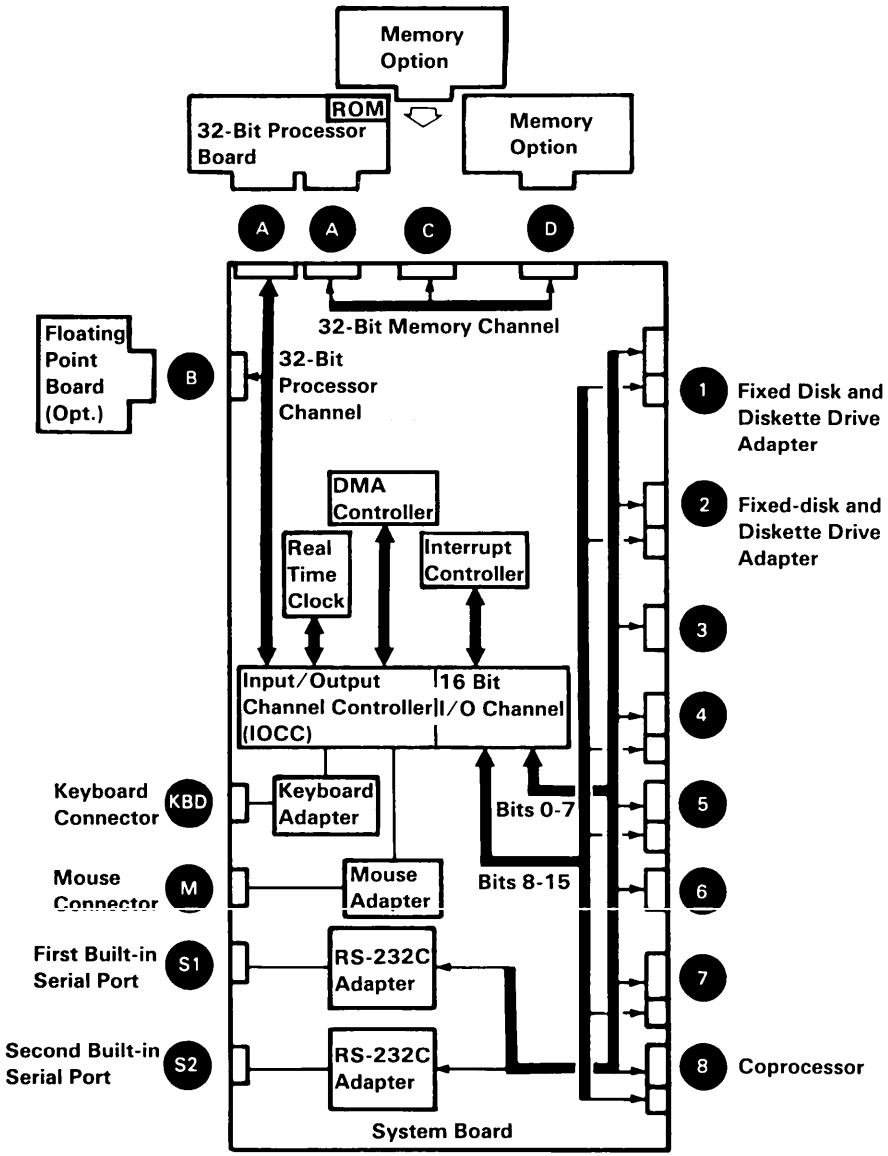
C Memory Option

D Memory Option

2 – 8 Adapter Slots

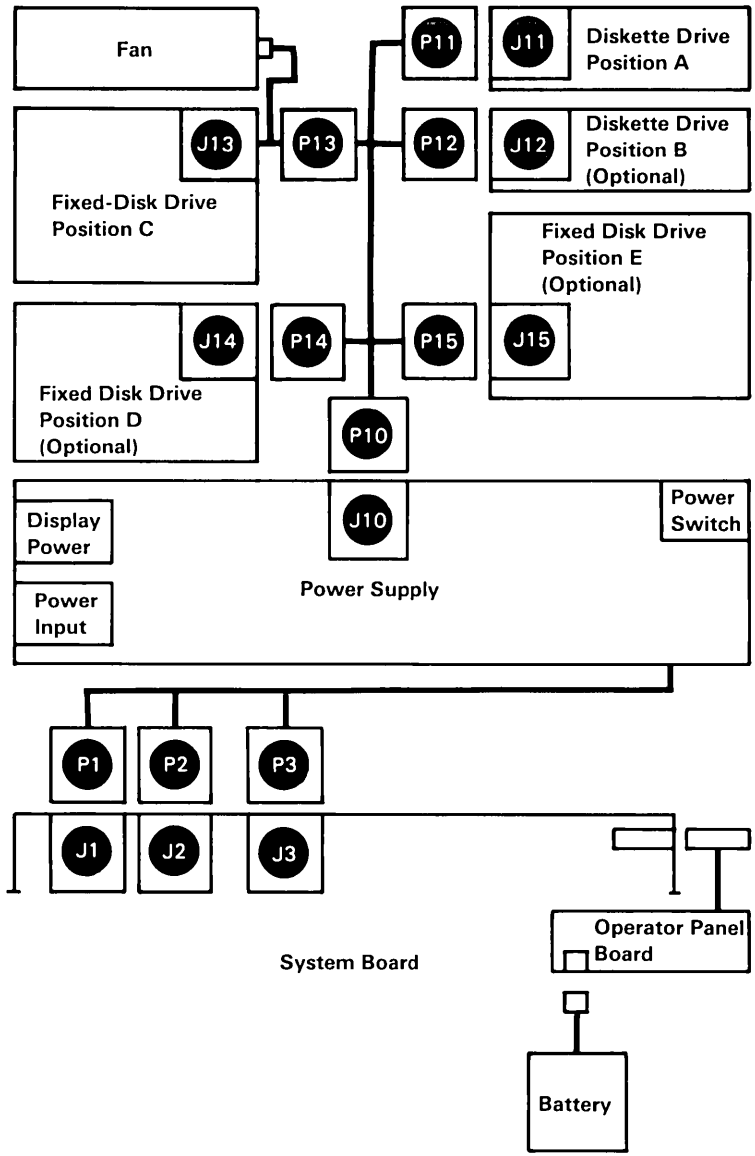
Data Flow Diagram

Use this Data Flow Diagram to identify data paths between system components.



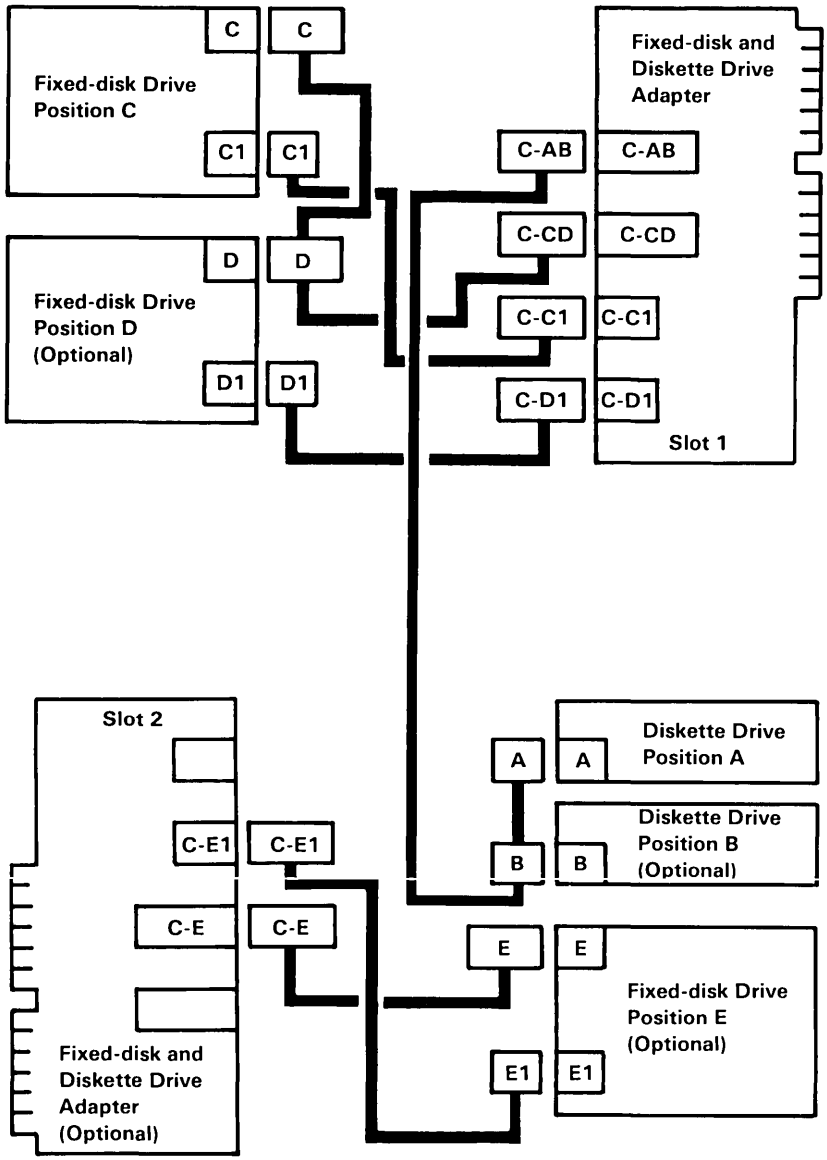
Power Distribution Diagram

Use this Power Distribution Diagram to identify the power connectors.



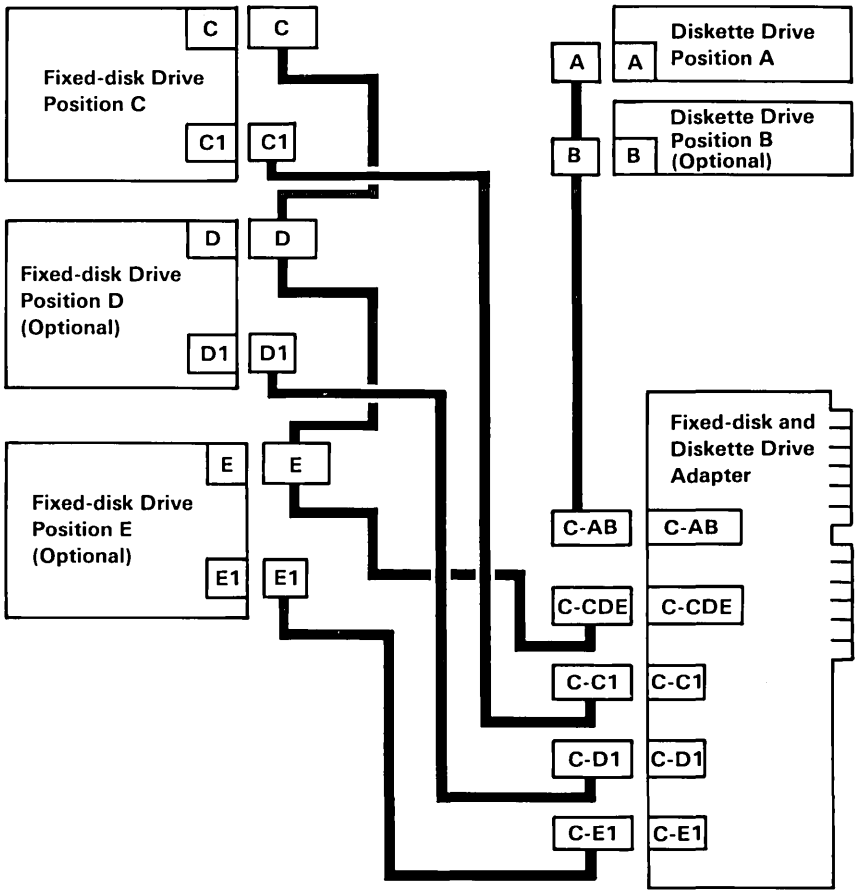
Internal Signal Cabling Diagram (Early Systems)

Use this Internal Signal Cabling Diagram to identify the signal connectors for systems using the Personal Computer AT Fixed-Disk and Diskette Drive Adapter and the ESDI Magnetic Media Adapter.

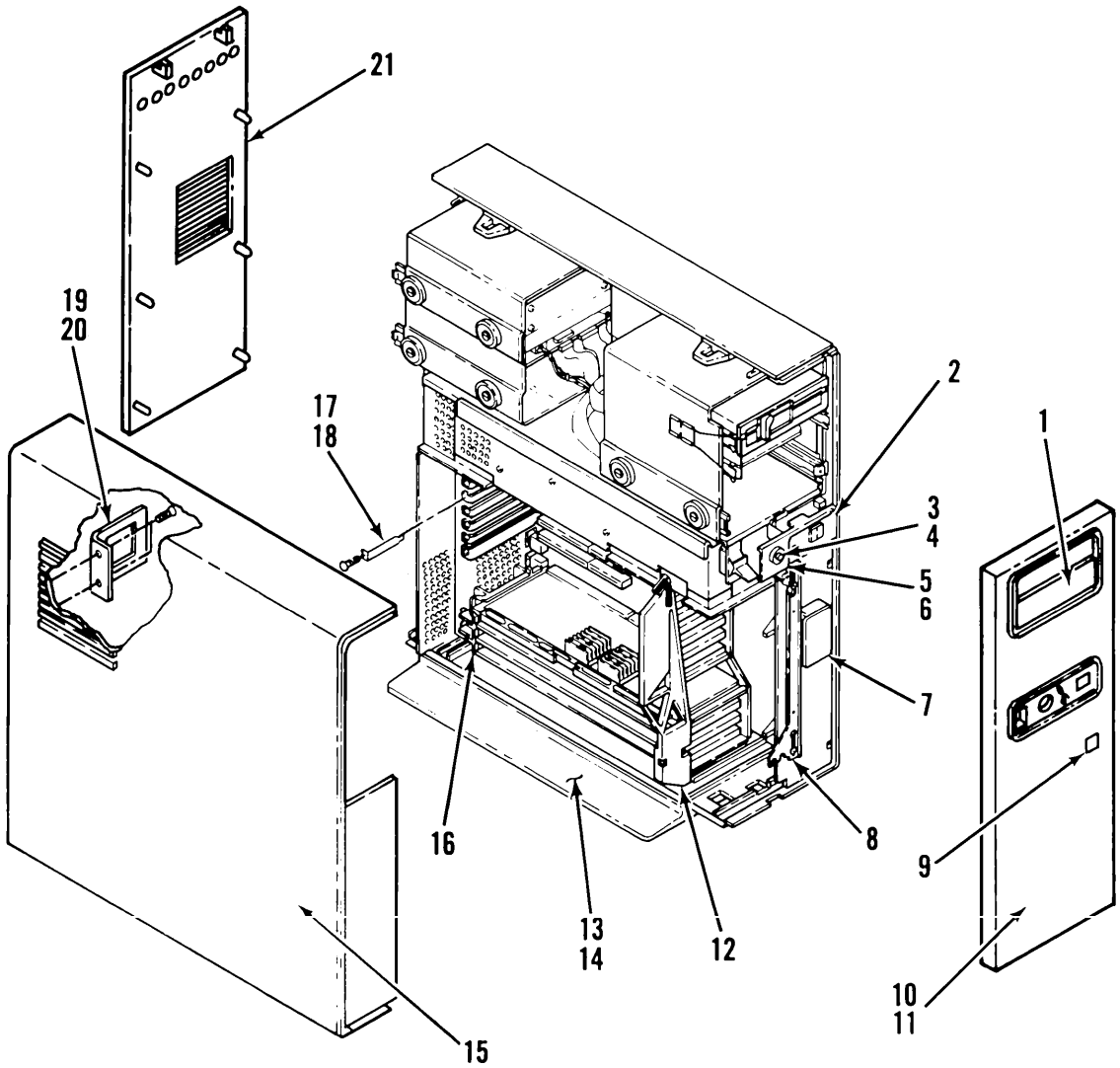


Internal Signal Cabling Diagram (Later Systems)

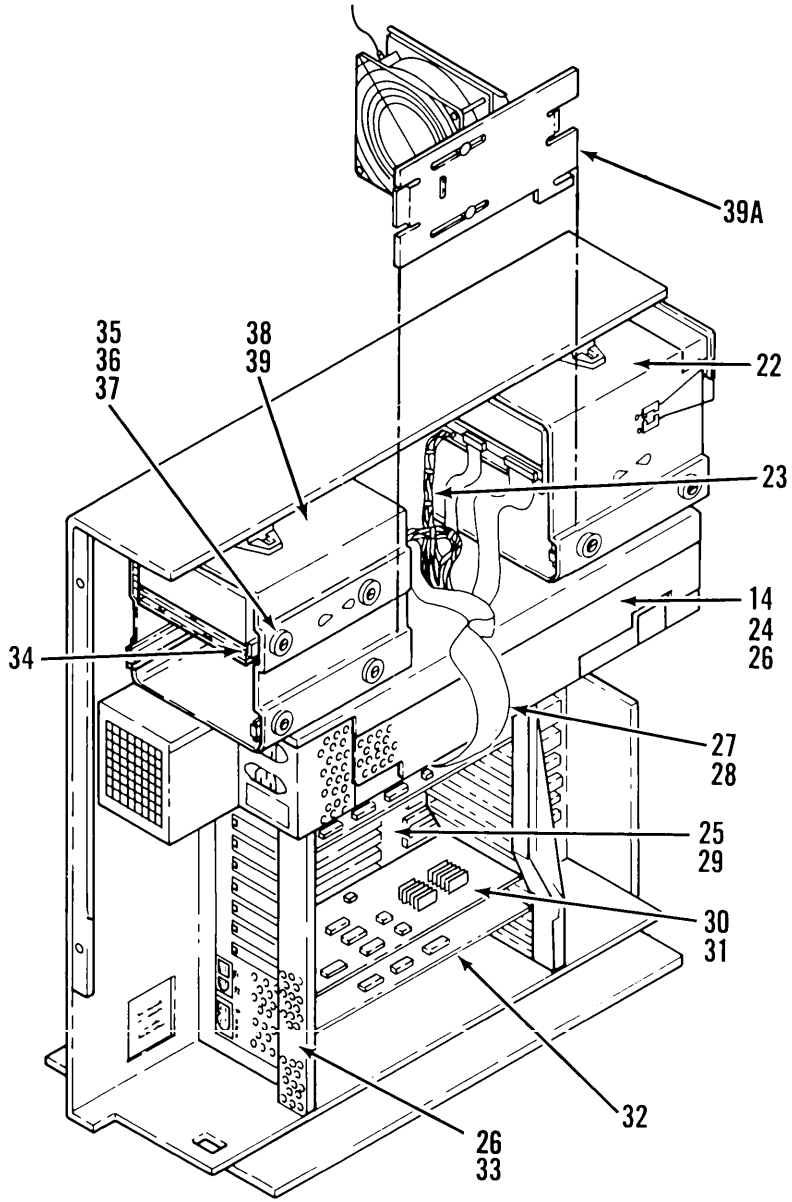
Use this Internal Signal Cabling Diagram to identify the signal connectors for systems using the Extended ESDI Magnetic Media Adapter.



Parts Information



Index Number	Part Number	Description
1	6294725	Blank diskette bezel
2	6453886	Operator panel board
3	6299485	Keylock
3	79X3355	Lock dog
4	6299523	Keylock spacer
5	6453890	Operator panel bracket
6	1622403	Nut, operator panel mounting
7	6299201	Battery
8	6299334	Lock slider
9	6294749	Logo
10	6080430	Front cover
11	1622403	Nut, bezel
12	6299408	Bridge
13	6298284	Foot, base
14	1621211	Screw, foot and power supply mounting
15	6080429	Side cover
16	6848091	Guide, rear lower
17	1501437	Blank bracket
18	6080443	Screw, blank bracket
19	6294731	Bracket, strain relief
20	1621190	Screw, strain relief
21	6298260	Rear cover


39A
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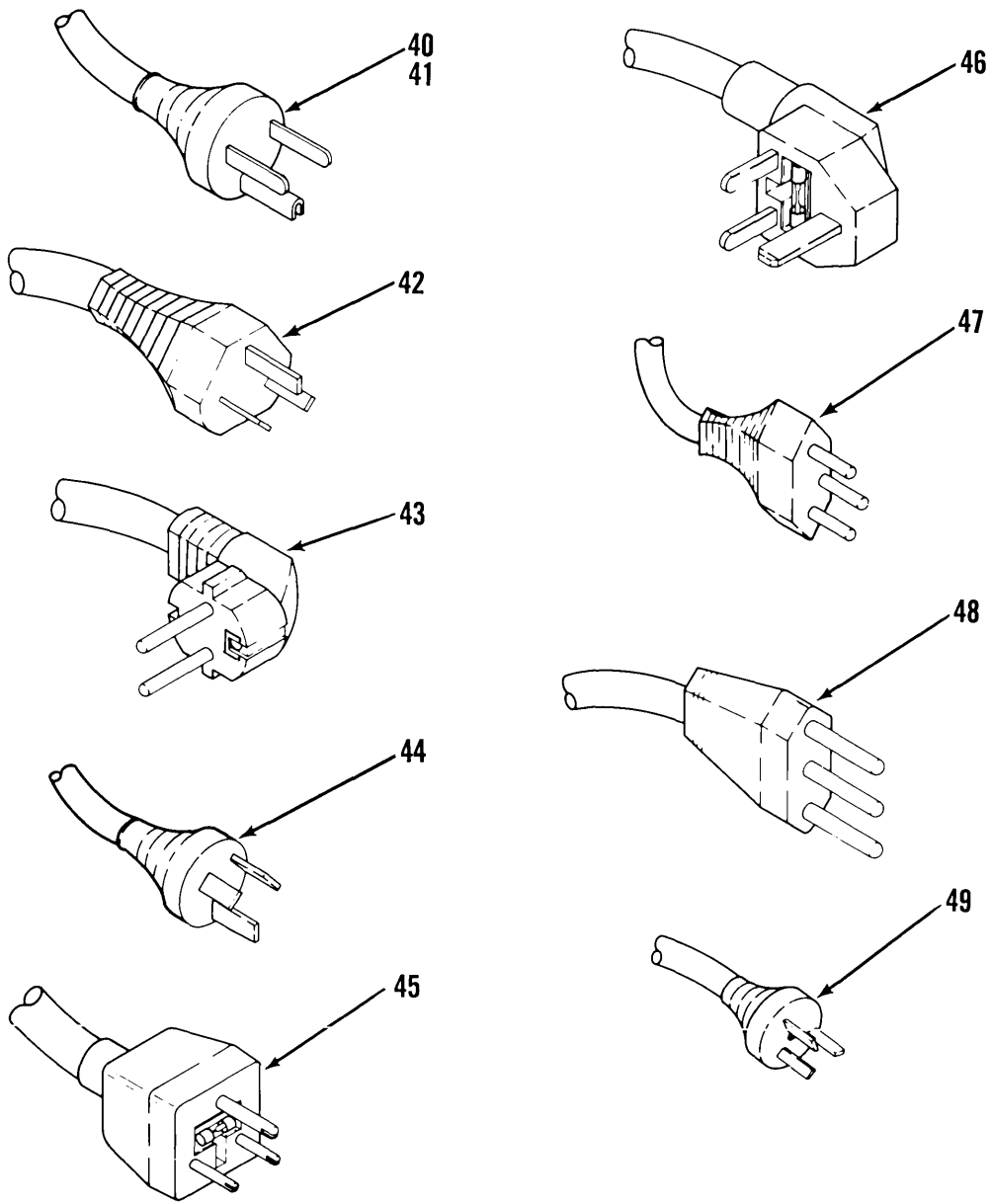
33

Index Number	Part Number	Description
22	6298994	Front cage
23	6298359	Power distribution cable
24	6080446	Power supply, U.S.
24	6080447	Power supply, WT low voltage
24	6080448	Power supply, WT high voltage
25	60X5677	Screw, system board mounting
26	7362385	Screw, bulkhead grounding and mounting
27	61X6937	Cable assembly, drive positions A - D
28	61X6938	Cable assembly, drive position E
29	6299232	System board
29	60X5712	System board WT
30	79X3766	Processor board with holder
31	6298223	Processor board holder
32	6299220	Floating-point board
33	6298418	Bulkhead
34	6298420	Fixed-disk drive track
35	6294779	Stud, track mounting
36	6294819	Washer, track mounting
37	6298178	Rubber bushing, track mounting
38	6298367	Rear cage
39	6360965	Cork pad
39A	61X6162	Fan/mounting assembly


40
41
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46
47
48
49

Index Number	Part Number	Description
40	6952300	Power cable, U.S., Venezuela, Canada, Japan, Saudi Arabia
41	6952301	Power cable, Cook County, Illinois
42	6952311	Power cable, Australia, New Zealand, Argentina
43	6952320	Power cable, Northern Europe, Greece, Turkey
44	1838574	Power cable, Thailand
45	6952347	Power cable, South Africa
46	6952356	Power cable, U.K., Ireland, Hong Kong, Singapore
47	6952365	Power cable, Switzerland
48	6952374	Power cable, Italy, Chile
49	6952383	Power cable, Israel

Built-In Serial Ports

The system board has two built-in RS-232C serial adapters. The connectors for the adapters are on the rear panel of the system unit. The connectors are labeled S1 and S2.

The built-in serial adapters are used for printers or communications devices. The serial adapters use the I/O channel to communicate with the 32-bit processor or the coprocessor.

Location	Built into the system board.
I/O addresses	None
DMA Channels	Serial adapter 1 - 1, 3 Serial adapter 2 - 0, 2
Connector type	10-pin

RT PC Processor Board

The RT PC Processor Board contains the 32-bit processor, the system memory controller, and the ROM modules. Each processor board contains an identification number.

Processor Board Identification Number

Each processor board contains an identification number used by the software to control access. This identification number is unique to that processor board.

After the processor board is exchanged, the identification number is a different number. Therefore, any program that uses the identification number for access needs the authorization updated.

Reminder to Service Representative: After you exchange the Processor Board, notify the customer that the unique identification number of the system unit has changed. The customer needs to update the authorization for any program that uses the identification number for access.

Removal Procedure

See Processor, Floating-Point, or System Memory Removal in Section 4.

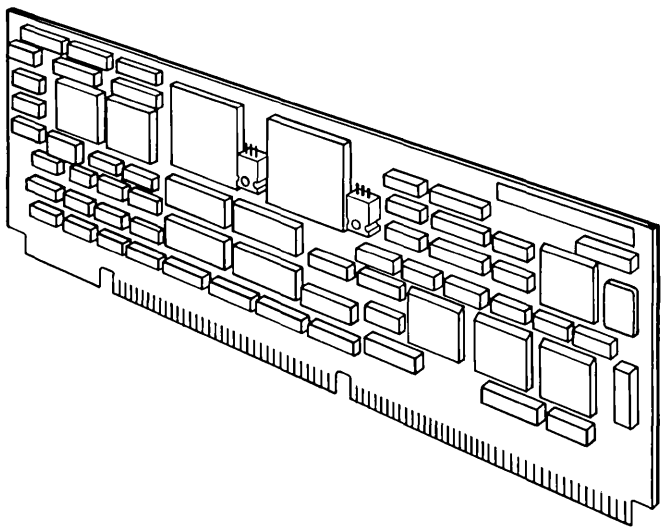
Replacement Procedure

See Processor, Floating-Point, or System Memory Replacement in Section 4.

Parts Information

For part numbers see Parts Information for the Base System Unit in this section.

Use the drawing below to identify the processor board.



RT PC Advanced Processor Board

The RT PC Advanced Processor Board contains the 32-bit processor, a floating-point unit, the system memory controller, and the ROM modules.

Processor Board Identification Number

Each processor board contains an identification number used by the software to control access. This identification number is unique to that processor board.

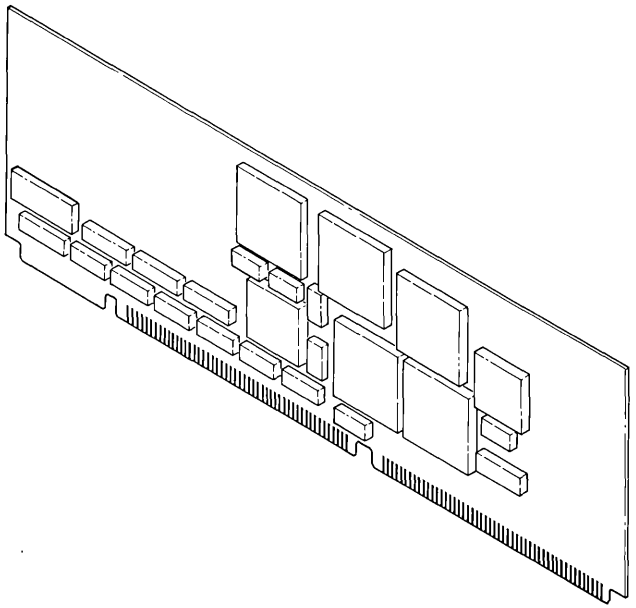
After the processor board is exchanged, the identification number is a different number. Therefore, any program that uses the identification number for access needs the authorization updated.

Reminder to Service Representative: After you exchange the Processor Board, notify the customer that the unique identification number of the system unit has changed. The customer needs to update the authorization for any program that uses the identification number for access.

Removal and Replacement Procedures

Use the Processor, Floating-Point, or System Memory Removal and Replacement procedures in Section 4.

Parts Information



Index Number	Part Number	Description
1	08F3628	RT PC Advanced Processor Board

RT PC Floating-Point Board

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

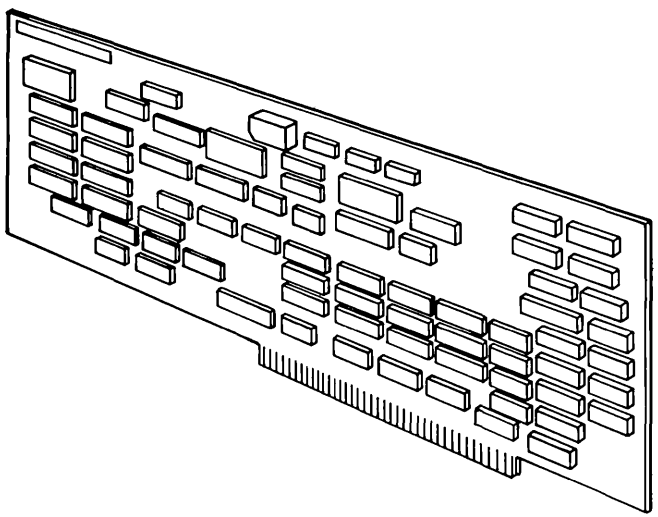
Removal and Replacement Procedures

See "Processor, Floating-Point, or System Memory Removal" on page 4-16.

Parts Information

For part numbers see Parts Information for the Base System Unit in this section.

Use the drawing below to identify the floating-point board.



RT PC Advanced Floating-Point Board

The RT PC Advanced Floating-Point Board improves the numerical processing ability of the 32-bit processor. The RT PC Advanced Floating-Point Board includes a second smaller board that plugs onto the first board. Both boards are included when ordering the replacement FRU.

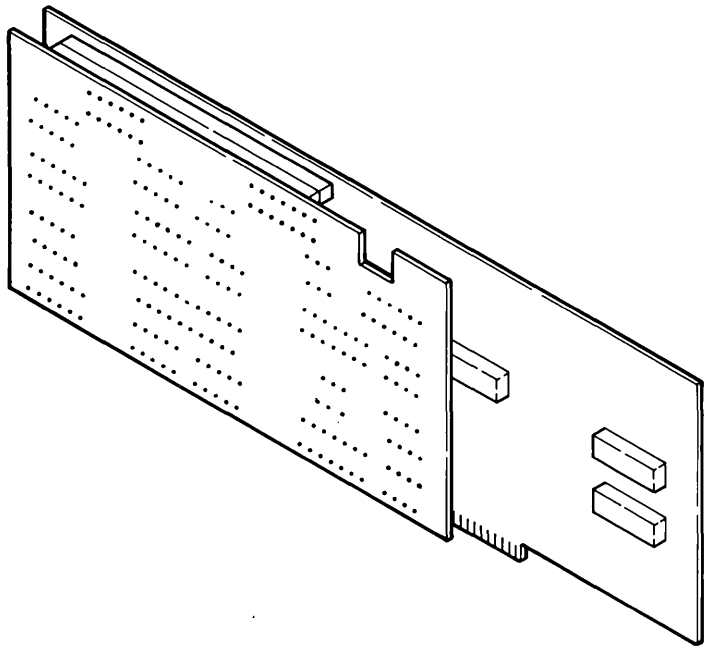
Removal Procedure

Use the Processor, Floating-Point, or System Memory Removal procedure in Section 4.

Replacement Procedure

Use the Processor, Floating-Point, or System Memory Replacement procedure in Section 4.

Parts Information



Index Number	Part Number	Description
1	61X6814	RT PC Advanced Floating-Point Board

Section 6. System Memory Options

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Removal and Replacement Procedures 6-008-1
Parts Information 6-008-2
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Specifications 6-010-1
Removal and Replacement Procedures 6-010-1
Parts Information 6-010-2
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Specifications 6-012-1
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| Jumper Settings 6-013-2
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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 2 through 7 and attach to the I/O channel.

Pages in this section contain a 3-digit product code in the page number to make future updating easier.

RT PC 1MB Memory Expansion Option

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

Specifications

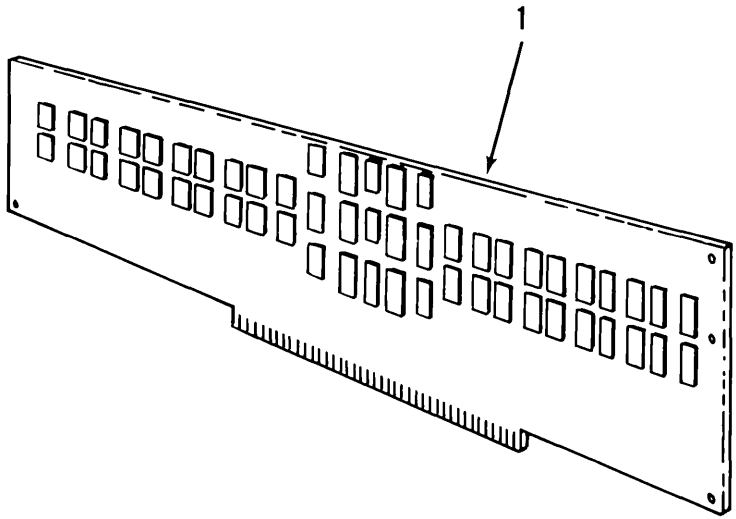
Slot positions	C, D
Bytes of memory	1.0M bytes
Memory type	ECC

Removal and Replacement Procedures

Use the "Processor, Floating-Point, or System Memory Removal" on page 4-16 procedure for removal.

Use the "Processor, Floating-Point, or System Memory Replacement" on page 4-17 procedure for replacement.

Parts Information



Index Number	Part Number	Description
1	6848223	RT PC 1MB Memory Expansion Option Note: Your 1MB Memory Expansion Option may look different than the drawing above. Look for "1MB ECC MEMORY" printed on the option.

RT PC 2MB Memory Expansion Option

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

Specifications

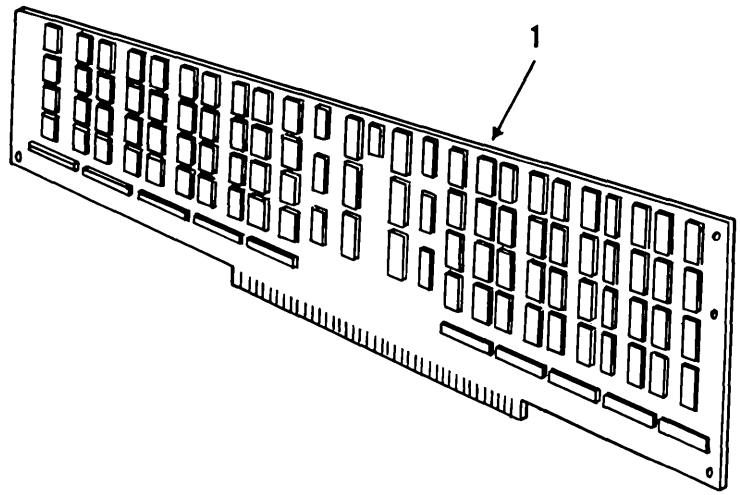
Slot positions	C, D
Bytes of memory	2.0M bytes
Memory type	ECC

Removal and Replacement Procedures

Use the "Processor, Floating-Point, or System Memory Removal" on page 4-16 procedure for removal.

Use the "Processor, Floating-Point, or System Memory Replacement" on page 4-17 procedure for replacement.

Parts Information



Index Number	Part Number	Description
1	6299228	RT PC 2MB Memory Expansion Option Note: Your RT PC 2MB Memory Expansion Option may look different than the drawing above. Look for "2MB ECC MEMORY" printed on the option.

RT PC 4MB Memory Expansion Option

The RT PC 4MB Memory Expansion Option provides direct-addressable memory for the 32-bit processor.

Specifications

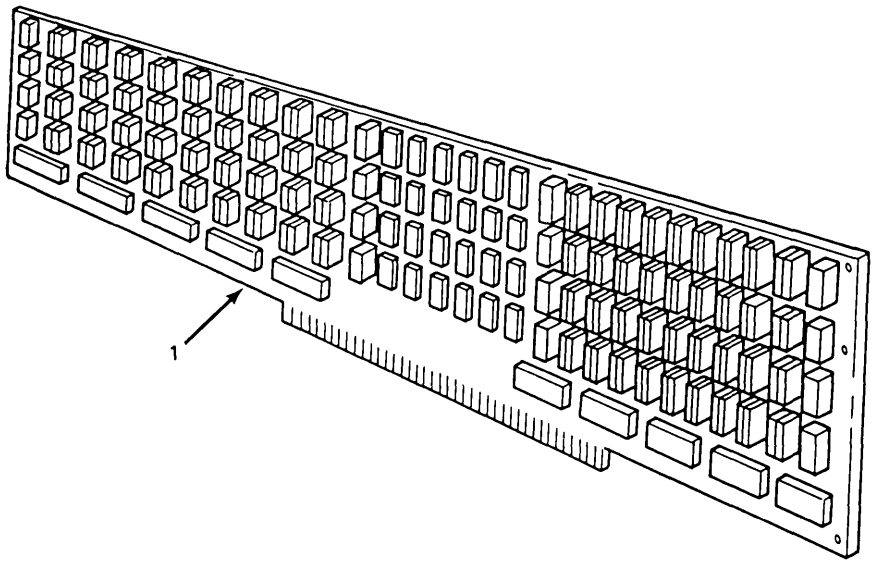
Slot positions	C, D
Bytes of memory	4.0M bytes
Memory type	ECC

Removal and Replacement Procedures

Use the "Processor, Floating-Point, or System Memory Removal" on page 4-16 procedure for removal.

Use the "Processor, Floating-Point, or System Memory Replacement" on page 4-17 procedure for replacement.

Parts Information



Index Number	Part Number	Description
1	61X6157	RT PC 4MB Memory Expansion Option Note: Your RT PC 4MB Memory Expansion Option may look different than the drawing above. Look for "4MB ECC MEMORY" printed on the option.

RT PC 4MB Fast Memory Expansion Option

The RT PC 4MB Fast Memory Expansion Option provides direct-addressable memory for the 32-bit processor. The RT PC 4MB Fast Memory Expansion Option is used with the RT PC Advanced Processor Board.

Specifications

Slot positions	C, D
Bytes of memory	4.0M bytes
Memory type	ECC

Removal Procedure

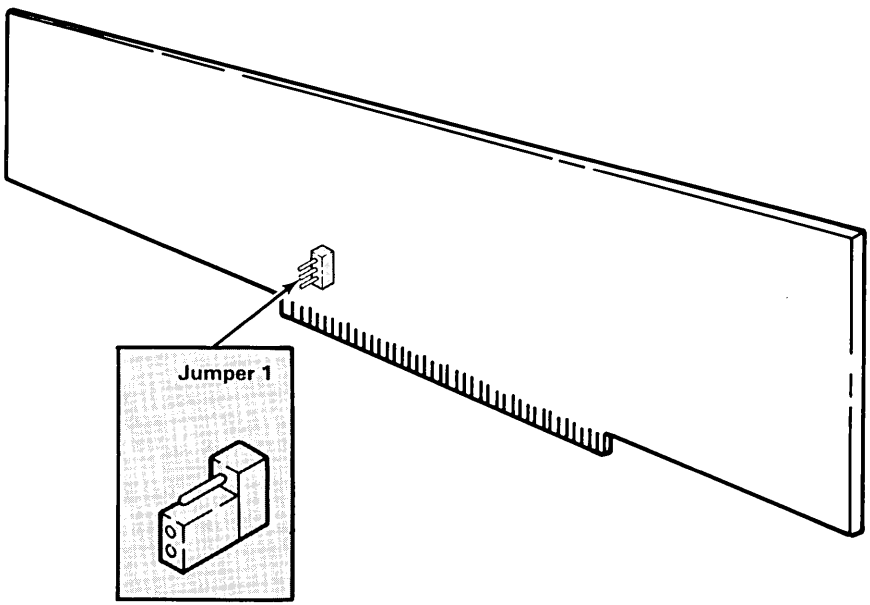
Use the Processor, Floating-Point, or System Memory Removal procedure in Section 4.

Replacement Procedure

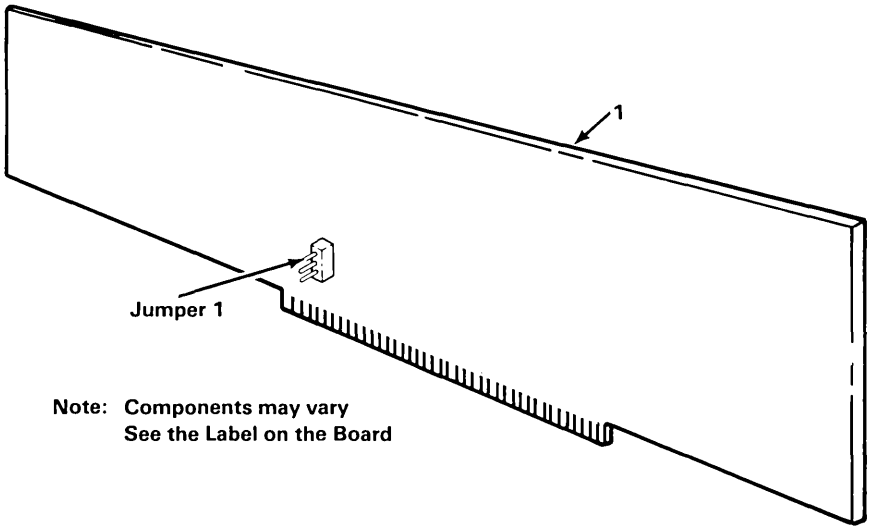
Use the Processor, Floating-Point, or System Memory Replacement procedure in Section 4.

Jumper Settings

Use the diagram below to set the memory access speed.



Parts Information



Index Number	Part Number	Description
1	61X7005	RT PC 4MB Fast Memory Expansion Option Note: Look for "4MB ENHANCED ECC MEMORY" printed on the option.

RT PC 8MB Fast Memory Expansion Option

The RT PC 8MB Fast Memory Expansion Option provides direct-addressable memory for the 32-bit processor. The RT PC 8MB Fast Memory Expansion Option is used with the RT PC Advanced Processor Board.

Specifications

Slot positions	D
Bytes of memory	8.0M bytes
Memory type	ECC

Removal Procedure

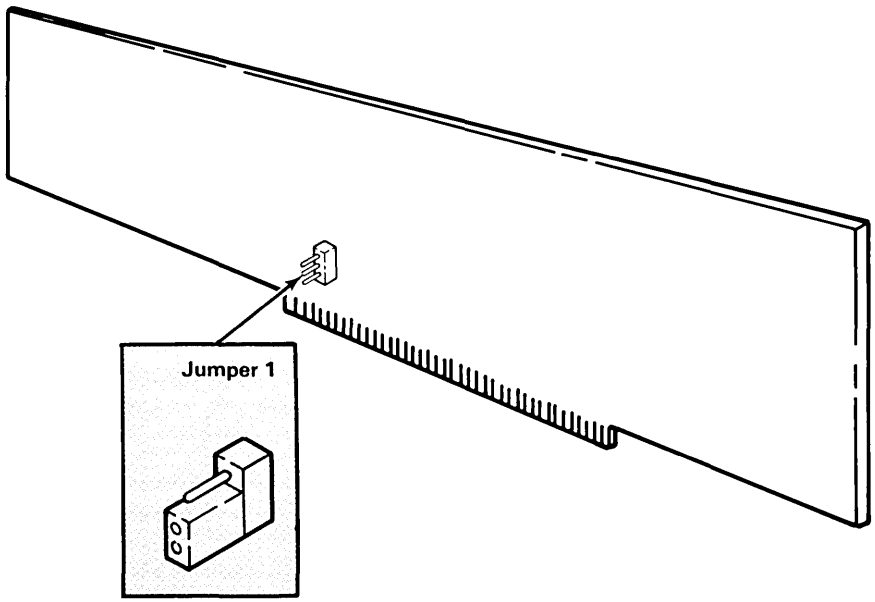
Use the Processor, Floating-Point, or System Memory Removal procedure in Section 4.

Replacement Procedure

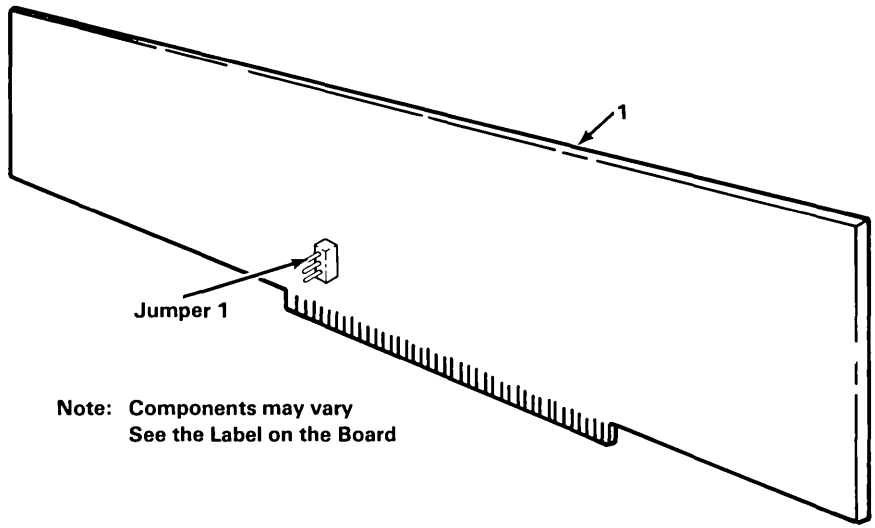
Use the Processor, Floating-Point, or System Memory Replacement procedure in Section 4.

Jumper Settings

Use the diagram below to set the memory access speed.



Parts Information



Index Number	Part Number	Description
1	61X7009	RT PC 8MB Fast Memory Expansion Option Note: Look for "8MB ENHANCED ECC MEMORY" printed on the option.

Section 7. Diskette Drives

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  Removal and Replacement Procedures 7-100-1
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  Parts Information 7-100-3
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About this Section

This section contains information about the diskette drives used in the IBM 6150 System Unit.

Drive position A always has a IBM AT High Capacity Diskette Drive installed.

Drive position B can have either the IBM AT High Capacity Diskette Drive or the IBM AT Dual-Sided Diskette Drive installed.

The diskette drives are controlled by the adapter in slot 1. The type of adapter installed in slot 1 is determined by the fixed-disk drives in drive positions C and D.

Pages in this section contain a 3-digit product code in the page number to make future updating easier.

Handling a Diskette Drive

Read and become familiar with the following diskette drive ***handling precautions.***

- Do not remove the antistatic bag from the drive until you are ready to install the drive in the system unit.
- Do not grasp the center part of the diskette drive when you are handling the drive. The squeezing action could damage the circuit board. Handle the drive by the frame only.
- Do not drop or lay the diskette drive down roughly, because that action may permanently damage the drive.

Observe the following general procedures, in addition to the specific procedures given in Section 4, to protect the drive from static discharges.

1. Lay the diskette drive (still wrapped in its antistatic bag) on a flat surface near the system unit.

2. Position yourself so you won't have to walk around while exchanging the drive. This helps prevent the generation of static electricity.

3. Touch a metal part of your system unit with one hand and the antistatic bag with the other hand. This will place your body, the drive, and the system unit at the same ground potential, thus preventing an accidental static discharge.

4. Slide the antistatic bag off of the diskette drive.

5. Handle the diskette drive by the frame only while installing or removing it. It is recommended that you use both hands to reduce the chance of dropping the drive.

6. Put the exchanged diskette drive back in the antistatic bag.

IBM AT High Capacity Diskette Drive

The IBM 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

Drive positions	A, B
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	2
Adapter	IBM AT Fixed-Disk and Diskette Drive Adapter or RT PC ESDI Magnetic Media Adapter

Removal and Replacement Procedures

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

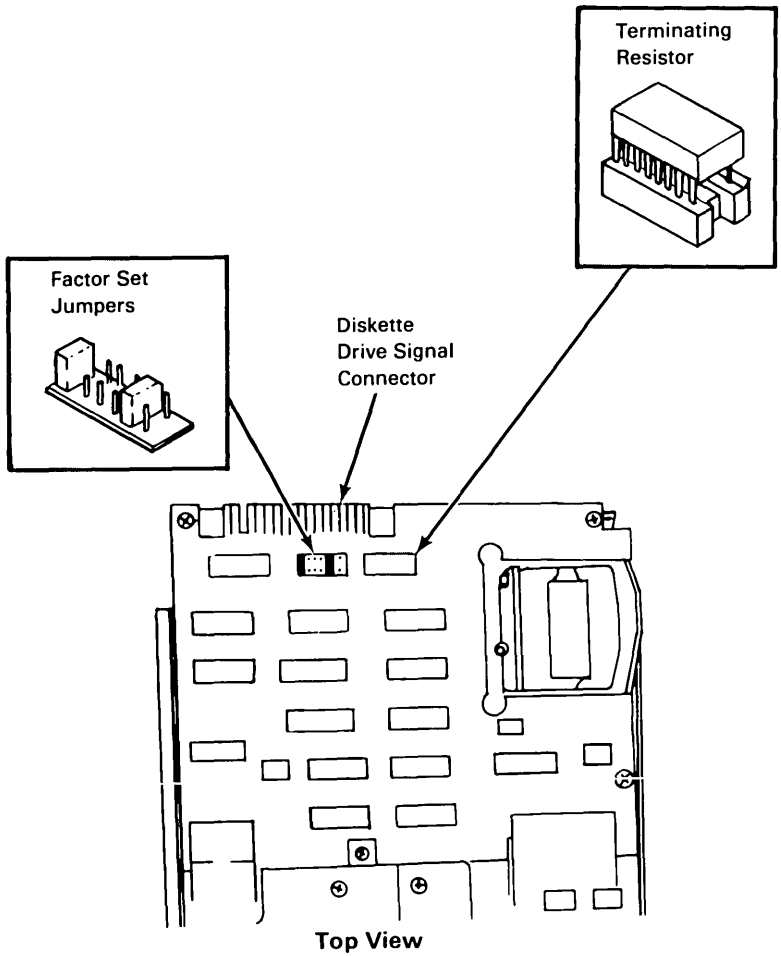
Use the "Diskette Drive Replacement" on page 4-26 procedure for replacement.

Terminator Resistor

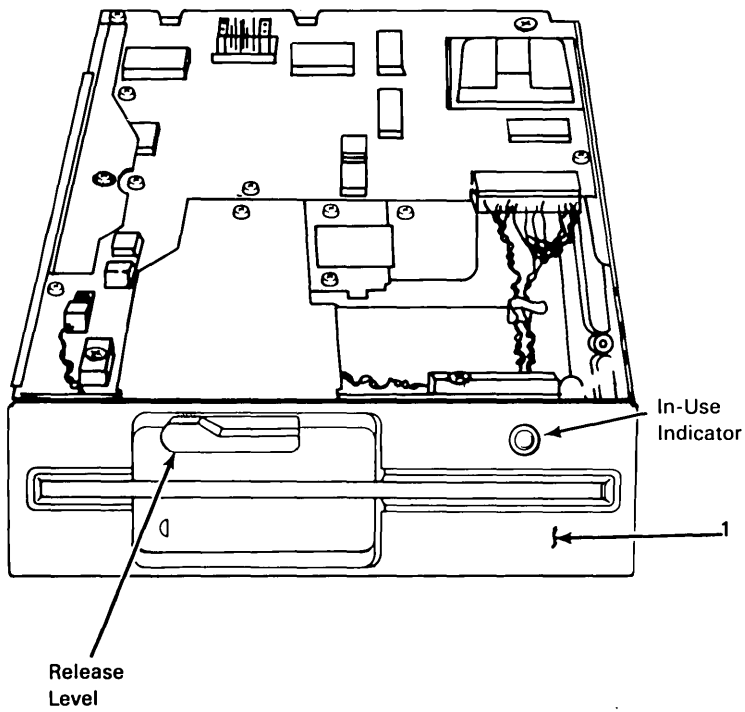
Use the diagram below to identify, install, or remove the terminator resistor.

Drive position A always has the terminator resistor installed.

Drive position B always has the terminator resistor removed.



Parts Information



Index Number	Part Number	Description
1	8286130	IBM AT High Capacity Diskette Drive
1	68X3752	IBM AT High Capacity Diskette Drive, WT
	61X6937	Cable, fixed-disk and diskette drive positions A - D
	6298359	Cable, power distribution

IBM AT Dual-Sided Diskette Drive

The IBM AT Dual-Sided Diskette Drive can store up to 360K bytes of formatted data on a Double-Sided Diskette. This drive is a single field-replaceable unit.

Specifications

Drive position	B
Diskette type	5.25 inch, double-sided
Total tracks	80 (40 tracks per side)
Sectors per track	9
Bytes per sector	512
Tracks per inch	48
Maximum number	1
Adapter	IBM AT Fixed-Disk and Diskette Drive Adapter or RT PC ESDI Magnetic Media Adapter

Removal and Replacement Procedures

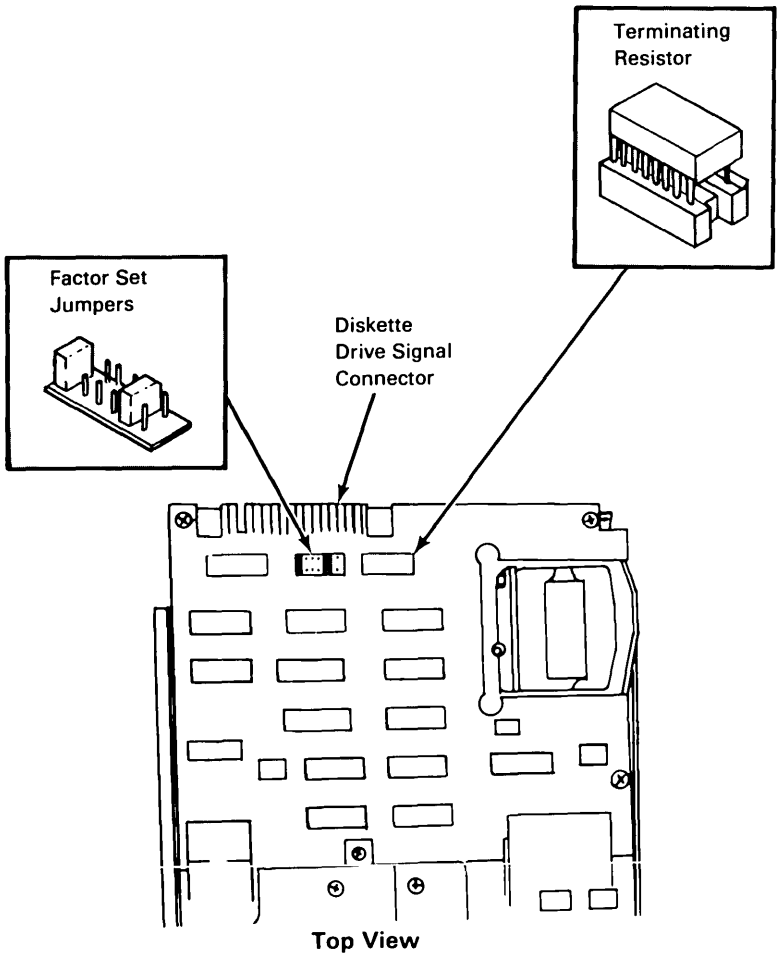
Use the "Diskette Drive Removal" on page 4-24 procedure for removal.

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

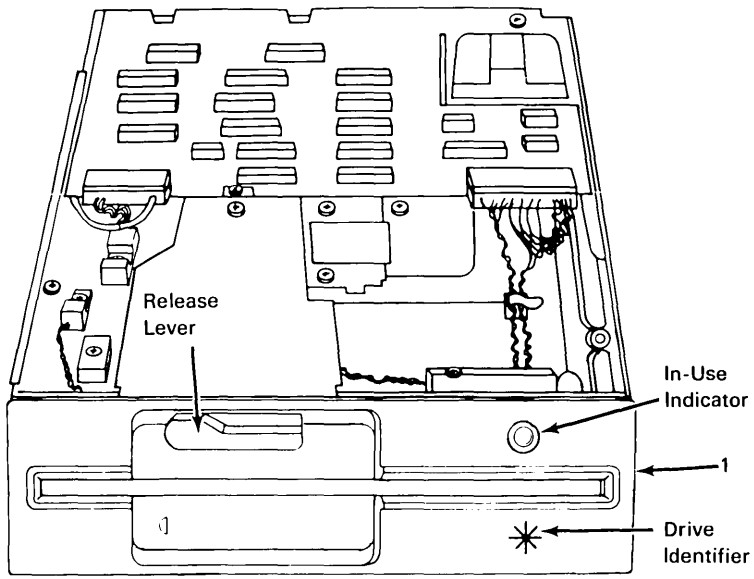
Terminator Resistor

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

Drive position B has the terminator resistor removed.



Parts Information



Index Number	Part Number	Description
1	8286131	IBM AT Dual-Sided Diskette Drive
1	68X3753	IBM AT Dual-Sided Diskette Drive, WT
	61X6937	Cable, fixed-disk and diskette drive positions A - D
	6298359	Cable, power distribution

Section 8. Fixed-Disk Drives

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| Replacement Procedure 8-130-1
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About this Section

This section provides information about the fixed-disk drives used in the IBM 6150 System Unit. The system unit always has a fixed-disk drive installed in drive position C. Drive positions D and E are optional drive positions.

The fixed-disk drives in drive positions C and D share an adapter in slot 1 with the diskette drives in drive positions A and B. The fixed-disk drive installed in drive position E uses an adapter in slot 2. See Section 9 for information about the adapters for the fixed-disk and diskette drives.

This section is arranged by fixed-disk drive type.

Pages in this section contain a 3-digit product code in the page number to make future updating easier.

Handling a Fixed-Disk Drive

Read and become familiar with the following fixed-disk drive ***handling precautions***.

- Do not remove the antistatic bag from the drive until you are ready to install the drive in the system unit.
- Do not grasp the center part of the fixed-disk drive when you are handling the drive. The squeezing action could damage the circuit board. Handle the drive by the frame only.
- Do not drop or lay the fixed-disk drive down roughly, because that action may permanently damage the drive.

Observe the following general procedures, in addition to the specific procedures given in Section 4, to protect the drive from static discharges.

1. Lay the fixed-disk drive (still wrapped in its antistatic bag) on a flat surface near the system unit.

2. Position yourself so you won't have to walk around while exchanging the drive. This helps prevent the generation of static electricity.

3. Touch a metal part of your system unit with one hand and the antistatic bag with the other hand. This will place your body, the drive, and the system unit at the same ground potential, thus preventing an accidental static discharge.

4. Slide the antistatic bag off of the fixed-disk drive.

5. Handle the fixed-disk drive by the frame only while installing or removing it. It is recommended that you use both hands to reduce the chance of dropping the drive.

6. Put the exchanged fixed-disk drive back in the antistatic bag.

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

Drive positions	C, D, E
Disk Size	5.25 inch fixed disk
Maximum number	3
Adapter	IBM 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.

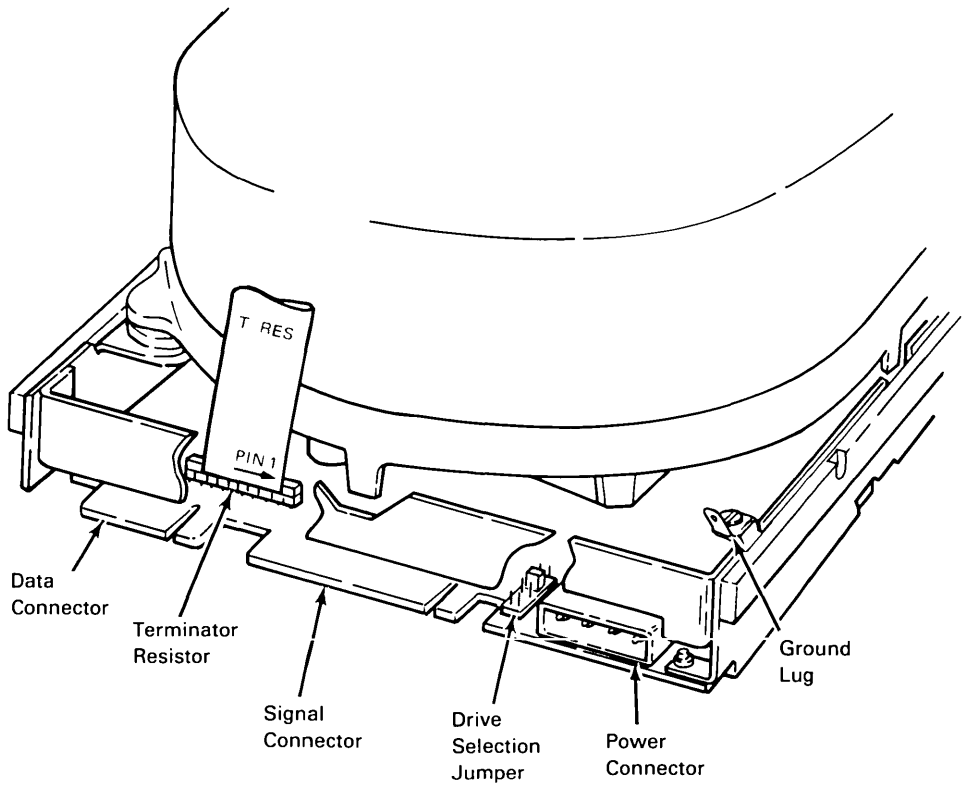
Terminator Resistor

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

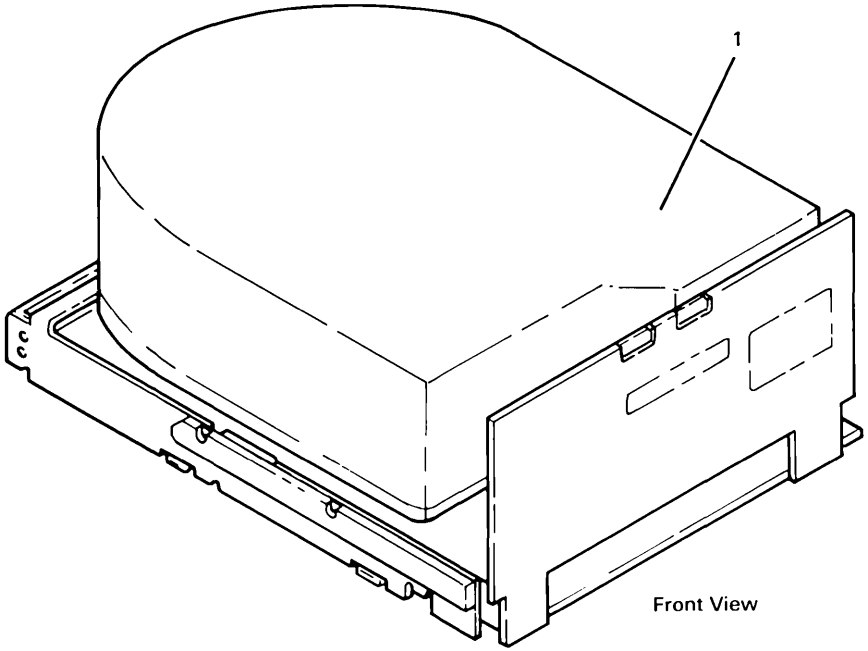
Install the terminator resistor if the drive is for fixed-disk drive positions C or E.

Remove the terminator resistor if the drive is for fixed-disk drive position D.

Set the drive selection jumper as shown.



Parts Information



Index Number	Part Number	Description
1	6299235	Fixed-disk drive type R40
	61X6937	Cable, fixed-disk and diskette drive positions A - D
	61X6938	Cable, fixed-disk drive position E
	6298359	Cable, power distribution

Fixed-Disk Drive Type R70

The Fixed-Disk Drive Type R70 has a storage capacity of at least 70M bytes of formatted data.

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

Specifications

Drive positions	IBM 6150 - C, D, E IBM 6151 - C
Disk Size	5.25 inch fixed disk
Maximum number	IBM 6150 - 3 IBM 6151 - 1
Adapter	RT PC ESDI Magnetic Media Adapter

Removal Procedure

Use the Fixed-Disk Drive Removal procedure in Section 4.

Replacement Procedure

Use the Fixed-Disk Drive Replacement procedure in Section 4.

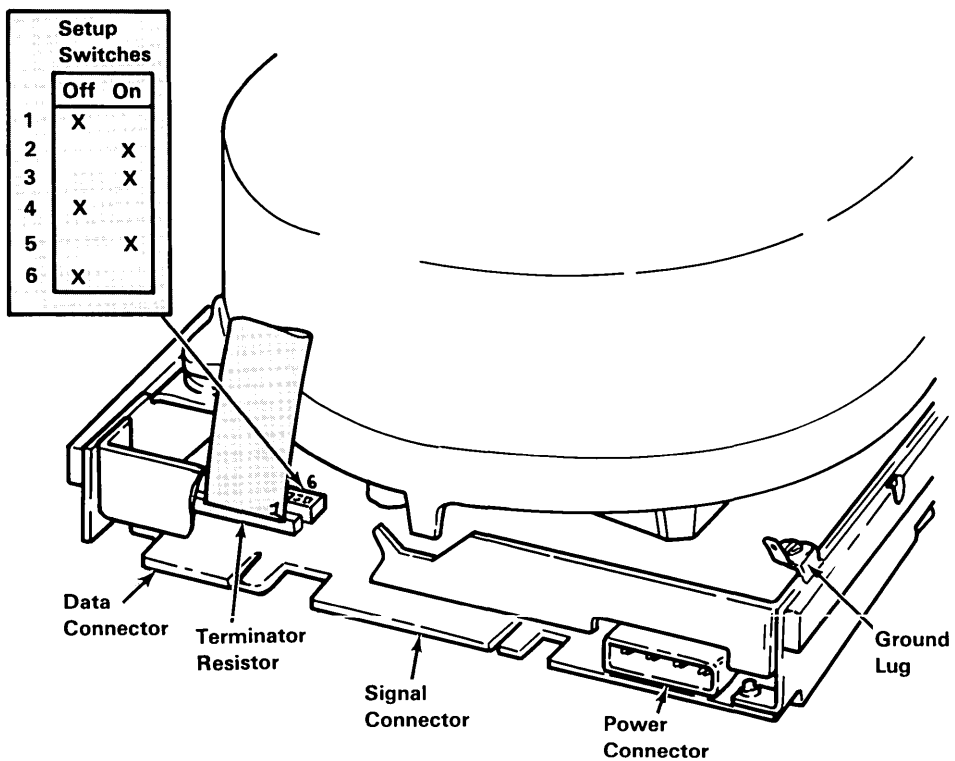
Terminator Resistor

Use the diagram below to identify, install, or remove the terminator resistor on the type R70 drive.

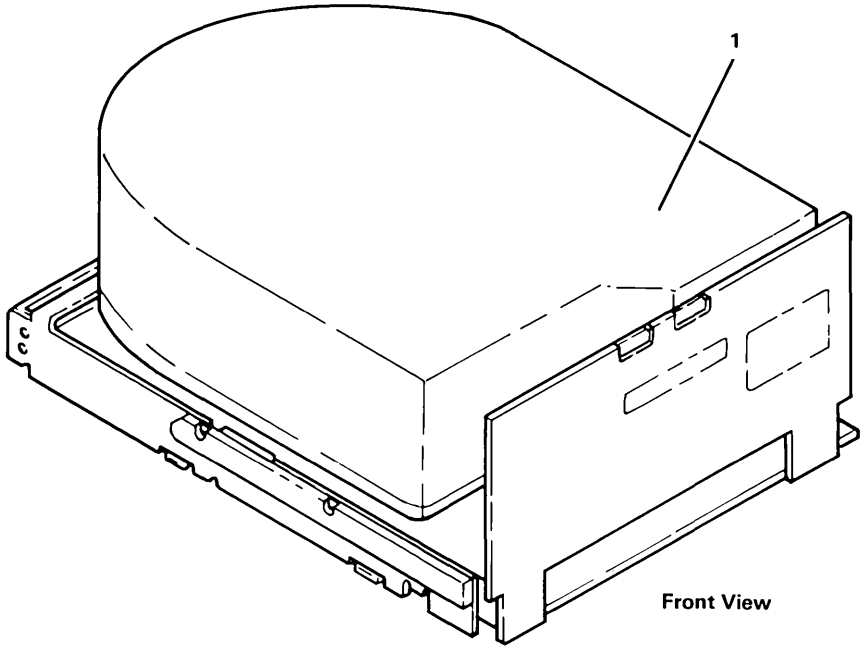
Install the terminator resistor if the drive is for fixed-disk drive position C or E.

Remove the terminator resistor if the drive is for fixed-disk drive position D.

Set the drive setup switches as shown.



Parts Information



Index Number	Part Number	Description
1	61X6942	Fixed-disk drive type R70
	61X6937	Cable, fixed-disk and diskette drive positions A - D
	61X6938	Cable, fixed-disk drive position E
	6298359	Cable, power distribution

Fixed-Disk Drive Type E70

The Fixed-Disk Drive Type E70 has a storage capacity of at least 70M bytes of formatted data.

This fixed-disk drive is physically the same as the Fixed-Disk Drive Type R70, but the formatting is different. The type R70 and E70 fixed-disk drives ***are not*** interchangeable.

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

Specifications

Drive positions	IBM 6150 - C, D, E IBM 6151 - C
Disk Size	5.25 inch fixed disk
Maximum number	IBM 6150 - 3 IBM 6151 - 1
Adapter	Extended ESDI Magnetic Media Adapter

Removal Procedure

Use the Fixed-Disk Drive Removal procedure in Section 4.

Replacement Procedure

Use the Fixed-Disk Drive Replacement procedure in Section 4.

Terminator Resistor

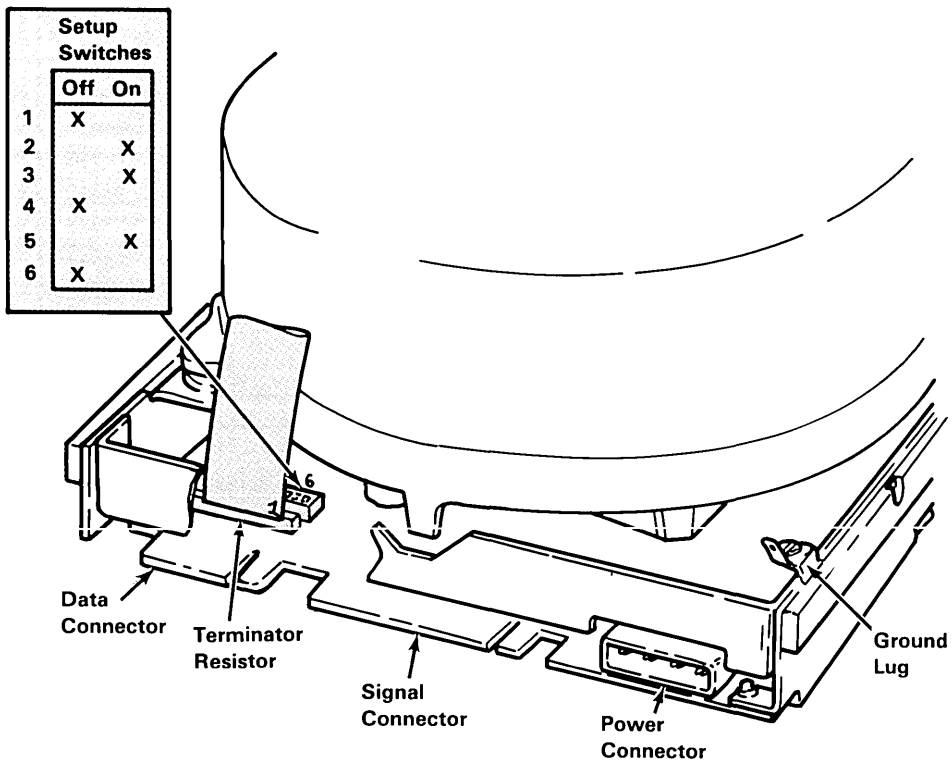
Use the diagram below to identify, install, or remove the terminator resistor on the type E70 drive.

For the IBM 6150, install the terminator resistor if the drive is for fixed-disk drive position C.

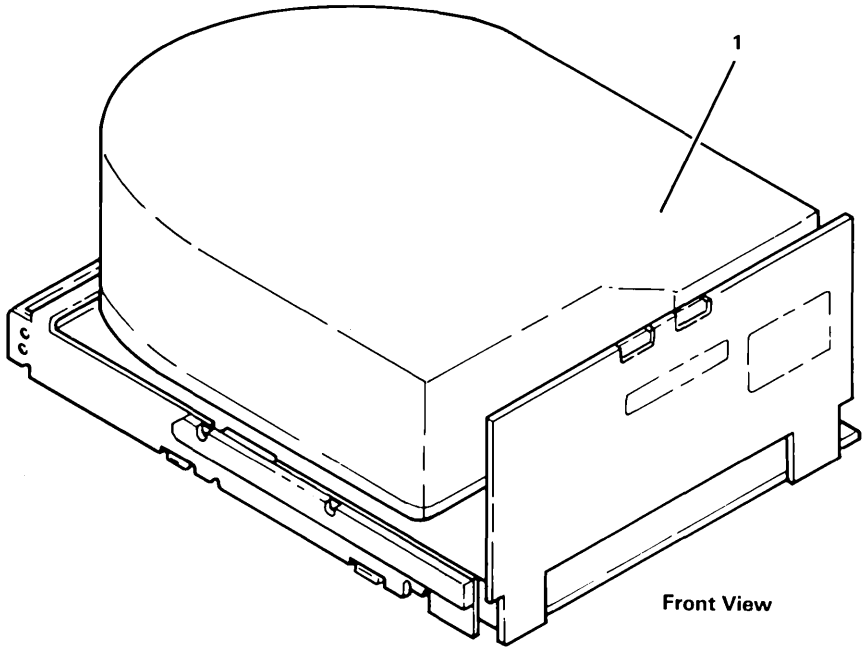
For the IBM 6150, remove the terminator resistor if the drive is for fixed-disk drive position D or E.

For the IBM 6151, install the terminator resistor.

Set the drive setup switches as shown.



Parts Information



Index Number	Part Number	Description
1	79X3989	Fixed-disk drive type E70
	79X3777	Fixed-disk and diskette drive cable A - E, IBM 6150
	6298359	Power distribution cable, IBM 6150
	61X6800	Fixed-disk and diskette drive cable, IBM 6151

Section 9. Adapters

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About this Section

This section contains detail information about adapters used in the IBM 6150 System Unit. Use the contents list on the preceding pages to find the information about your adapter.

Pages in this section contain a 3-digit product code in the page number to make future updating easier.

IBM AT 512 KB Memory Expansion Option

The IBM 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, 5, 7
Maximum number	2

Removal and Replacement Procedures

Use the "Adapter Removal" on page 4-18 procedure for removal of the option. To remove a single module, use the module puller and pull straight up. If needed, see Appendix A for a description of the module puller.

Use the "Adapter Replacement" on page 4-19 procedure for replacement of the option. To install a single module, align the notched end of the module with the notched end of the socket and press into position.

Switch Settings

Use the drawing on the next page to locate the switch banks, then use one of the charts below to set the switches.

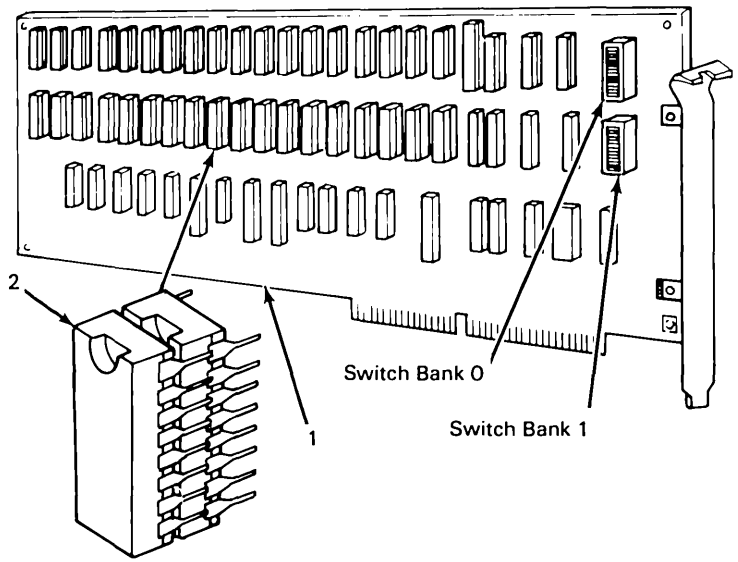
First Memory Option Switch Settings

	Bank 0 Off	Bank 0 On	Bank 1 Off	Bank 1 On
Switch 1		X		X
Switch 2		X		X
Switch 3		X		X
Switch 4		X		X
Switch 5		X		X
Switch 6		X	X	
Switch 7		X		X
Switch 8		X	X	

Second Memory Option Switch Settings

	Bank 0 Off	Bank 0 On	Bank 1 Off	Bank 1 On
Switch 1		X		X
Switch 2		X		X
Switch 3		X		X
Switch 4	X		X	
Switch 5		X		X
Switch 6		X	X	
Switch 7		X		X
Switch 8		X	X	

Parts Information



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

RT PC AT Coprocessor Option

The RT PC 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 IBM AT 512 KB Memory Expansion Option.

The IBM AT Math Co-Processor attaches to the RT PC AT Coprocessor Option to improve the numerical capability of the coprocessor.

Specifications

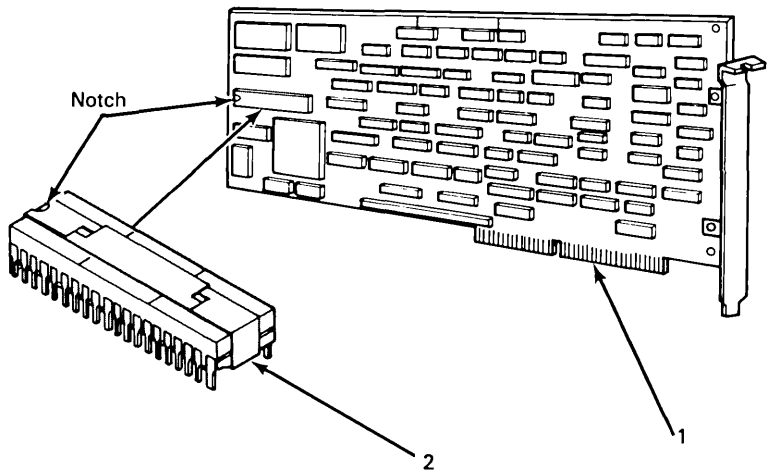
Slot position	8
Interrupt level	15 (shared)
Maximum number	1

Removal and Replacement Procedures

Use the "Adapter Removal" on page 4-18 procedure for removal of the coprocessor. If the IBM AT Math Co-Processor is present, pry up on the ends of the module to remove it.

Use the "Adapter Replacement" on page 4-19 procedure for replacement of the coprocessor. If the IBM 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	RT PC AT Coprocessor Option
2	8286127	IBM AT Math Co-Processor module

IBM AT Fixed-Disk and Diskette Drive Adapter

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

Specifications

Slot positions	Drive positions A - D, slot 1 Drive position E, slot 2
I/O addresses	Drive positions A and B, 03F0 - 03F7 Drive positions C and D, 01F0 - 01F7 Drive position E, 0170 - 0177
DMA channel	Diskette drives, 2
Interrupt levels	Diskette drives, 6 Fixed-disk drives, 14
Maximum number	2

Removal and Replacement Procedures

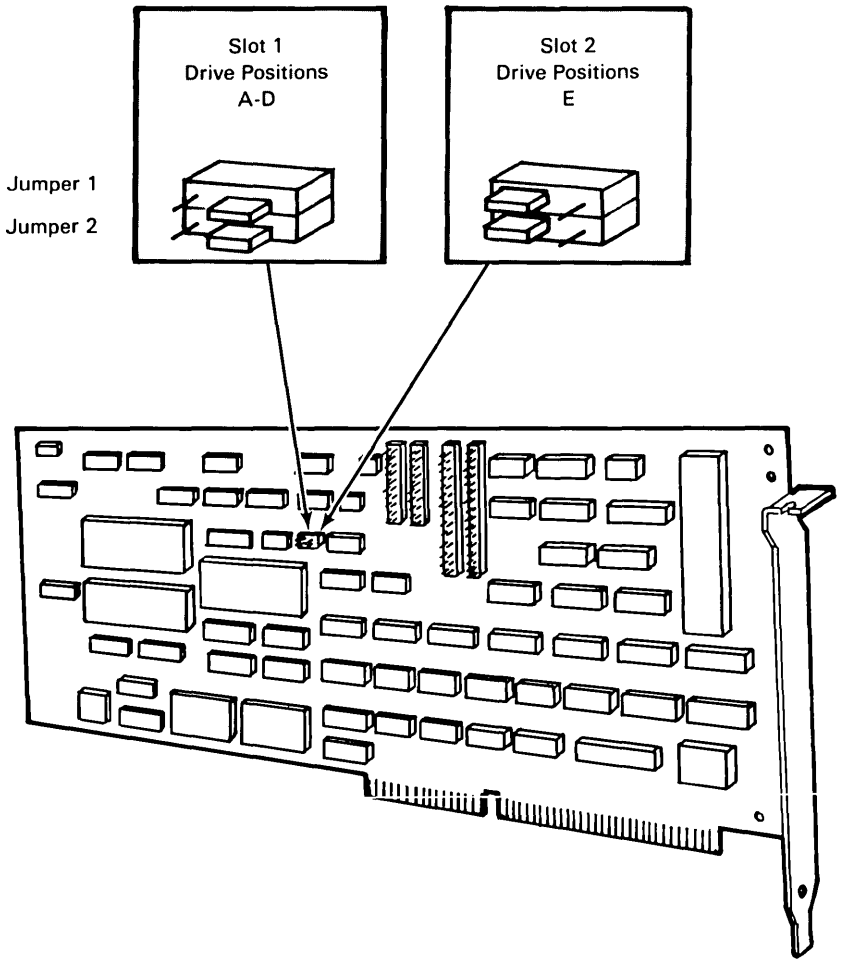
Use the "Adapter Removal" on page 4-18 procedure for removal.

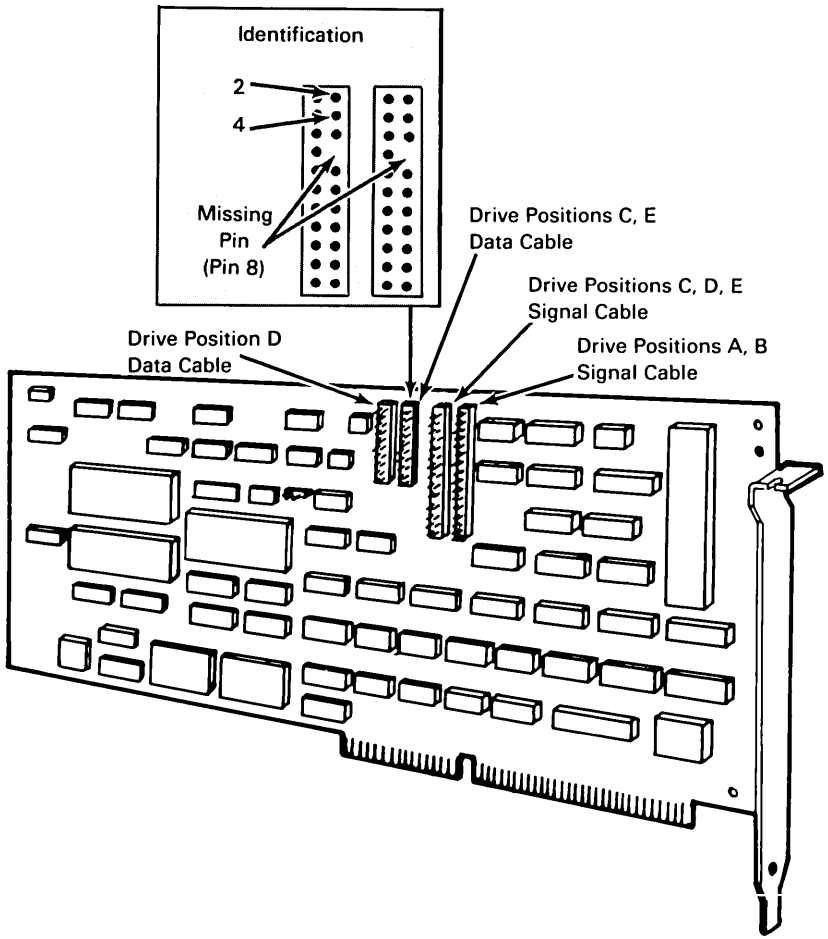
Use the "Adapter Replacement" on page 4-19 procedure for replacement.

Jumper Settings

Use the diagram below to set the jumpers for the adapter location. Set the jumpers for Slot 1 or Slot 2.

The jumpers set the I/O addresses of the adapter.




Identification
2
4
Missing
Pin
(Pin 8)
Drive Positions C, E
Data Cable
Drive Positions C, D, E
Signal Cable
Drive Positions A, B
Signal Cable
Drive Position D
Data Cable

Index Number	Part Number	Description
1	8286125	IBM AT Fixed-Disk and Diskette Drive Adapter
	61X6937	Cable, fixed-disk and diskette drive positions A - D
	61X6938	Cable, fixed-disk drive position E

RT PC ESDI Magnetic Media Adapter

The RT PC ESDI Magnetic Media Adapter contains adapters for two diskette drives and two fixed-disk drives.

Specifications

Slot positions	Drive positions A - D, slot 1 Drive position E, slot 2
I/O addresses	Drive positions A and B, 03F0 - 03F7 Drive positions C and D, 01F0 - 01F7 Drive position E, 0170 - 0177
DMA channel	Diskette drives, 2
Interrupt levels	Diskette drives, 6 Fixed-disk drives, 14
Maximum number	2

Removal and Replacement Procedures

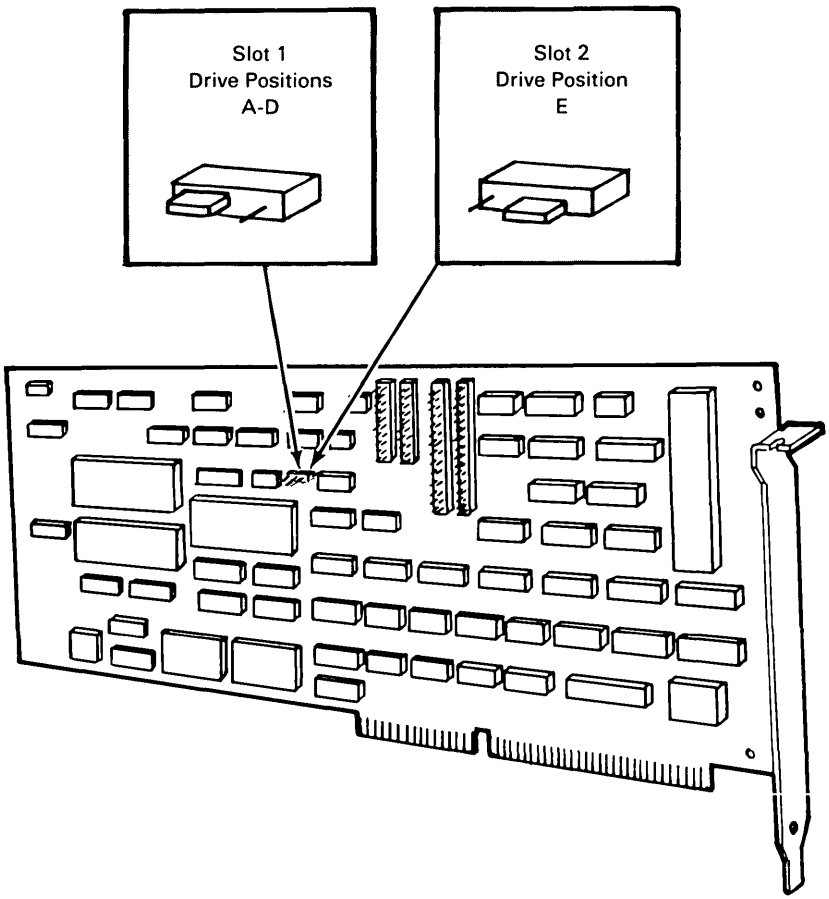
Use the "Adapter Removal" on page 4-18 procedure for removal.

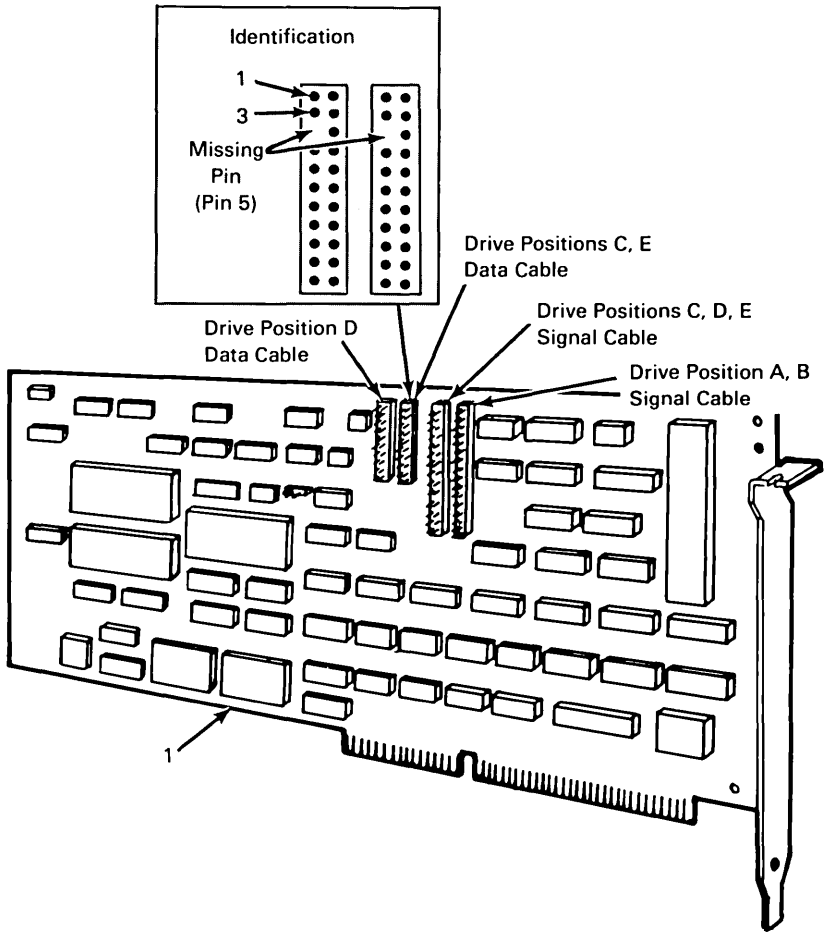
Use the "Adapter Replacement" on page 4-19 procedure for replacement.

Jumper Settings

Use the diagram below to set the jumpers for the adapter location. Set the jumpers for Slot 1 or Slot 2.

The jumpers set the I/O addresses of the adapter.




Identification
1
3
Missing
Pin
(Pin 5)
Drive Positions C, E
Data Cable
Drive Positions C, D, E
Signal Cable
Drive Position D
Data Cable
Drive Position A, B
Signal Cable
1

Index Number	Part Number	Description
1	61X6351 61X6937 61X6938	RT PC ESDI Magnetic Media Adapter Cable, fixed-disk and diskette drive positions A - D Cable, fixed-disk drive position E

RT PC Extended ESDI Magnetic Media Adapter

The RT PC Extended ESDI Magnetic Media Adapter contains adapters for two diskette drives and three fixed-disk drives.

Specifications

Slot positions	IBM 6150, slots 1 IBM 6151, slot 6
I/O addresses	Drive positions A and B, 03F0 - 03F7 Drive positions C, D, and E, 01F0 - 01F7
DMA channel	Diskette drives, 2 Fixed-disk drives, 0, 1 (set by program)
Interrupt level	Diskette drives, 6 Fixed-disk drives, 12, 14 (set by program)

Removal Procedure

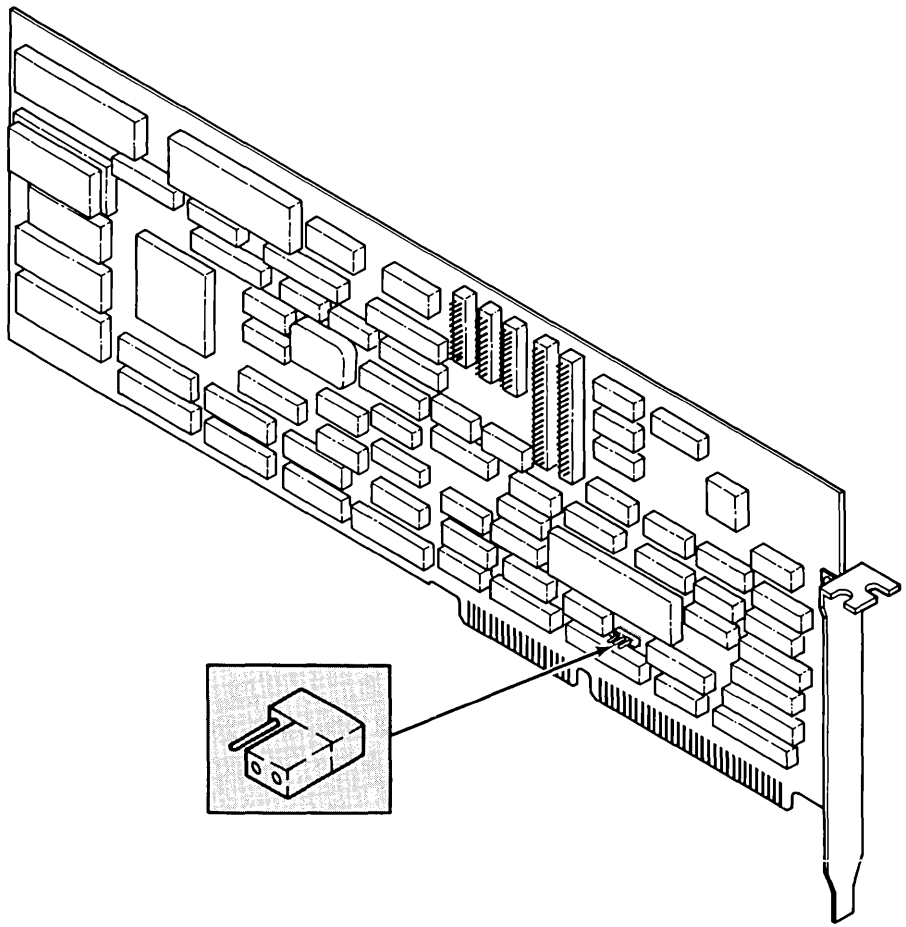
Use the Adapter Removal procedure in Section 4.

Replacement Procedure

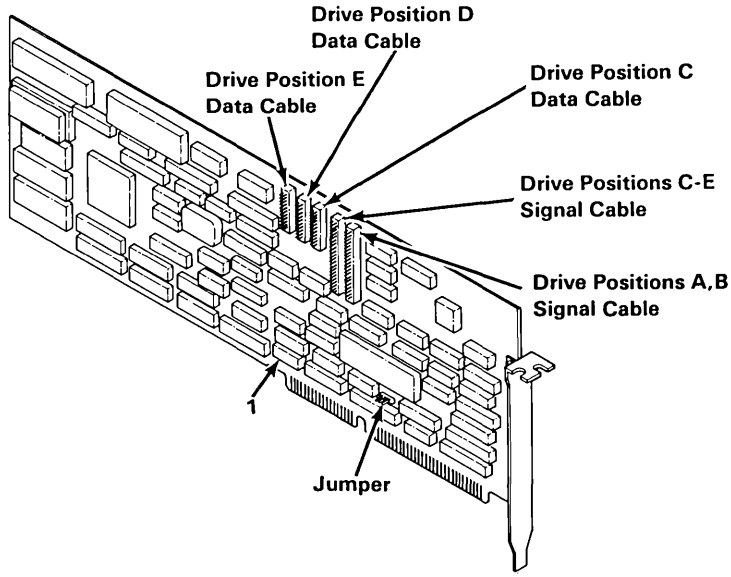
Use the Adapter Replacement procedure in Section 4.

Jumper Settings

Use the diagram below to set the jumper as shown.



Parts Information



Index Number	Part Number	Description
1	6848231	RT PC Extended ESDI Magnetic Media Adapter
	79X3777	Fixed-disk and diskette drive cable A - E, IBM 6150
	61X6800	Fixed-disk and diskette drive cable, IBM 6151

IBM Monochrome Display and Printer Adapter

The IBM Monochrome Display and Printer Adapter is the same adapter that is used in the IBM Personal Computer system units to attach the IBM 5151 Personal Computer Display.

Specifications

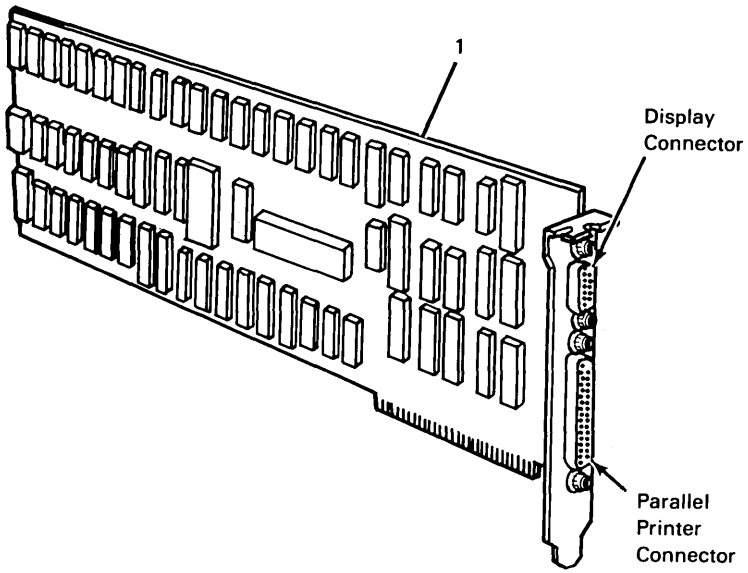
Slot positions	3
I/O addresses	Display adapter, 03B0 - 03BA Printer adapter, 03BB - 03BF
Memory addresses	Display, 0B0000 - 0B7FFF
Interrupt level	Printer adapter, 7
Maximum number	1

Removal and Replacement Procedures

Use the "Adapter Removal" on page 4-18 procedure for removal.

Use the "Adapter Replacement" on page 4-19 procedure for replacement.

Parts Information



Index Number	Part Number	Description
1	8529148 8529214	IBM Monochrome Display and Printer Adapter IBM PC Parallel Printer Cable

IBM PC Enhanced Graphics Adapter

The IBM PC Enhanced Graphics Adapter attaches the IBM 5154 Enhanced Color Display to the system unit. The IBM PC Enhanced Graphics Adapter contains 64K bytes of display memory. The display memory size can be expanded to 256K bytes by adding the IBM PC Graphics Memory Expansion Card (64K bytes) and IBM PC Graphics Memory Expansion Kit (128K bytes) to the adapter.

Specifications

Slot positions	3, 6
I/O addresses	03C0 - 03DF
Memory addresses	0A0000 - 0BFFFF
BIOS addresses	0C0000 - 0C3FFF
Interrupt level	9
Maximum number	1

Removal and Replacement Procedures

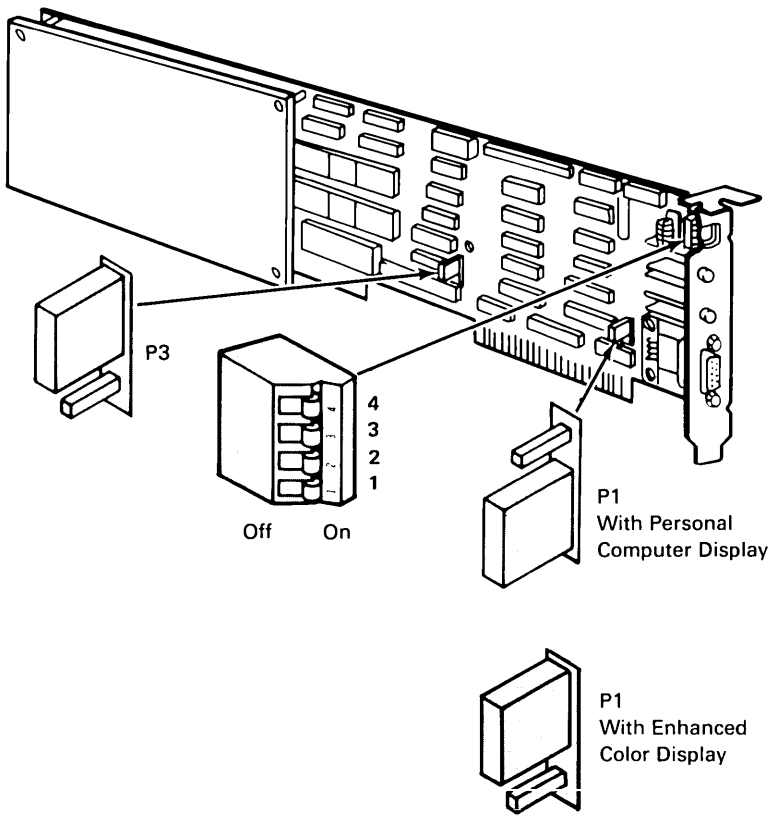
Use the "Adapter Removal" on page 4-18 procedures for removal. If the IBM PC Graphics Memory Expansion Card is present, remove the card from the adapter. If your failure is isolated to a failing module on the IBM PC Graphics Memory Expansion card, remove the failing module.

If you removed a failing module, align the failing module with the socket (be sure the notch is in the same direction as the other modules), then press it into position.

If you removed the IBM PC Graphics Memory Expansion Card, install it on the adapter. Then, use the "Adapter Replacement" on page 4-19 procedures for replacement.

Jumper Settings

Use the diagram below to set the jumpers. Use the chart on the following page to set the mode switch.



Switch Settings

Use this table to set the mode switches for the type of display attached to the IBM PC Enhanced Graphics Adapter when ***one*** of the following conditions is present:

- The RT PC AT Coprocessor Option ***is not*** installed.
- The display attached to the IBM PC Enhanced Graphics Adapter is not assigned to the RT PC AT Coprocessor Option.
- The display attached to the IBM PC Enhanced Graphics Adapter is assigned to the RT PC AT Coprocessor Option in ***shared*** mode.

Type of Display Attached to the IBM PC Enhanced Graphics Adapter	**Sw1**	**Sw2**	**Sw3**	**Sw4**
IBM 5154 Enhanced Color Display	Off	On	On	Off
IBM 5151 Personal Computer Display	Off	Off	On	Off

Use this table to set the mode switches when the following conditions are present:

- The IBM 5151 Personal Computer Display is attached to the IBM PC Enhanced Graphics Adapter.
- The IBM 5151 is assigned to the RT PC AT Coprocessor Option in ***dedicated*** mode.
- Another display may also be installed and assigned to the RT PC AT Coprocessor Option as a second display.

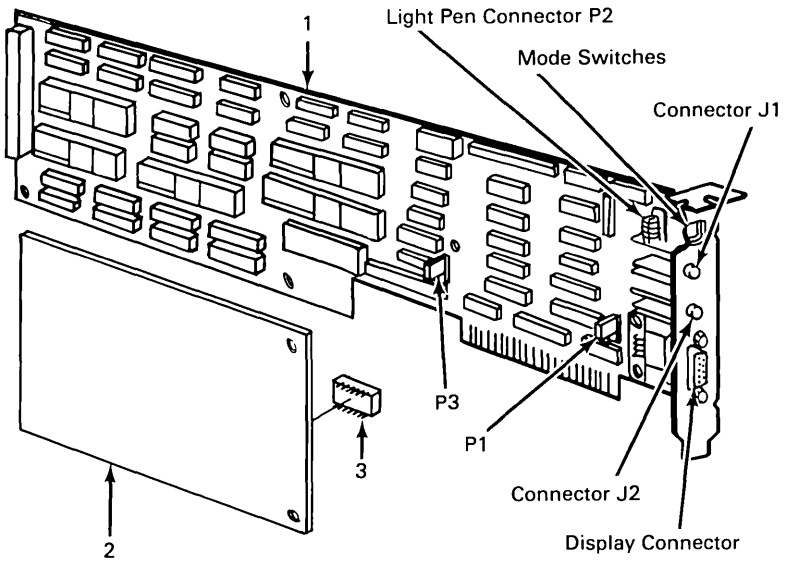
IBM 5151 Assignment	**Second Display Mode of Operation**	**Sw1**	**Sw2**	**Sw3**	**Sw4**
Primary	80 X 25 Color	Off	Off	On	Off
Primary	40 X 25 Color	On	Off	On	Off
Secondary	80 X 25 Color	Off	On	Off	On
Secondary	40 X 25 Color	On	On	Off	On

Use this table to set the mode switches when the following conditions are present:

- The IBM 5154 Enhanced Color Display is attached to the Enhanced Graphics Adapter.
- The IBM 5154 is assigned to the RT PC AT Coprocessor Option in ***dedicated*** mode.
- Another display may also be installed and assigned to the RT PC AT Coprocessor Option as a second display.

IBM 5154 Assignment	**IBM 5154 Operating Mode or Emulation Mode**	**Sw1**	**Sw2**	**Sw3**	**Sw4**
Primary	80 X 25 High Resolution	Off	On	On	Off
Primary	80 X 25 Enhanced Color	On	On	On	Off
Secondary	80 X 25 High Resolution	Off	Off	On	On
Secondary	80 X 25 Enhanced Color	On	Off	On	On

Parts Information



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

RT PC Advanced Monochrome Graphics Display Adapter

The RT PC Advanced Monochrome Graphics Display Adapter attaches the IBM 6151 Advanced Monochrome Graphics Display to the system unit.

Specifications

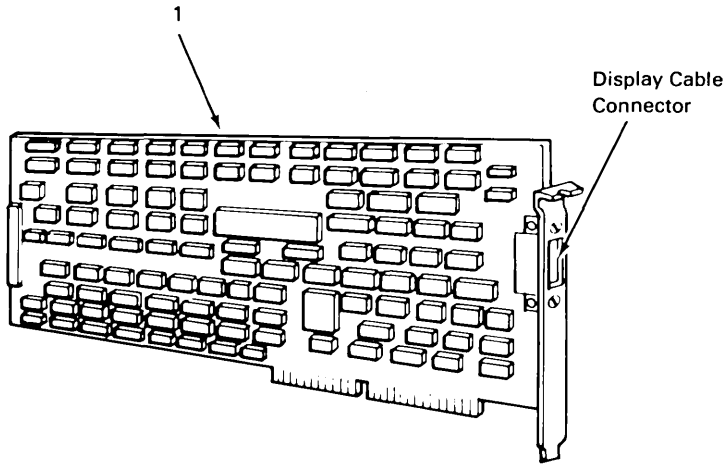
Slot positions	2, 4, 5, 7, 8
I/O addresses	0160 - 016F
Memory addresses	D00000 - D1FFFF
Interrupt level	11
Maximum number	1

Removal and Replacement Procedures

Use the "Adapter Removal" on page 4-18 procedure for removal.

Use the "Adapter Replacement" on page 4-19 procedure for replacement.

Parts Information



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

RT PC Advanced Color Graphics Display Adapter

The RT PC Advanced Color Graphics Display Adapter attaches the IBM 6154 Advanced Color Graphics Display to the IBM 6150 System Unit.

Specifications

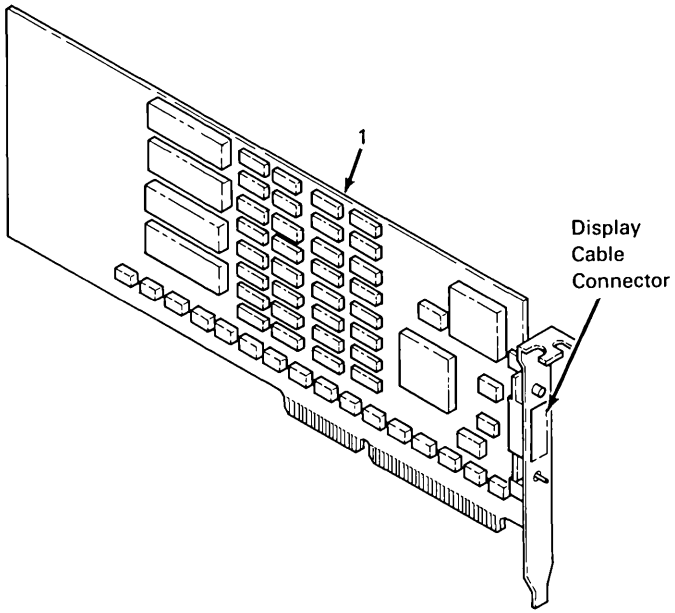
Slot positions	2, 4, 5, 7, 8
I/O addresses	0150 - 015F
Memory addresses	D20000 - D3FFFF
Interrupt level	11
Maximum number	1

Removal and Replacement Procedures

Use the "Adapter Removal" on page 4-18 procedure for removal.

Use the "Adapter Replacement" on page 4-19 procedure for replacement.

Parts Information



Index Number	Part Number	Description
1	6299392	RT PC Advanced Color Graphics Display Adapter

RT PC Extended Monochrome Graphics Display Adapter

The RT PC Extended Monochrome Graphics Display Adapter attaches the IBM 6155 Extended Monochrome Graphics Display to the IBM 6150 System Unit.

Specifications

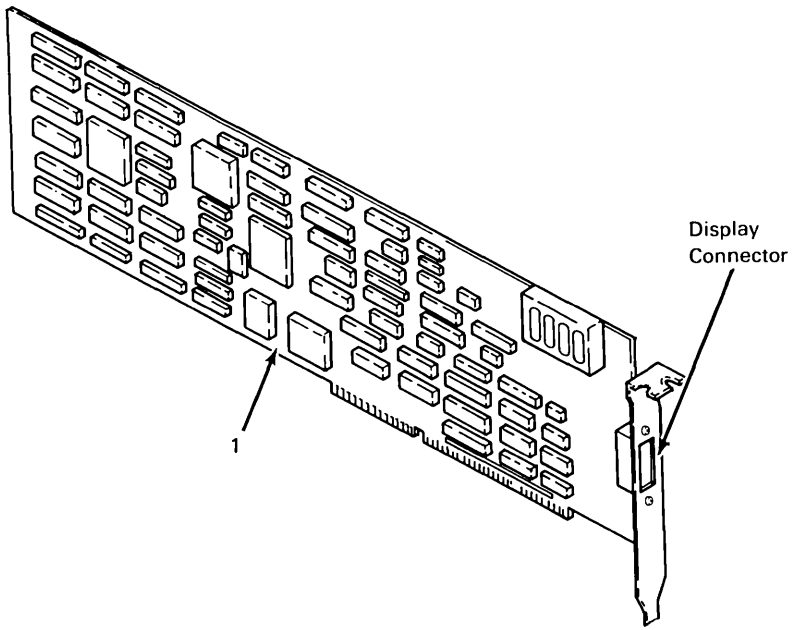
Slot positions	2, 4, 5, 7
I/O addresses	0D10 - 0D2F
Memory addresses	D80000 - DFFFFF
DMA channel	7
Interrupt level	11
Maximum number	1

Removal and Replacement Procedures

Use the "Adapter Removal" on page 4-18 procedure for removal.

Use the "Adapter Replacement" on page 4-19 procedure for replacement.

Parts Information



Index Number	Part Number	Description
1	6299351	RT PC Extended Monochrome Graphics Display Adapter

IBM Megapel Display Adapter

The IBM Megapel Display Adapter attaches the IBM 5081 Display to the RT PC system unit. The IBM Megapel Display Adapter consists of two boards, the display controller board and the display processor board. They are physically attached and plug into two adjacent double slots.

The display controller board produces the red, green, and blue (RGB) video signals for the IBM 5081 Display.

The display processor board provides the processing function for the display controller board. It also contains a parallel printer adapter.

Note: The parallel printer adapter on the IBM Megapel Display Adapter must be ***disabled*** (see switch settings) if the IBM Monochrome Display and Printer Adapter is installed in the system unit.

Specifications

Slot positions	IBM 6150, slots 4 and 5 IBM 6151, slots 2 and 3
I/O addresses	0930 – 094F
Memory addresses	0B8000 – 0BBFFF, PC color graphics adapter emulation mode C00000 – C3FFFF, Adapter data space D60000 – D7FFFF, Adapter program space
DMA channels	7
Interrupt level	11 (shared)
Horizontal frequency	63.36 KHz
Vertical frequency	60 Hz, non-interlaced
Display connector	3-Pin video
Printer connector	25-Pin D-shell
Maximum number	1

Removal Procedure

Note: The IBM Megapel Display Adapter consists of two boards fastened together. Use care when removing or disconnecting them.

1. Use the Adapter Removal Procedure in Section 4 to remove the adapter.
2. Record the switch settings (on the processor and printer adapter board).
3. Remove the four screws that attach the display processor board (the one with the 25-pin connector) to the display controller board.
4. Disconnect the display processor board.
5. Exchange either board, then use the following procedure to assemble.

Replacement Procedure

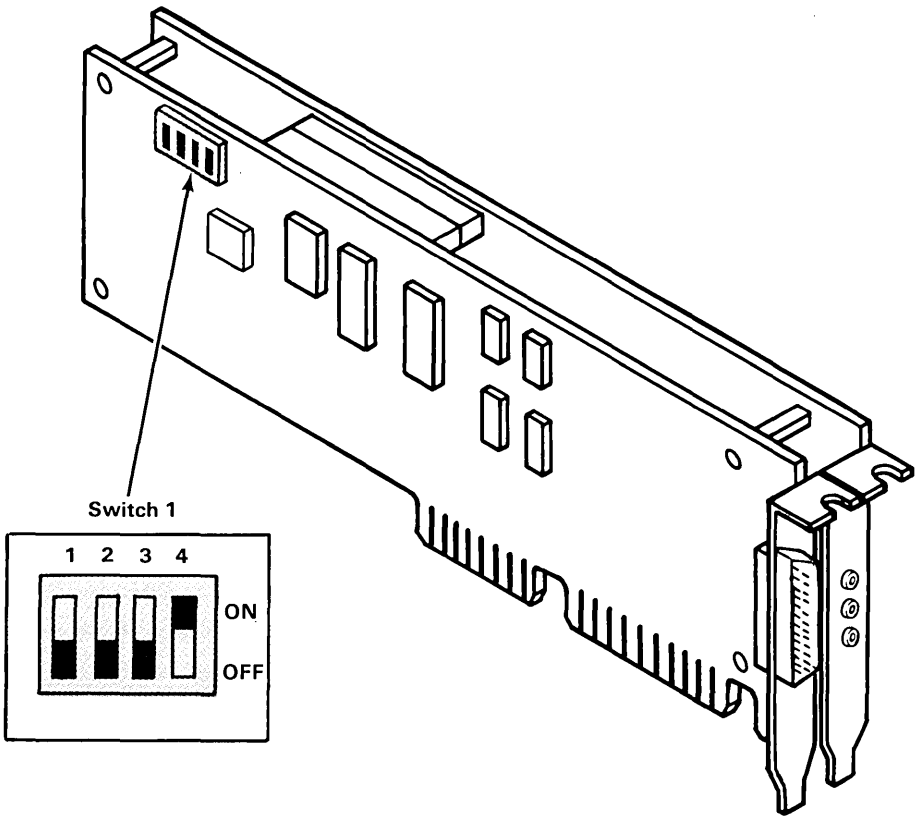
Note: The IBM Megapel Display Adapter consists of two boards fastened together. Use care when connecting or installing them.

1. Align the display processor board connector with the connector on the display controller board and press into position.
2. Install the four screws to fasten the boards together.
3. Use the switch settings you recorded, set the switches.
4. Use the Adapter Replacement Procedure in Section 4 to install the adapter.

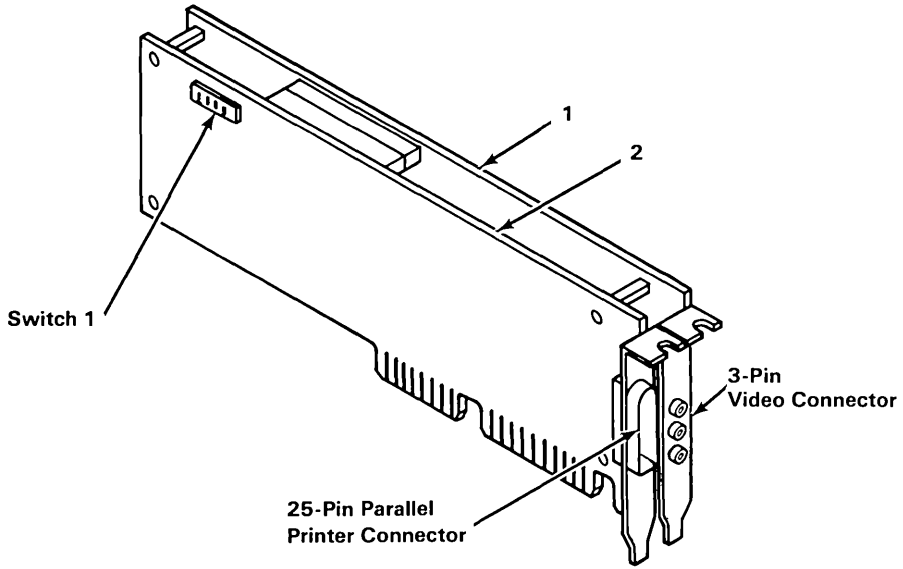
Switch Settings

Use the following table to set the switch positions on the display processor board.

Switch Position	On	Off (Open)
1	Not used	Set to Off
2	Enable the printer adapter	Disable the printer adapter
3	Enable the PC Color Graphics Adapter emulation	Disable the PC Color Graphics Adapter emulation
4	Set to On	Not used



Parts Information



Index Number	Part Number	Description
1	6247666	Display controller board
2	6247662	Display processor board
	6247661	Cable, IBM 5081 attachment

RT PC 4-Port Asynchronous RS-232C Adapter (Buffered)

The RT PC 4-Port Asynchronous RS-232C Adapter (Buffered) contains four asynchronous adapters. The RT PC 4-Port Asynchronous RS-232C Adapter uses the I/O channel to communicate with the 32-bit processor or coprocessor.

Specifications

Slot positions	IBM 6150, slots 2, 4, 5, 7, 8 IBM 6151, slots 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, but see the notes for the RT PC Small Computer Systems Interface Adapter before using level 11 shared.)
Bit rates	50 - 19200 (set by program)
Bits per character	5, 6, 7, 8 (set by program)
Maximum number	4

Removal Procedure

Use the Adapter Removal Procedure in Section 4.

Replacement Procedure

Use the Adapter Replacement Procedure in Section 4.

Switch Settings

Refer to the drawing on the next page to locate the switch banks, then use the charts 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.

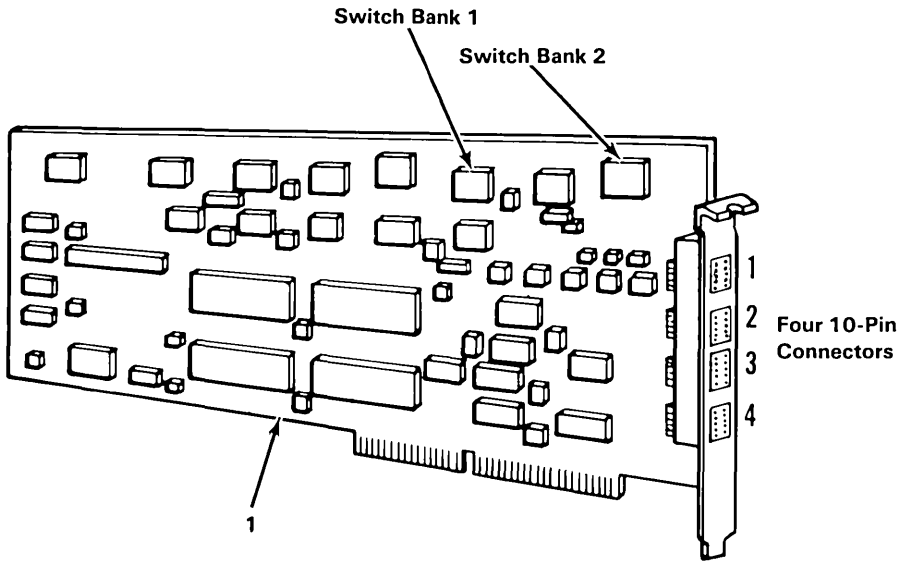
Switch Bank 1 - Interrupt Level Selection

	9		10		11	
	Off	On	Off	On	Off	On
Switch 1		X	X		X	
Switch 2	X			X	X	
Switch 3	X		X			X

Switch Bank 2 - Address Range Selection

	1		2		3		4	
	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	X		X		X		X	
Switch 8	X		X		X		X	

Parts Information



Index Number	Part Number	Description
1	61X6339	4-Port Asynchronous RS-232C Adapter (Buffered)
	6298240	RT PC Modem Cable - RS-232C (10 Pin)
	6298525	RT PC Serial Printer Cable (10 Pin)
	6298526	RT PC ASCII Terminal Cable - RS-232C (10 Pin)
	79X3914	RT PC ASCII Terminal Cable RS-232C (10/25M-Pin)

RT PC 4-Port Asynchronous RS-422A Adapter (Buffered)

The RT PC 4-Port Asynchronous RS-422A Adapter (Buffered) contains four asynchronous adapters. The RT PC 4-Port Asynchronous RS-422A Adapter uses the I/O channel to communicate with the 32-bit processor or coprocessor.

Specifications

Slot positions	IBM 6150, slots 2, 4, 5, 7, 8 IBM 6151, slots 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, but see the notes for the RT PC Small Computer Systems Interface Adapter before using level 11 shared.)
Bit rates	50 - 19200 (set by program)
Bits per character	5, 6, 7, 8 (set by program)
Maximum number	4

Removal Procedure

Use the Adapter Removal Procedure in Section 4.

Replacement Procedure

Use the Adapter Replacement Procedure in Section 4.

Switch Settings

Refer to the drawing on the next page to locate the switch banks, then use the charts 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.

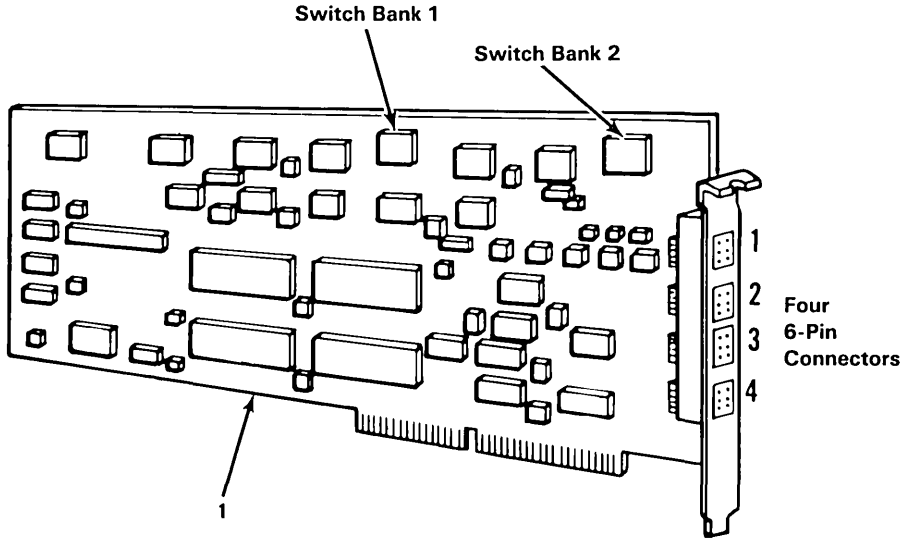
Switch Bank 1 - Interrupt Level Selection

	9		10		11	
	Off	On	Off	On	Off	On
Switch 1		X	X		X	
Switch 2	X			X	X	
Switch 3	X		X			X

Switch Bank 2 - Address Range Selection

	1		2		3		4	
	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	X		X		X		X	
Switch 8	X		X		X		X	

Parts Information



Index Number	Part Number	Description
1	79X3782	4-Port Asychronous RS-422A Adapter (Buffered)
	6298246	RT PC ASCII Terminal Cable - RS-422A (6 pin), 20 m
	6487640	RT PC ASCII Terminal Cable - RS-422A (6 pin), 3 m

IBM AT Serial/Parallel Adapter

The IBM 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	2 - 8
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

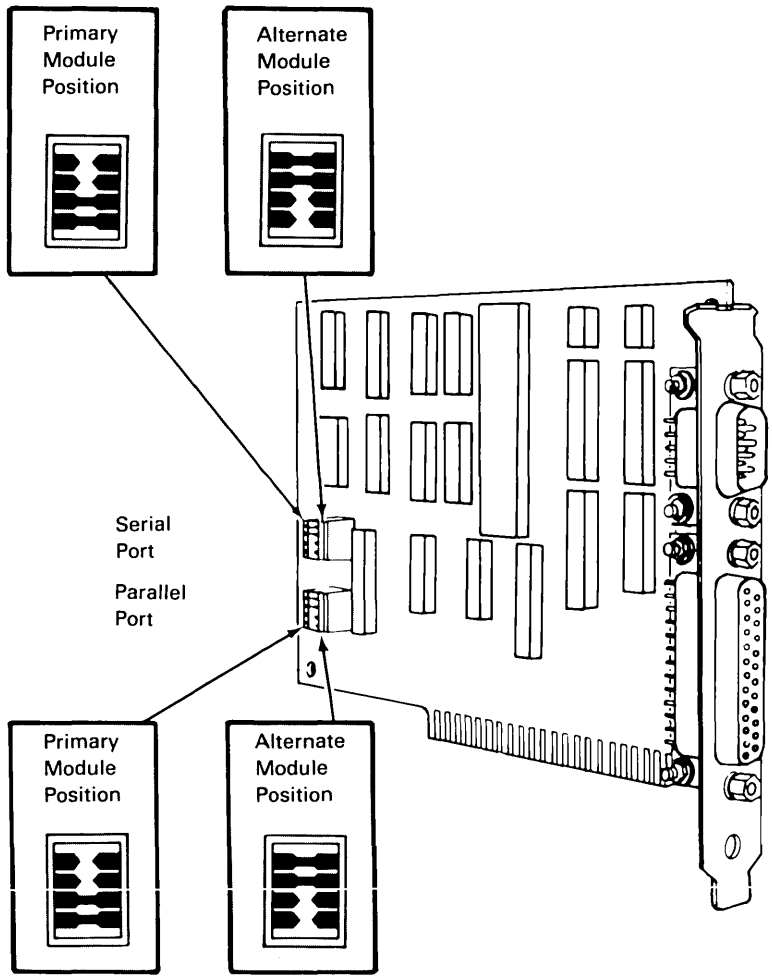
Removal and Replacement Procedures

Use the "Adapter Removal" on page 4-18 procedure for removal.

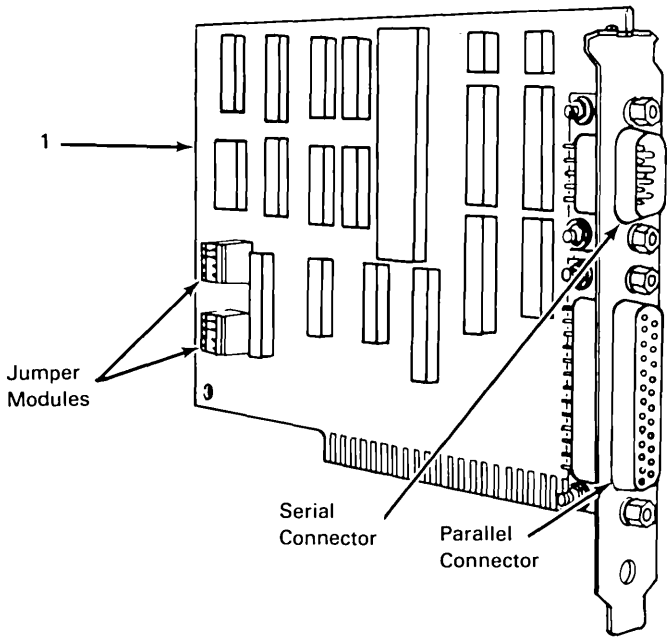
Use the "Adapter Replacement" on page 4-19 procedure for replacement.

Jumper Module Settings

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



Parts Information



Index Number	Part Number	Description
1	8286147	IBM AT Serial/Parallel Adapter
	8286194	IBM AT Serial Adapter Connector (10 inch)
	6298963	RT PC Serial Printer Cable (9 Pin)
	8286170	IBM AT Modem Cable - RS232C/9 Pin
	8529214	IBM PC Parallel Printer Cable
	6848247	RT PC ASCII Terminal Cable - RS232 (9-pin)

IBM PC Network Adapter

The IBM PC Network Adapter attaches the IBM 6150 System Unit to the IBM PC Network. The IBM PC Network Adapter uses the I/O channel to communicate with the 32-bit processor and coprocessor.

Specifications

Slot positions	2 - 8
I/O addresses	Primary, 0360 - 0367 Alternate, 0368 - 036F
Memory addresses	0CC000 - 0CDFFF
DMA channel	3
Interrupt levels	3, 9
Maximum number	1

Removal and Replacement Procedures

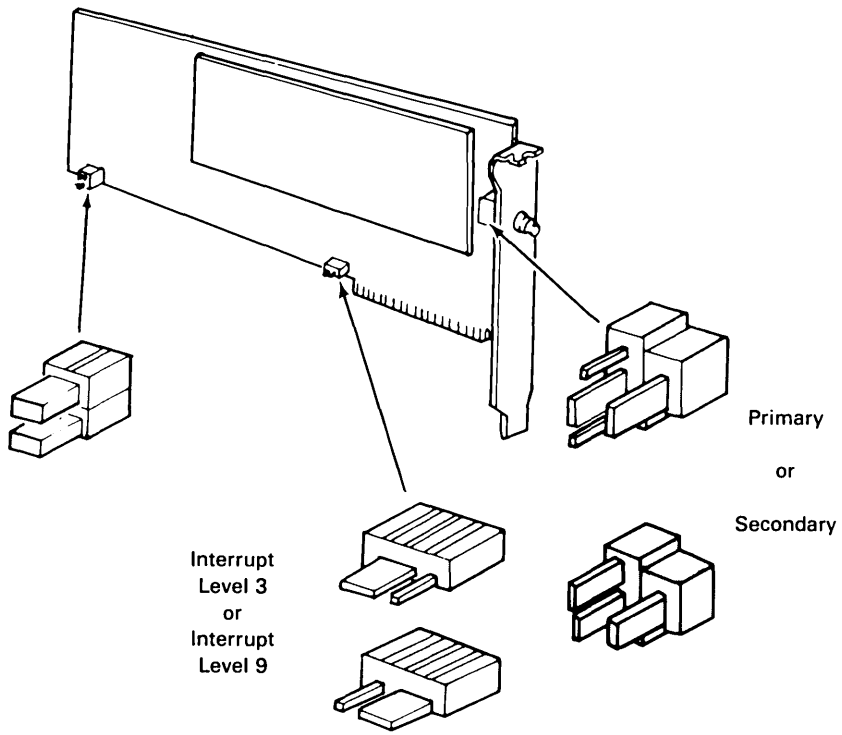
Use the "Adapter Removal" on page 4-18 procedure for removal.

Use the "Adapter Replacement" on page 4-19 procedure for replacement.

Jumper Settings

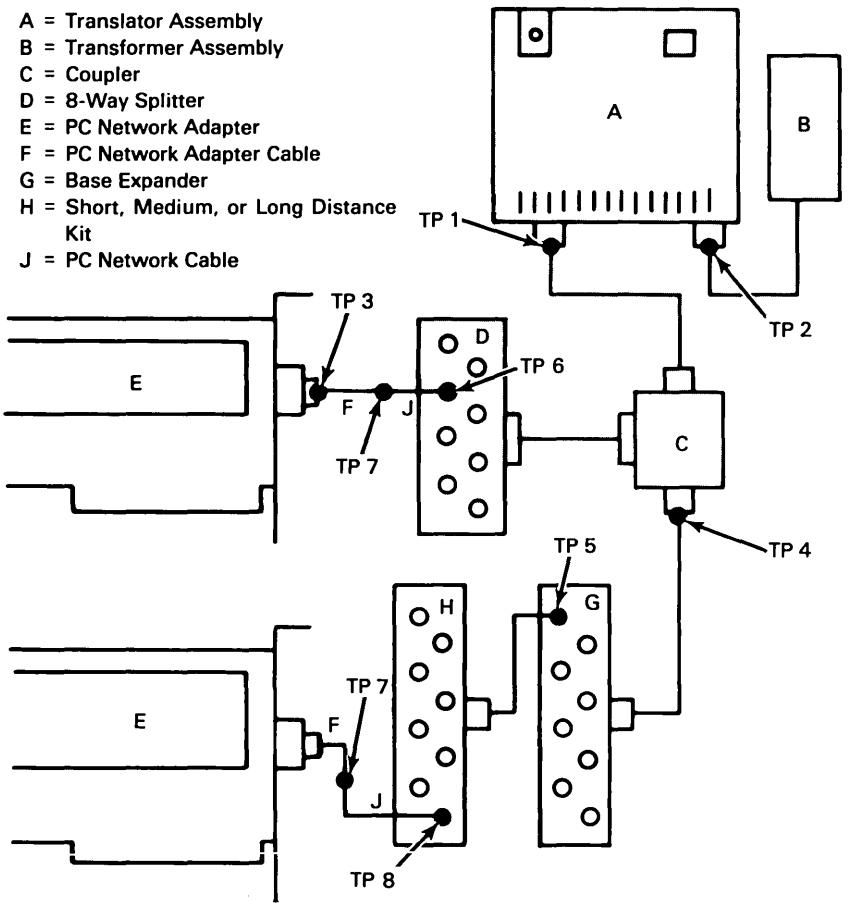
Set the jumpers to select Primary or Alternate addresses.

Set the jumper to select Interrupt Level 3 or Interrupt Level 9.



IBM PC Network Cabling Example

The IBM PC Network Cabling Example below is for diagnostic understanding only. Your IBM PC Network cabling may contain more or less components than those shown below.

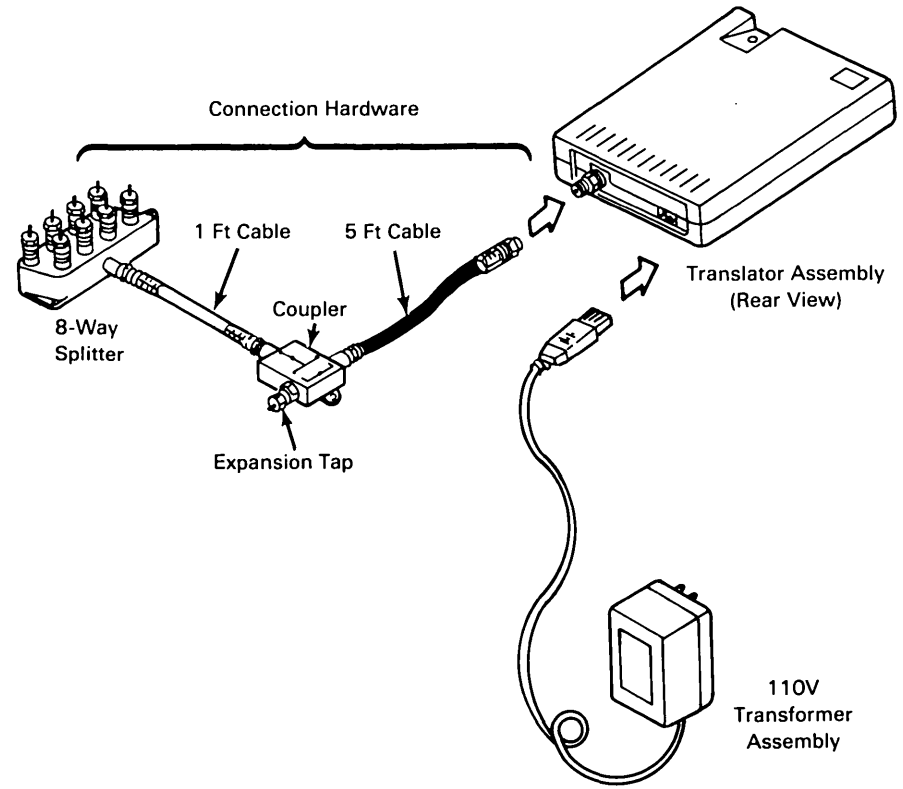


Highlighted units make up the Portable Translation Unit.

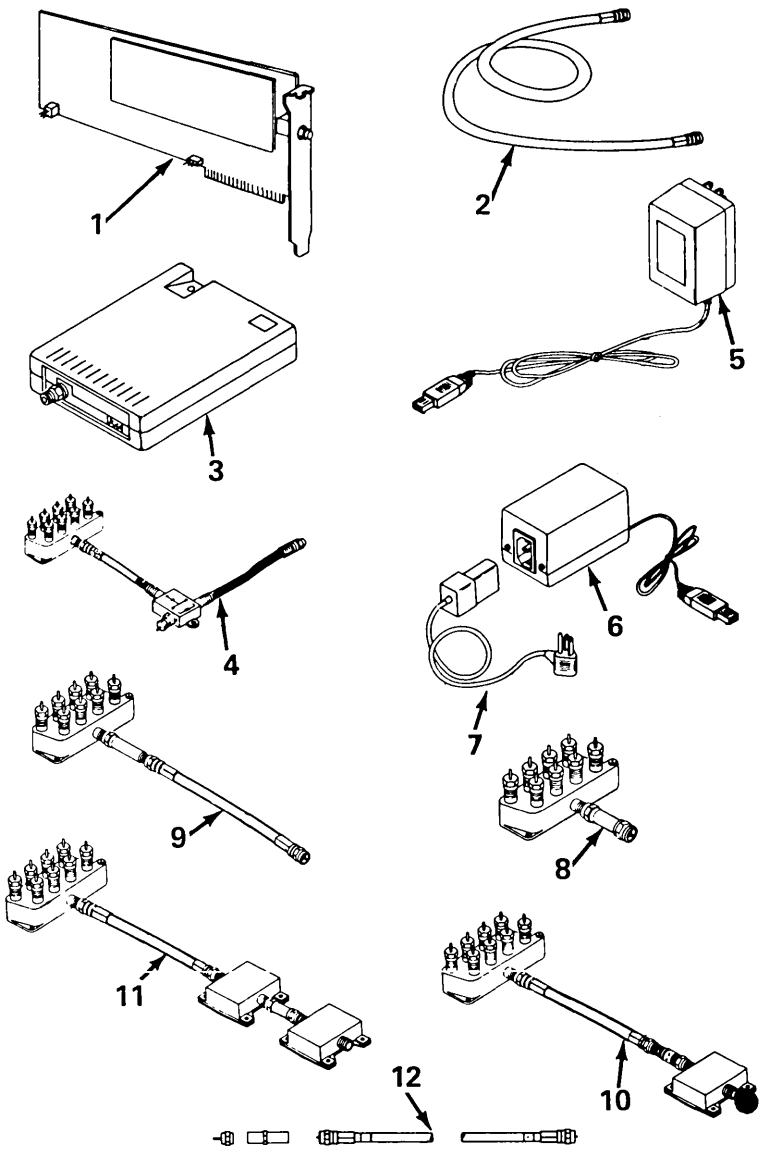
IBM PC Network Portable Translator Unit

Three field-replaceable units (FRUs) are assembled into a diagnostic tool known as the IBM PC Network Portable Translator Unit (PTU). Instructions for the use of the PTU are on the diagnostic diskette. You are instructed when to use the PTU while running the IBM PC Network Checkout routines. The PTU consists of the following FRUs:

- The Translator Assembly, part number 8286173.
- The Transformer Assembly, part number 8286176.
- The Connection Hardware Assembly, part number 8286174. The Connection Hardware Assembly includes:
  - A coupler
  - An 8-way splitter
  - A 1.5 m (5 foot) cable
  - A .3 m (1 foot) cable.



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 a 9/16 wrench, 30Dd attenuator, labels - A, label kit assembly
5	8286176	Transformer Assembly, 120 V ac
6	8286177	Transformer Assembly, 230 V ac
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)

RT PC Multiprotocol Adapter

The RT PC Multiprotocol Adapter provides hardware to attach various communications devices to the IBM 6150 System Unit. The RT PC Multiprotocol Adapter uses the I/O bus to communicate with the 32-bit processor and coprocessor.

Specifications

Slot position	2, 4, 5, 7, 8
I/O addresses	Primary, 0510 - 052F Alternate, 0910 - 092F
DMA channel	Primary, 1 Alternate, 5
Interrupt levels	10, 11 (shared)
Maximum number	2

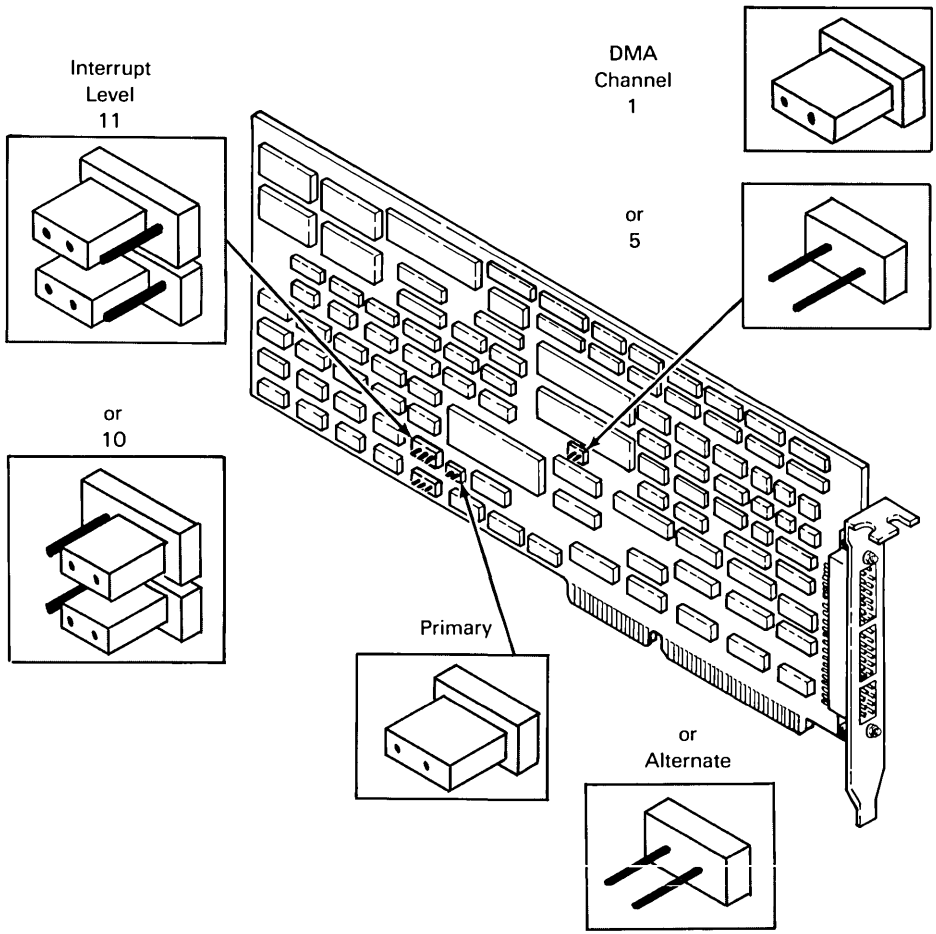
Removal and Replacement Procedures

Use the "Adapter Removal" on page 4-18 procedure for removal.

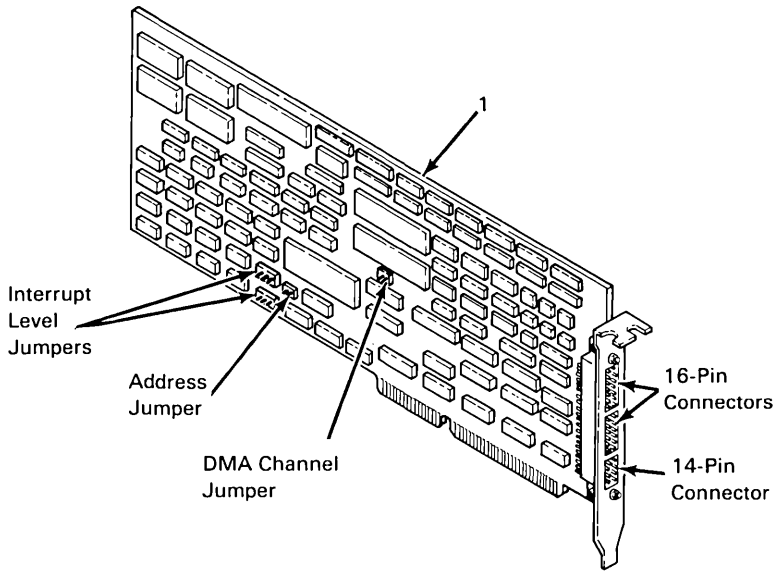
Use the "Adapter Replacement" on page 4-19 procedure for replacement.

Jumper Settings

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



Parts Information



Index Number	Part Number	Description
1	6299350	RT PC Multiprotocol Adapter
	6294813	RT PC Multiprotocol Adapter RS-232C cable
	6294815	RT PC Multiprotocol Adapter RS-366 cable
	6294817	RT PC Multiprotocol Adapter X.21 cable

RT PC Baseband Adapter

The RT PC Baseband Adapter provides the hardware to attach the IBM 6150 System Unit to an Ethernet Network. The RT PC Baseband Adapter uses the I/O channel to communicate with the 32-bit processor and coprocessor.

Specifications

Slot positions	2 - 7
Memory addresses	080000 - 0F8000 (any 32K-byte block)
Interrupt levels	3, 4, 5, 7, 9
Maximum number	2

Removal and Replacement Procedures

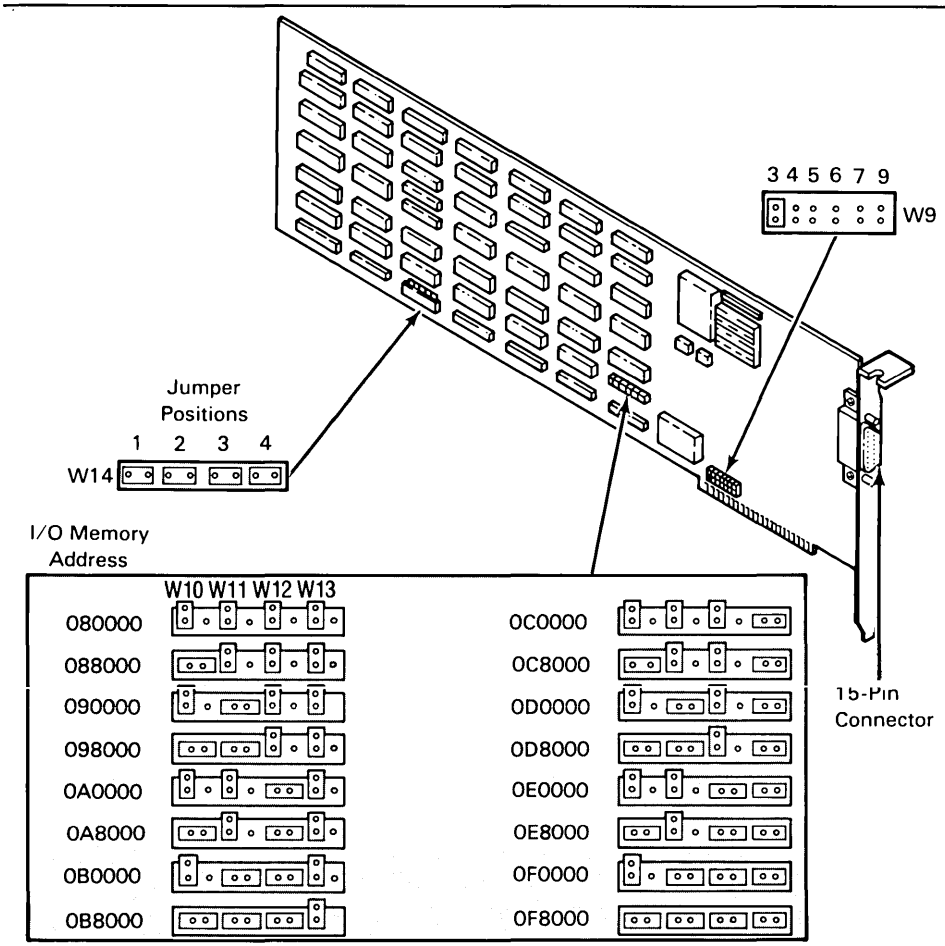
Use the "Adapter Removal" on page 4-18 procedure for removal.

Use the "Adapter Replacement" on page 4-19 procedure for replacement.

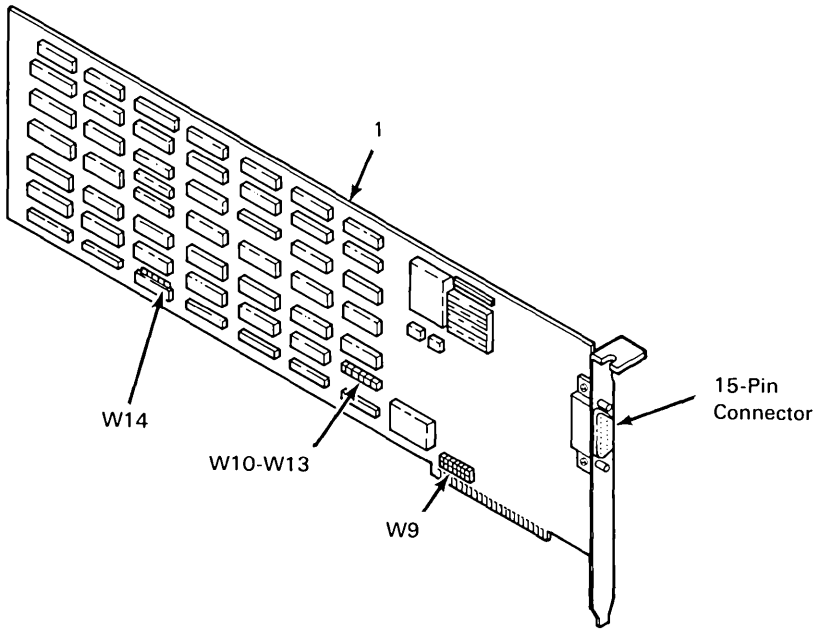
Jumper Settings

Set the jumpers as follows:

W9	Set to the interrupt level desired.
W10 - W13	Set for the 32K-byte block of memory desired.
W14	Sets the interrupt request rate:
	Position 1 Interrupts every 9.1 ms
	Position 2 Interrupts every 18.3 ms
	Position 3 Interrupts every 36.6 ms
	Position 4 Interrupts every 73.2 ms.



Parts Information



Index Number	Part Number	Description
1	61X6809	RT PC Baseband Adapter

IBM PC 3278/79 Emulation Adapter

The IBM PC 3278/79 Emulation Adapter provides the hardware to make the IBM 6150 System Unit respond to a host system like an IBM 3278 or IBM 3279 Display Terminal.

There are two styles of IBM PC 3278/79 Emulation Adapters in use. The long adapter is the earlier design and has no jumper or switch settings. The short adapter has switch settings. When ordering a replacement adapter, order the short adapter.

Note: The long and short adapters ***cannot*** be in the same system unit.

Specifications

Slot positions	IBM 6150, Slots 2 – 8 IBM 6151, Slots 1 – 5
I/O addresses	Address range 1, 02D0 – 02DA Address range 2, 06D0 – 06DA Address range 3, 0AD0 – 0ADA Address range 4, 0ED0 – 0EDA
Memory addresses	0CE000 – 0CFFFF
Interrupt level	9
Maximum number	4

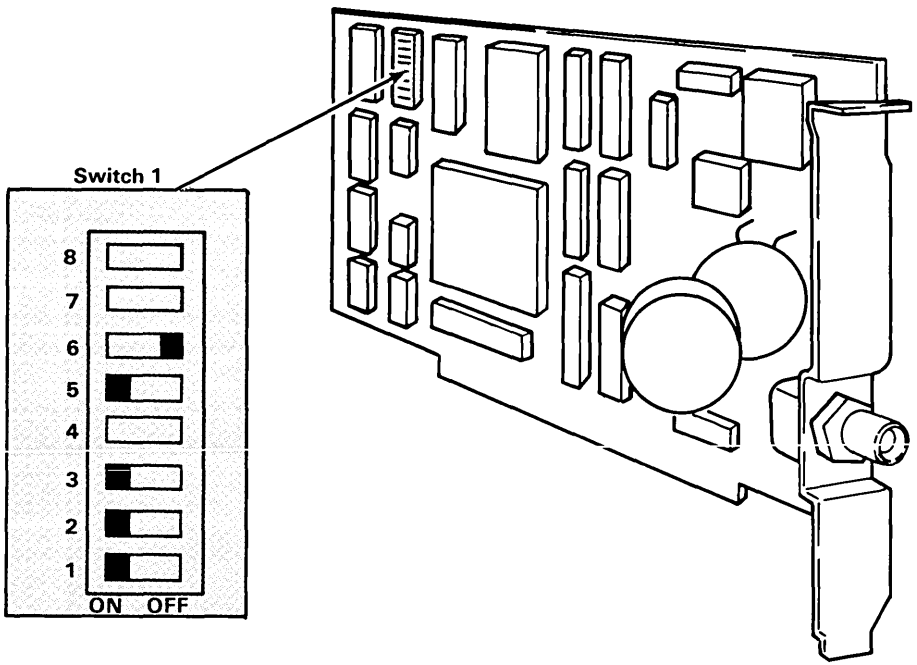
Removal and Replacement Procedures

Use the Adapter Removal and Replacement procedures in Section 4.

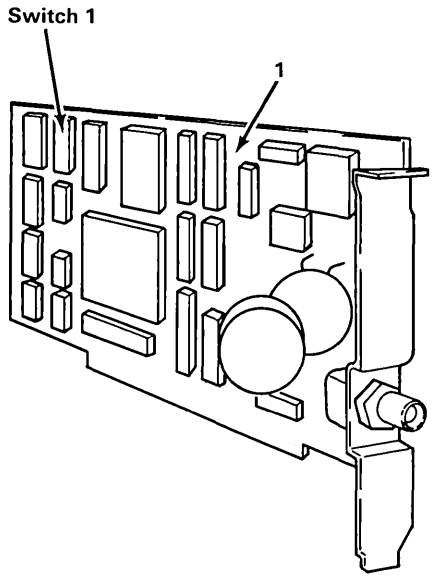
Switch Settings

Note: Only one adapter can use an address range.

Position	Description
1 and 2	Address range 1, 1 On, 2 On Address range 2, 1 Off, 2 On Address range 3, 1 On, 2 Off Address range 4, 1 Off, 2 Off
3	Off, disable interrupts On, enable interrupts
4	Reserved
5	On, for address range 1 Off, for address ranges 2 – 4
6	Off, slots 1 – 7 on PCXT and all RT PC slots On, slot 8 on PCXT
7 and 8	Reserved



Parts Information



Index Number	Part Number	Description
1	8665792	IBM PC 3278/79 Emulation Adapter (short adapter). Use this adapter to replace the long adapter also.

IBM Token-Ring Network RT PC Adapter

The IBM Token-Ring Network Adapter provides the hardware to attach the IBM RT PC System Units to the IBM Token-Ring Network. This adapter uses the I/O channel to communicate with the 32-bit processor. Two types of the IBM Token-Ring Network RT PC Adapter are in use. The early version allows the selection of two address ranges, while the later version allows for four address ranges. Use the switch settings for your version.

Specifications

Slot positions	IBM 6150, slots 2, 4, 5, 7, (also slot 8 with address ranges 1, 2, 4) IBM 6151, slots 2, 3, 4, (also slot 5 with address ranges 1, 2, 4)
I/O addresses	Address range 1, 01C0 - 01CF (Early Version, primary) Address range 2, 0140 - 014F (Early Version, alternate) Address range 3, 11C0 - 11CF Address range 4, 11D0 - 11DF
DMA channel	Address range 1, 5 (Early Version, primary) Address range 2, 6 (Early Version, alternate) Address range 3, 7 Address range 4, 3
Interrupt level	11, 12 (both shared), (Early Version, 12 shared)
Maximum number	4 (Early Version, 2)

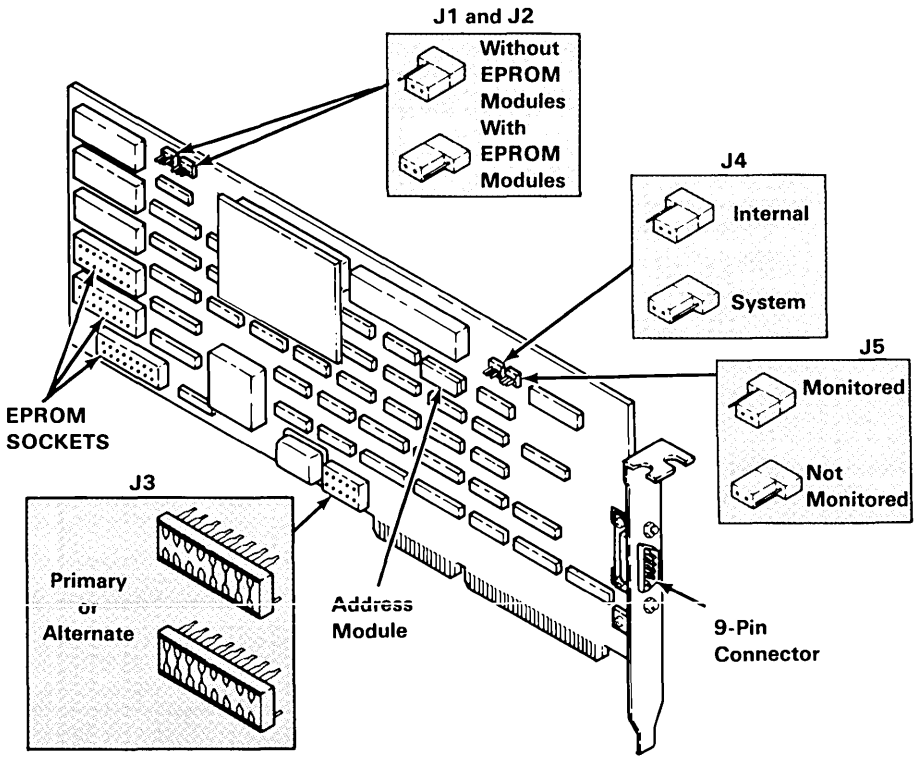
Removal and Replacement Procedures

Use the Adapter Removal and Replacement procedures in Section 4.

Jumper Settings (Early Version)

Set the jumpers as follows:

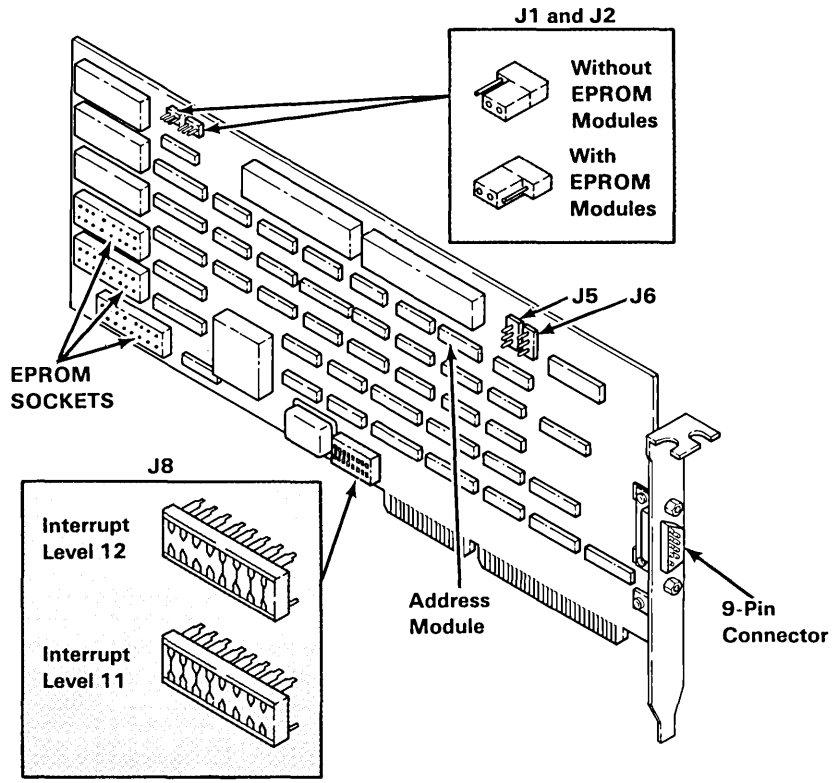
J1 and J2	Set after looking at the EPROM sockets.
J3	Set for Primary or Alternate adapter.
J4	Internal — the adapter address is provided by the Address Module. System — the adapter address is provided by the system.
J5	Monitored — the Processor Activity Timer is active. Not Monitored — the Processor Activity Timer is not active.



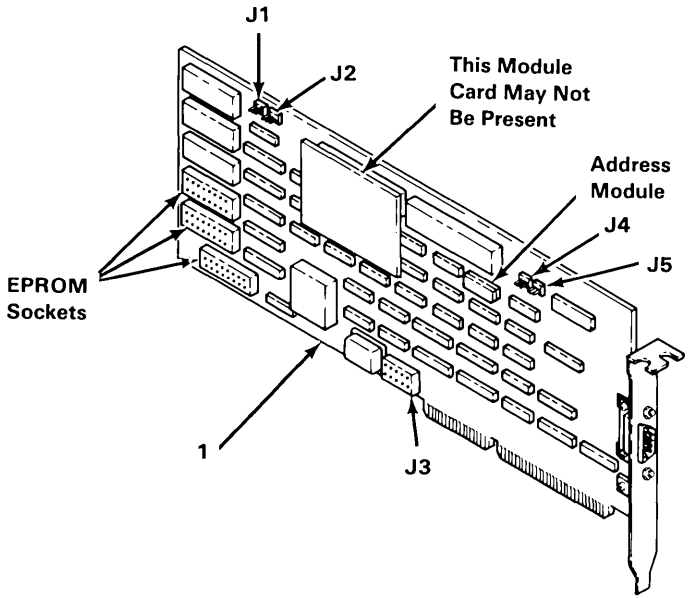
Jumper Settings (Later Version)

Set the jumpers as follows:

J1 and J2	Set after looking at the EPROM sockets.
J5 and J6	Address range 1, J5 Up, J6 Up
	Address range 2, J5 Up, J6 Down
	Address range 3, J5 Down, J6 Up
	Address range 4, J5 Down, J6 Down
J8	Set for interrupt level 11 or 12

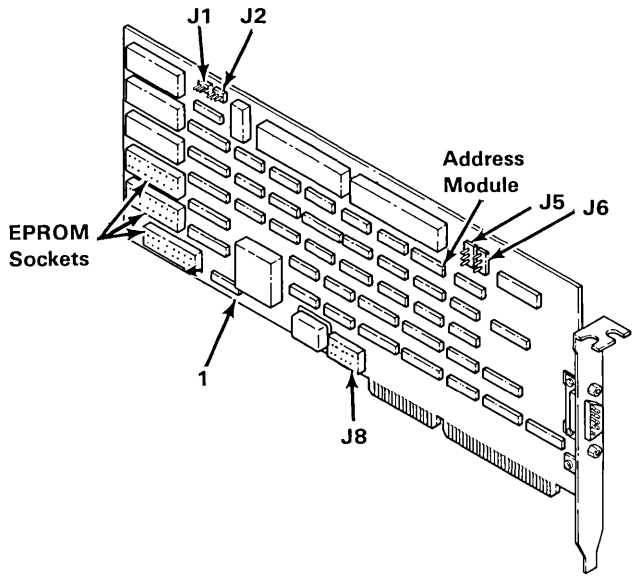


Parts Information (Early Version)



Use the parts list on the following page.

Parts Information (Later Version)



Index Number	Part Number	Description
1	69X8142	IBM Token-Ring Network RT PC Adapter (Order to replace both early and later adapters)
	6339098	IBM Token-Ring Network RT PC Adapter Cable

RT PC Small Computer Systems Interface Adapter

Notes:

1. The RT PC Small Computer Systems Interface Adapter is abbreviated as RT PC SCSI Adapter in this publication.
2. The RT PC SCSI Adapter should not share interrupt level 11 with either of the 4-port asynchronous adapters.

The RT PC SCSI Adapter provides for the attachment of devices that use the Small Computer System Interface (SCSI) bus to the IBM 6150 and 6151 System Units. The RT PC SCSI Adapter uses the I/O channel to communicate with the 32-bit processor and coprocessor.

Specifications

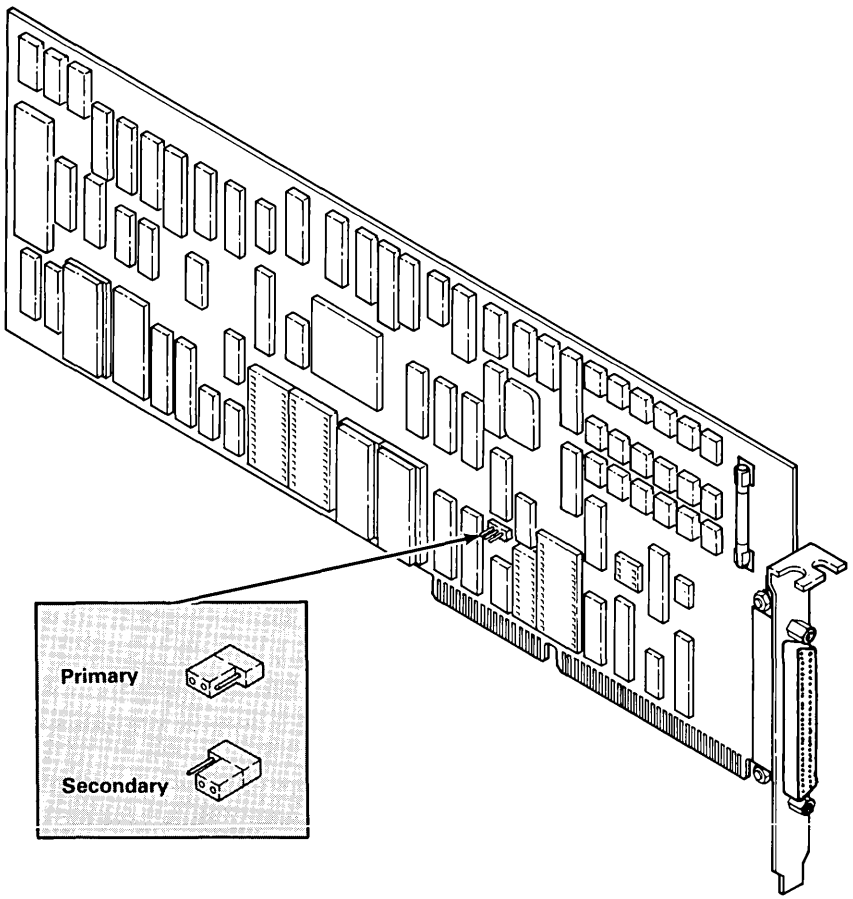
Slot positions	IBM 6150, slots 2, 4, 5, 7 (also slot 8 except with DMA channel 7) IBM 6151, slots 2, 3, 4 (also slot 5 except with DMA channel 7)
I/O addresses	Primary, 0D50 - 0D5F Secondary, 0950 - 095F
DMA Channels	0,1,3,5,6,7 (program controlled)
Interrupt level	11, 12 (both shared, see note 2 above)
Maximum number	2

Removal and Replacement Procedures

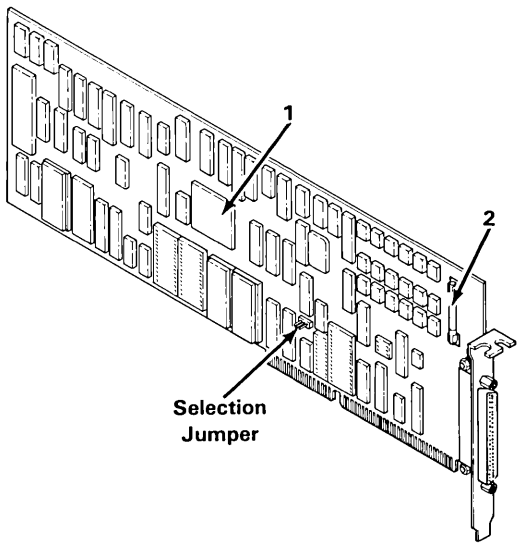
Use the Adapter Removal and Replacement procedures in Section 4.

Jumper Settings

Set the jumper for **Primary** or **Secondary** as shown below.



Parts Information



Index Number	Part Number	Description
1	61X7001	RT PC SCSI Adapter
2	0855253	Fuse, 1.0A 250V
	79X3467	RT PC SCSI Adapter Cable
	79X3469	RT PC SCSI Device-to-Device Cable
	79X3795	Terminator

RT PC Streaming Tape Drive Adapter

The RT PC Streaming Tape Drive Adapter attaches the IBM 6157 Streaming Tape Drive to the IBM 6150 System Unit. The Streaming Tape Drive Adapter uses the I/O channel to communicate with the 32-bit processor and coprocessor.

Specifications

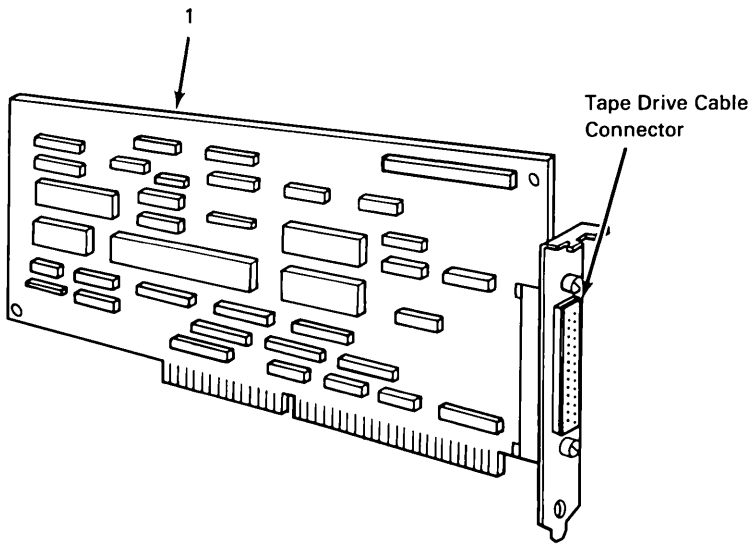
Slot positions	2, 4, 5, 7, 8
I/O addresses	01E8 - 01EF
Interrupt level	12
Maximum number	1

Removal and Replacement Procedures

Use the "Adapter Removal" on page 4-18 procedure for removal.

Use the "Adapter Replacement" on page 4-19 procedure for replacement.

Parts Information



Index Number	Part Number	Description
1	6299222	RT PC Streaming Tape Drive Adapter

RT PC 5080 Peripheral Adapter

The RT PC 5080 Peripheral Adapter provides the hardware to connect the IBM 5085 Dials Feature and the IBM 5085 Lighted Program Function Keyboard Feature to the IBM 6150 System Unit. The RT PC 5080 Peripheral Adapter uses the I/O channel to communicate with the 32-bit processor or coprocessor.

Specifications

Slot positions	2, 4, 5, 7, 8
I/O addresses	4230 - 424F
Interrupt levels	11 (shared)
Maximum number	1

Removal and Replacement Procedures

Use the "Adapter Removal" on page 4-18 procedure for removal.

Use the "Adapter Replacement" on page 4-19 procedure for replacement.

Switch Settings

Use the drawing on the next page to locate the switch banks, then set the interrupt level and the address switches as shown.

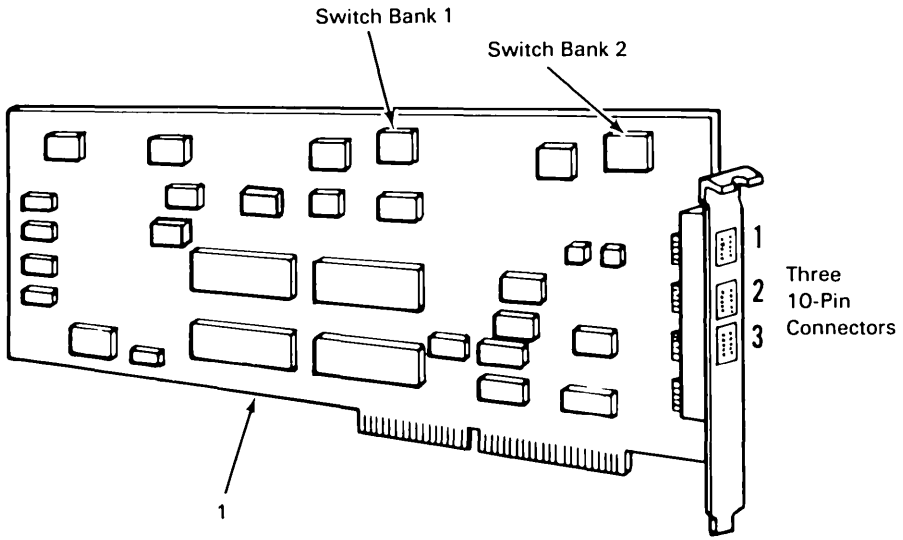
Switch Bank 1 - Interrupt Level Selection

	11	
	Off	**On**
Switch 1	X	
Switch 2	X	
Switch 3		X

Switch Bank 2 - Address Range Selection

	4	
	Off	**On**
Switch 1	X	
Switch 2	X	
Switch 3	X	
Switch 4		X
Switch 5	X	
Switch 6	X	
Switch 7	X	
Switch 8	X	

Parts Information



Index Number	Part Number	Description
1	6487562 6487563	RT PC 5080 Peripheral Adapter RT PC 5080 Peripheral Adapter Cable Kit

RT PC 5080 Attachment Adapter

The RT PC 5080 Attachment Adapter is used to connect the IBM 6150 System Unit to the IBM 5085 Graphics Processor.

Specifications

Slot positions	2, 4, 5, 7, 8
I/O addresses	0E90 - 0E9F
Memory addresses	E80000 - E9FFFF
DMA channel	6
Interrupt level	10
Maximum number	1

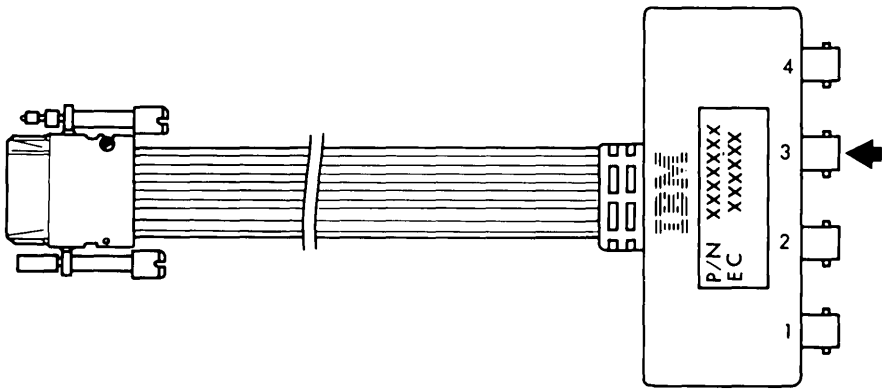
Removal Procedure

1. Look at coaxial cable position 3 on the RT PC 5080 Attachment Adapter Cable. If position 3 has a cable attached, this system unit is attached to an IBM 5080 system.

2. If the system unit is attached to an IBM 5080 system, be sure the IBM 5088 has stopped communications on this link before proceeding or removing power from this system unit. If needed, get assistance.

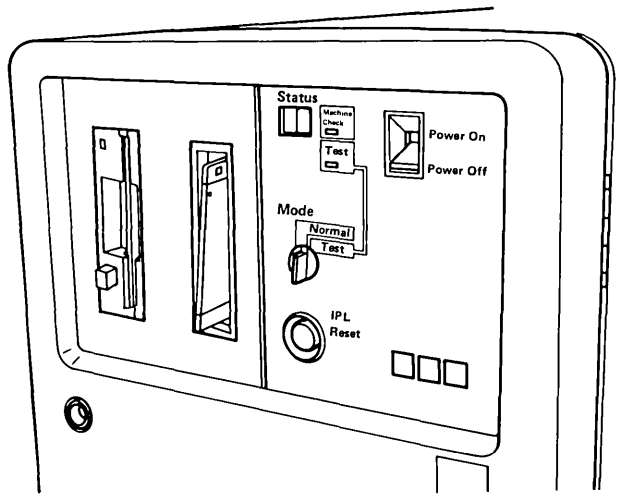
3. Set the power switch on the IBM 5085 to Off.

4. Remove the adapter. If needed, see page 4-18.



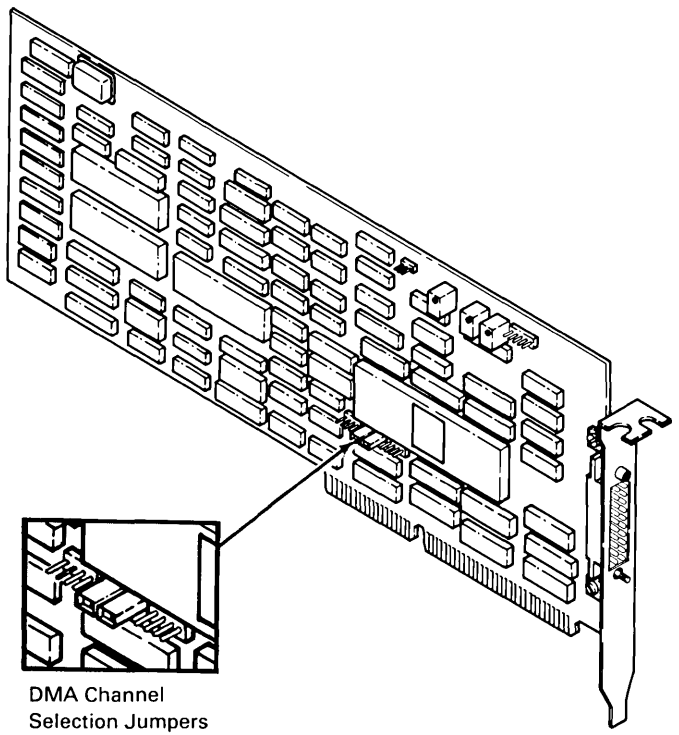
Replacement Procedure

1. Install the adapter. If needed, see page 4-19.
2. Set the power switch on the IBM 5085 to On.
3. Run the System Checkout.

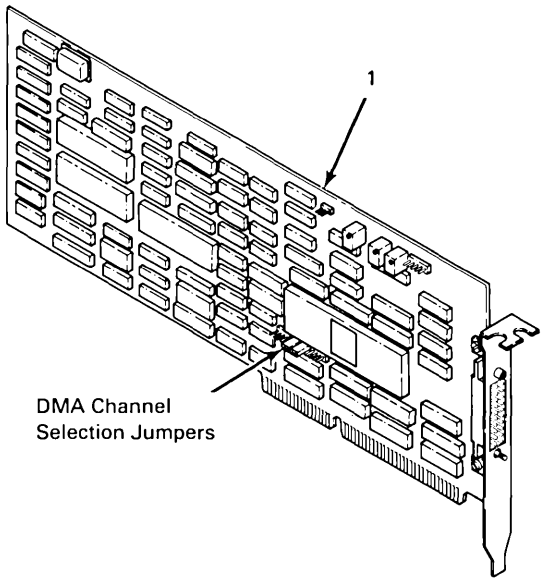


Jumper Settings

Use the diagram below to set the jumpers.



Parts Information



Index Number	Part Number	Description
1	6247851	RT PC 5080 Attachment Adapter
	6247861	RT PC 5080 Attachment Adapter Cable Kit
	6246330	Terminator, serial interface

RT PC S/370 Host Interface Adapter

The RT PC S/370 Host Interface Adapter is used to connect the IBM 6150 System Unit to the IBM 5088 Graphics Controller.

The RT PC S/370 Attachment Adapter provides the hardware to allow the IBM RT PC System to transfer information to and from the IBM 5088 and then to the host system.

Specifications

Slot positions	IBM 6150 – 2, 4, 5, 7, 8 IBM 6151 – 2, 3, 4, 5
I/O addresses	0E20 – 0E2F
Memory addresses	EA0000 – EBFFFF
DMA channel	5
Interrupt level	10
Bit rate	1M or 2M bits per second (Set by program)
Maximum number	1

Removal Procedure

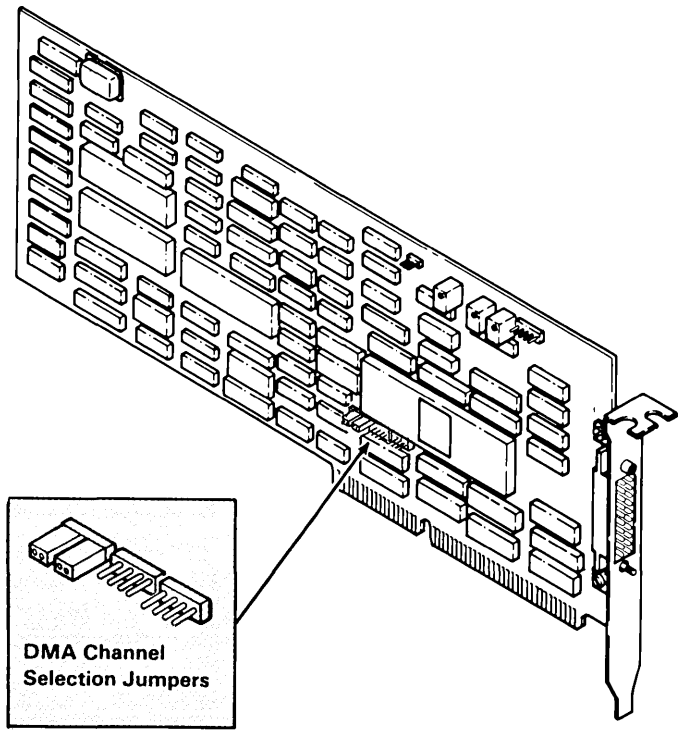
1. Be sure all communications on this link is stopped before proceeding. If needed, get assistance.
2. Use the Adapter Removal Procedure in Section 4 to remove the adapter.

Replacement Procedure

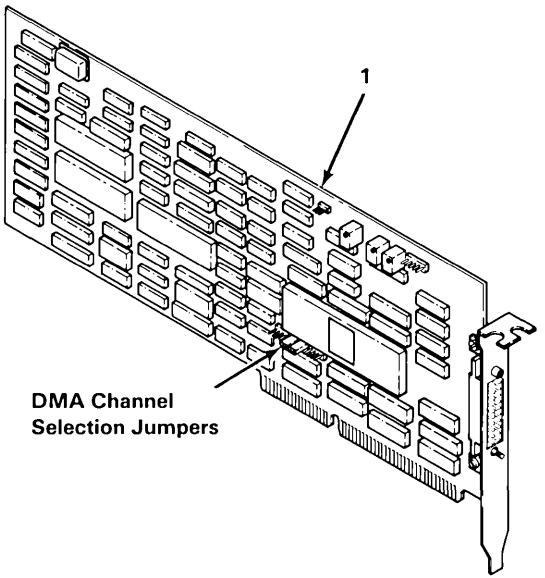
Use the Adapter Replacement Procedure in Section 4 to install the adapter.

Jumper Settings

Use the diagram below to set the DMA channel selection jumpers.



Parts Information



Index Number	Part Number	Description
1	6247891	RT PC S/370 Host Interface Adapter
	6247861	RT PC 5080 Attachment Adapter Cable Kit
	6246330	Terminator, serial interface

Section 10. User Input Devices

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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.

Pages in this section contain a 3-digit product code in the page number to make future updating easier.

Keyboard

The keyboard connects to the KBD (keyboard) connector on the rear of the system unit. The keyboard also contains the system speaker.

When the IBM 5080 Graphics System is connected to the IBM 6150 System Unit, the keyboard attaches to the Peripheral Connection Assembly (PCA) of the IBM 5085 Graphics Processor. The PCA is installed in the base of the IBM 5081 Display. The keyboard/tablet attachment cable connects the PCA on the IBM 5085 to the M (mouse) and KBD (keyboard) connectors on the IBM 6150 System Unit.

When the IBM 5085 is attached, the IBM 5085 Keyboard is used. The IBM 5085 must be On and operational before the keyboard can be switched for use by the IBM 6150 (Alt-Sw Keybd).

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 or from the PCA

Removal Procedure

If the IBM 5085 is attached, use the IBM 5085 maintenance manual for keyboard removal, otherwise do the following steps:

1. Do the "Rear Cover Removal" on page 4-12.

2. Pull the keyboard cable connector out from the KBD connector on the system unit.

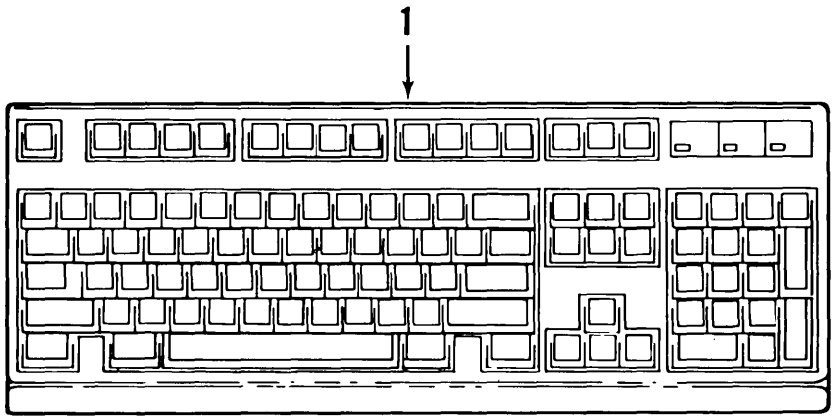
Replacement Procedure

If the IBM 5085 is attached, use the IBM 5085 maintenance manual for replacement, otherwise do the following steps:

1. Push the keyboard cable connector into the KBD connector on the system unit.

2. Do the "Rear Cover Replacement" on page 4-13.

Parts Information



Index Number	Part Number	Description
1	6299238	Keyboard, United States English
1	6299315	Keyboard, United Kingdom English
1	6299316	Keyboard, French
1	6299317	Keyboard, German
1	6299318	Keyboard, Spanish
1	6299319	Keyboard, Italian
1	6487676	Keyboard, Portuguese
1	6487677	Keyboard, Danish
1	6487678	Keyboard, Norwegian
1	6487679	Keyboard, Finnish/Swedish
1	6487680	Keyboard, Belgian-French/Dutch
1	6487681	Keyboard, Swiss German/French
1	6487682	Keyboard, Canadian-French
		Note: If the system is attached to an IBM 5085, use the IBM 5085 parts information.
	6247861	IBM 5085 Keyboard Attachment kit - includes two cables, a terminator, diskettes, and documentation

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

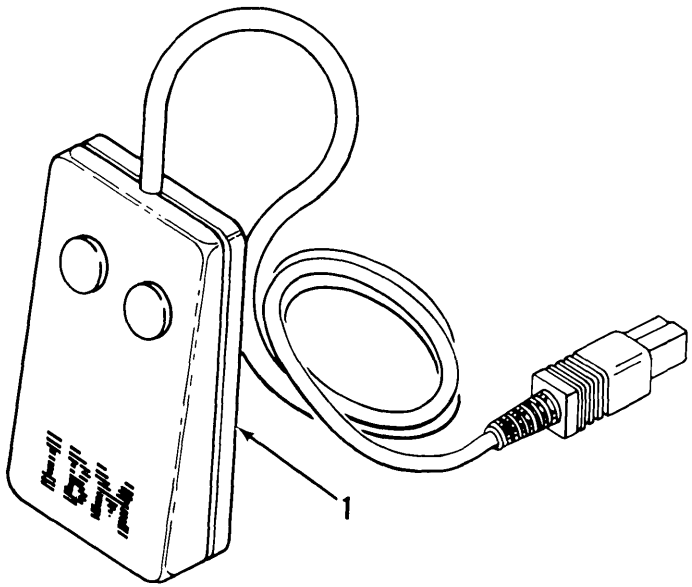
Removal Procedure

1. Do the "Rear Cover Removal" on page 4-12.
2. Pull the mouse cable connector out from the M connector on the system unit.

Replacement Procedure

1. Push the mouse cable connector into the M connector on the system unit.
2. Do the "Rear Cover Replacement" on page 4-13.

Parts Information



Index Number	Part Number	Description
1	6299239	Mouse

IBM 5083 Tablet

The IBM 5083 Tablet is a thin flat-surfaced unit used to input pointing instructions to the system. Either the ***Cursor*** or the ***Stylus*** attaches to the Tablet.

The Cursor is a mouse-like device with four buttons. The Stylus is a pen-like device. When the Cursor or the Stylus is moved on the surface of the Tablet, the Tablet provides their location to the software. When the buttons on the Cursor are pressed, or when the Stylus is pressed, the Tablet provides an identifying code to the software.

On models 1, 11, and 12 of the IBM 5083 Tablet, the RT PC 5083 Tablet Cable Kit is required to attach the IBM 5083 Tablet to the IBM 6150 or IBM 6151 System Unit. The cable from the RT PC 5083 Tablet Cable Kit attaches the IBM 5083 to the M connector on the rear of the system unit. The RT PC 5083 Tablet Cable Kit also includes a clamping device that encloses the connectors.

On models 11A and 12A of the IBM 5083 Tablet, a single cable attaches the tablet to the M connector on the IBM 6150 or IBM 6151 System Unit.

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

Specifications

Number of buttons	Cursor, 4
Power	From the adapter
Adapter	RT PC 5080 Peripheral Adapter

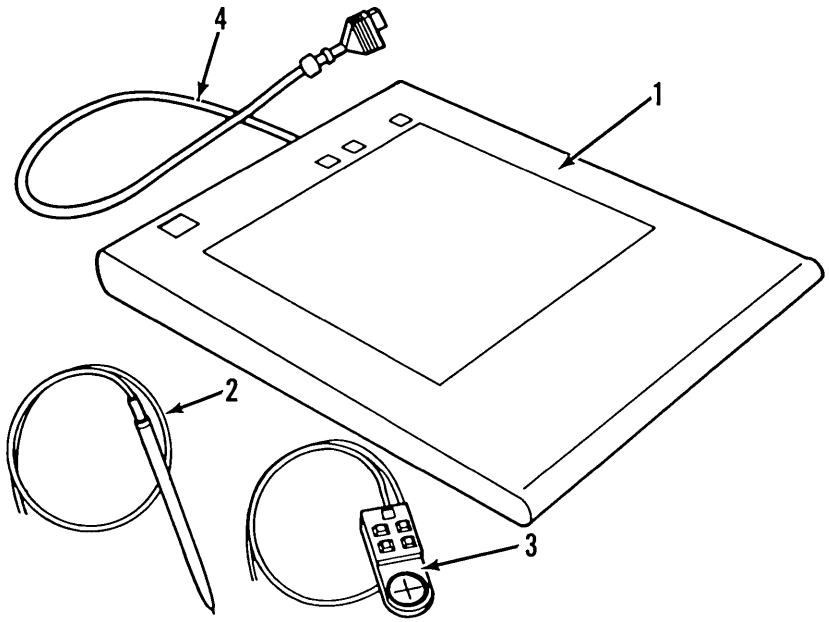
Removal Procedure

1. Set the power switch on the system unit to Off.
2. Do the Rear Cover Removal procedure.
3. Disconnect the cable from the M connector on the rear of the system unit.
4. If present, remove the clamping device and disconnect the IBM 5083 Tablet cable.
5. Disconnect the Stylus or Cursor from the front of the IBM 5083.

Replacement Procedure

1. Connect the Cursor or Stylus into the connector on the front of the IBM 5083.
2. If present, connect the IBM 5083 cable connector to the cable included in the Tablet Cable Kit and install the clamping device.
3. Connect that cable to the M connector on the rear of the system unit.
4. Do the Rear Cover Replacement procedure.
5. Set the power switch on the system unit to On.

Parts Information



Index Number	Part Number	Description
1	6248426	IBM 5083 Model 1 Tablet
1	6248514	IBM 5083 Model 11 Tablet
1	6248513	IBM 5083 Model 12 Tablet
1	6248516	IBM 5083 Model 11A Tablet
1	6248515	IBM 5083 Model 12A Tablet
2	6248427	Stylus for the Model 1
2	6248522	Stylus for the Models 11, 11A, 12, 12A
3	6248428	Cursor for the Model 1
3	6248523	Cursor for the Models 11, 11A, 12, 12A
	6487587	RT PC 5083 Tablet Cable Kit for Models 1, 11, 12
4	6248524	Cable, IBM RT PC to IBM 5083, Models 11A and 12A

IBM 5085 Dials Feature

The IBM 5085 Dials Feature is a desktop unit with eight dials arranged in two rows of four dials. The Dials Feature is used to input analog positional information. The dials can turn completely around without any stops. The software uses the information provided by the Dials Feature.

The RT PC 5080 Peripheral Cable Kit is required to attach the Dials Feature to the IBM 6150 System Unit. The cable from the Peripheral Cable Kit attaches to the end of the Dials Feature cable. The Peripheral Cable Kit also includes a clamping device that encloses the connectors.

Specifications

Number of dials	8
Power	From the adapter
Adapter	RT PC 5080 Peripheral Adapter

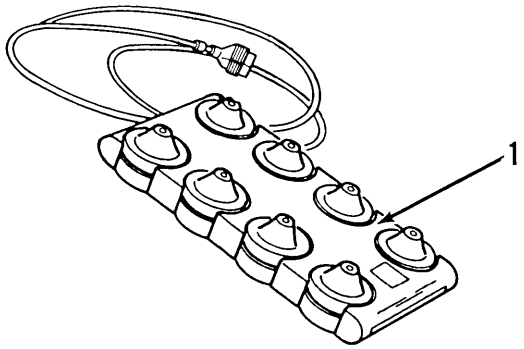
Removal Procedure

1. Set the power switch on the system unit to Off.
2. Do the "Rear Cover Removal" on page 4-12.
3. Disconnect the cable to the IBM 5085 Dials Feature from the RT PC 5080 Peripheral Adapter.
4. Remove the clamping device and disconnect the Dials Feature cable.

Replacement Procedure

1. Connect the Dials Feature cable connector to the cable Peripheral Cable Kit and install the clamping device.
2. Connect the cable to the RT PC 5080 Peripheral Adapter.
3. Do the "Rear Cover Replacement" on page 4-13.
4. Set the power switch on the system unit to On.

Parts Information



Index Number	Part Number	Description
1	6248436 6487563	IBM 5085 Dials Feature RT PC 5080 Peripheral Cable

IBM 5085 Lighted Program Function Keyboard Feature

The IBM 5085 Lighted Program Function Keyboard (LPFK) Feature provides additional function keys. The LPFK Feature keys can be lighted individually by the software to indicate which keys are active. The function of each key is determined by the program using the LPFK.

The RT PC 5080 Peripheral Cable Kit is required to attach the LPFK Feature to the IBM 6150 System Unit. The cable from the Peripheral Cable Kit attaches to the end of the LPFK Feature cable. The Peripheral Cable Kit also includes a clamping device that encloses the connectors.

Specifications

Number of keys	32
Power	From the adapter
Adapter	RT PC 5080 Peripheral Adapter

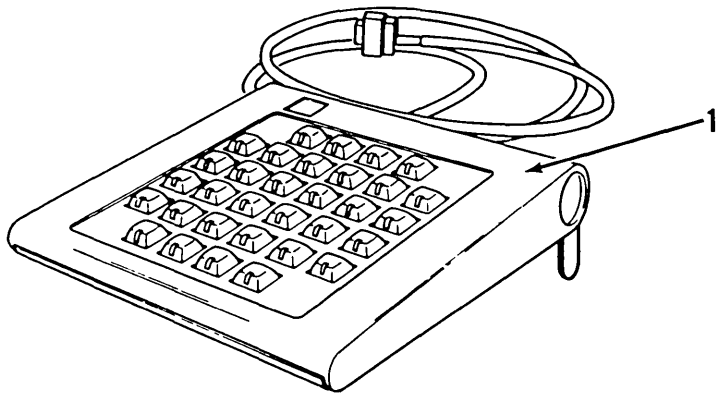
Removal Procedure

1. Set the power switch on the system unit to Off.
2. Do the "Rear Cover Removal" on page 4-12.
3. Disconnect the cable to the IBM 5085 LPFK Feature from the RT PC 5080 Peripheral Adapter.
4. Remove the clamping device and disconnect the LPFK Feature Cable.

Replacement Procedure

1. Connect the LPFK Feature cable connector to the cable from Peripheral Cable Kit and install the clamping device.
2. Connect the cable to the adapter.
3. Do the "Rear Cover Replacement" on page 4-13.
4. Set the power switch on the system unit to On.

Parts Information



Index Number	Part Number	Description
1	6246799 6487563	IBM 5085 LPFK Feature RT PC 5080 Peripheral Cable

Section 11. Displays

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About this Section

This section contains information about the IBM Displays attached to the IBM 6150 System Unit. Use the contents list on the preceding page to find information about your display.

Pages in this section contain a 3-digit product code in the page number to make future updating easier.

IBM 5081 Color Graphics Display

Note: The information in this publication is for Models 16 and 19 of the IBM 5081. If you have another model of the IBM 5081, see the Maintenance Information Manual for your model.

The IBM 5081 Color Graphics Display is the same display used on the IBM 5080 Graphics System.

Internal parts of the IBM 5081 Color Graphics Display are field replaceable. Refer to the Maintenance Information Manual that was shipped with your display, for part numbers, removal procedures, and replacement procedures.

Specifications

Input voltage	Low voltage, 100 - 120 V ac High Voltage, 220 - 240 V ac
Input current	4.0 Amperes
Power frequency	60 Hz
Adapters	IBM Megapel Display Adapter

Removal Procedure

Use the Attached Device Removal procedure in Section 4.

Replacement Procedure

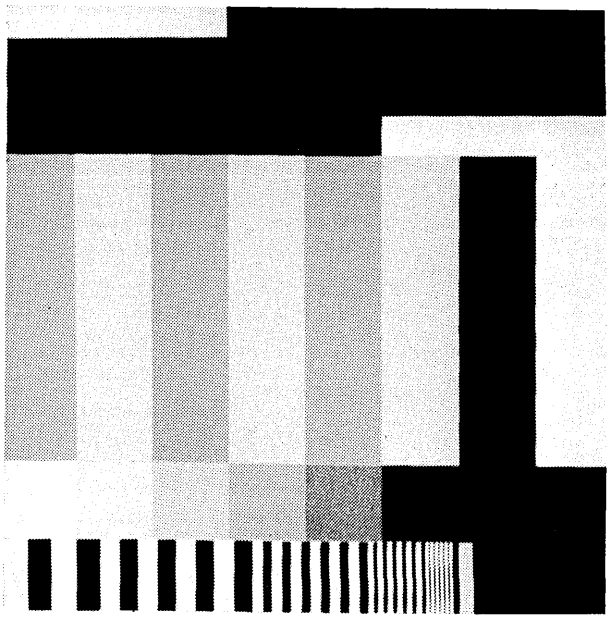
Use the Attached Device Replacement procedure in Section 4.

Test Patterns

You will be directed when to use the following Test Patterns while running the Display Checkout program.

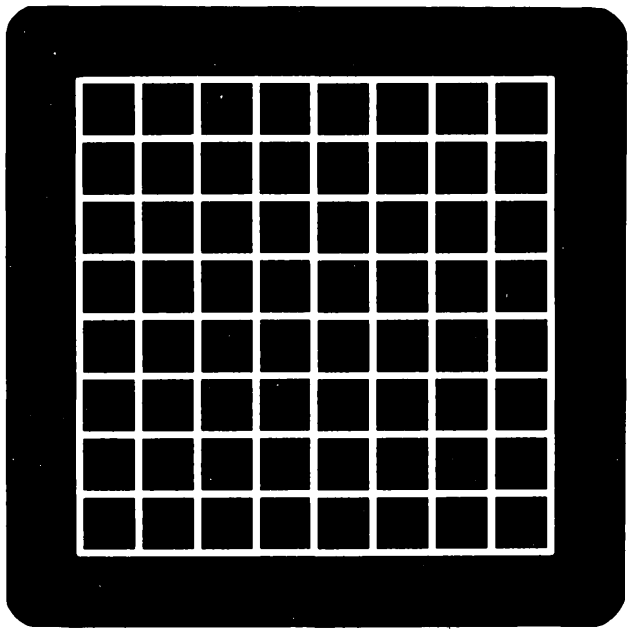
Combination Color Bar Pattern

Left to right, the color bars are green, yellow, red, magenta, blue, cyan, black, and white.



Crosshatch or Grid Pattern

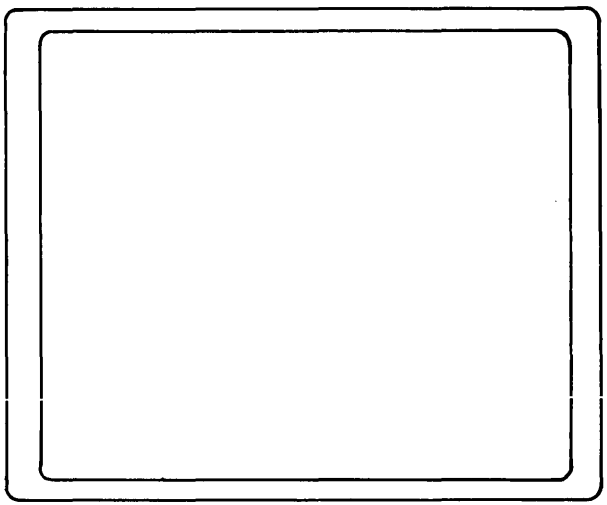
This test pattern is used to check the convergence and the alignment on the IBM 5081. Use the alignment mask shipped with the IBM 5081 with this test pattern.



Flat Field Test Patterns

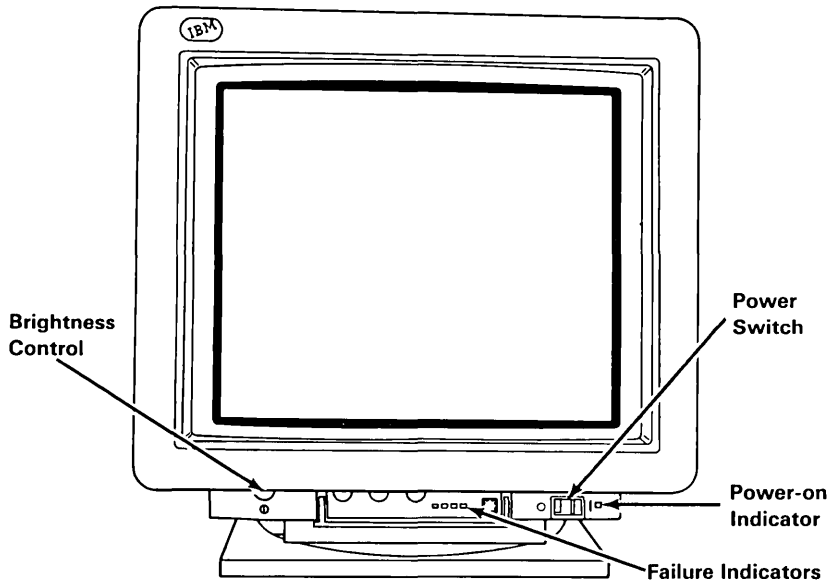
The following types of Flat Field Test Patterns are available using the Display Test procedure:

White Flat Field	The red, blue, and green colors are at their full intensity to check color purity.
Black Flat Field	All colors are off.
Red Flat Field	The red color is on at full intensity.
Green Flat Field	The green color is on at full intensity.
Blue Flat Field	The blue color is on at full intensity.



Parts Information

For the part numbers and descriptions, see the Maintenance Information Manual that was shipped with the IBM 5081 Color Graphics Display.



IBM 5151 Personal Computer Display

The IBM 5151 Personal Computer Display 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.

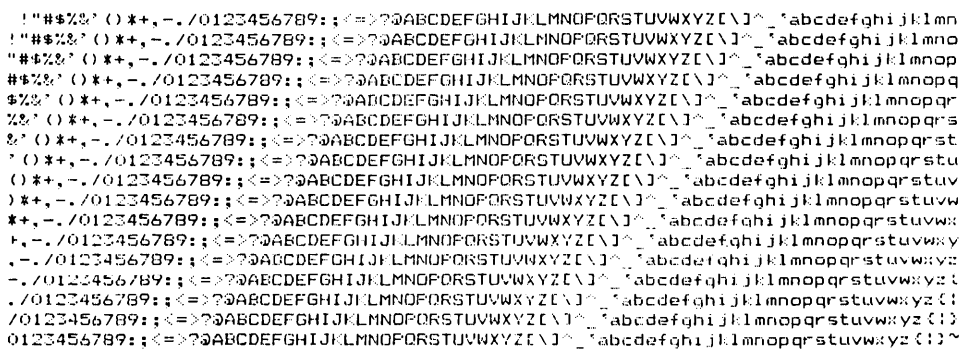
Use the "Attached Device Replacement" on page 4-21 procedure for replacement.

Test Patterns

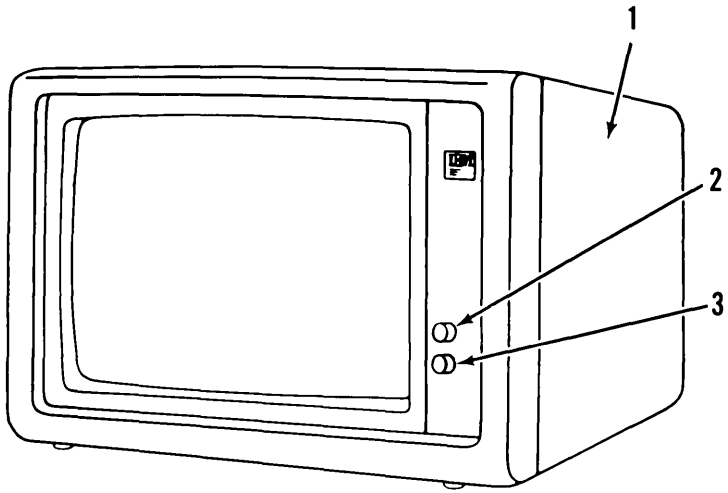
Use the following Test Patterns when you are running the display checkout program.

Test Pattern 1

Test Pattern 2



Parts Information



Index Number	Part Number	Description
1	8529171	IBM 5151 display, low voltage
1	8529209	IBM 5151 display, 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

IBM 5154 Enhanced Color Display

The IBM 5154 Enhanced Color Display 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	IBM PC Enhanced Graphics Adapter

Removal and Replacement Procedures

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

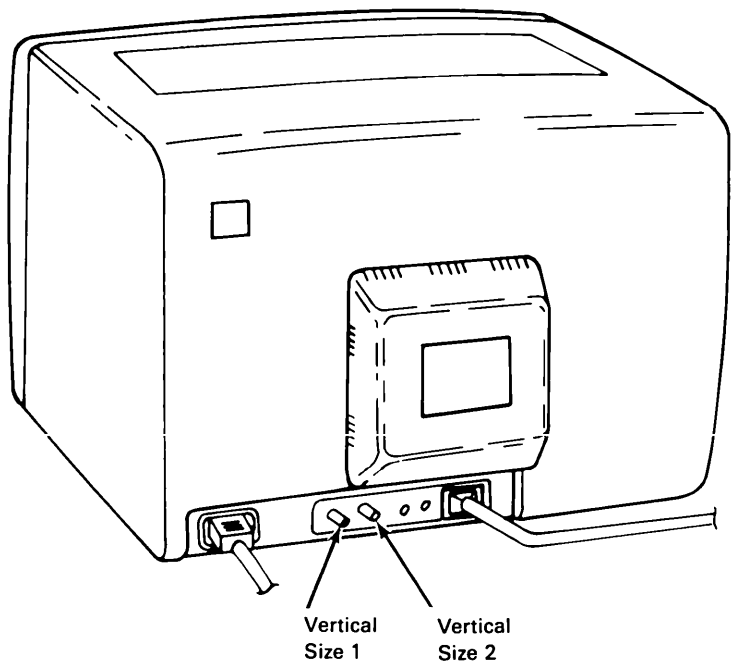
Use the "Attached Device Replacement" on page 4-21 procedure for replacement.

Adjustments

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

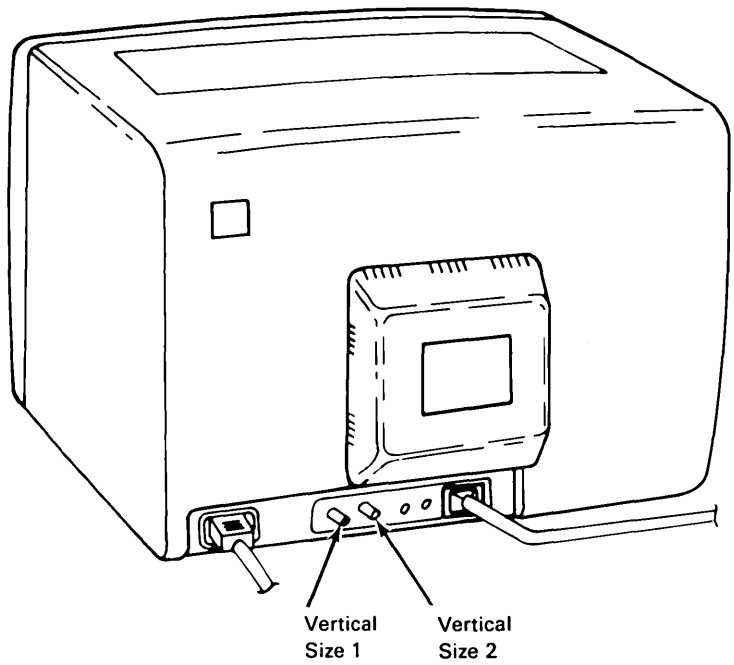
Vertical Size 1

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 IBM PC 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.

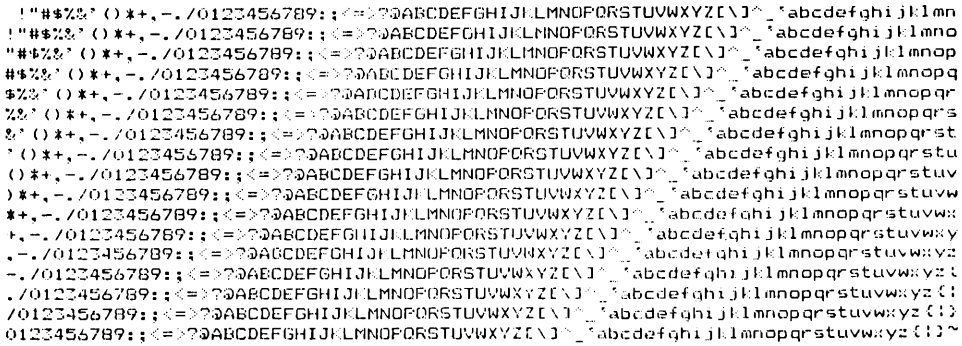


Test Patterns

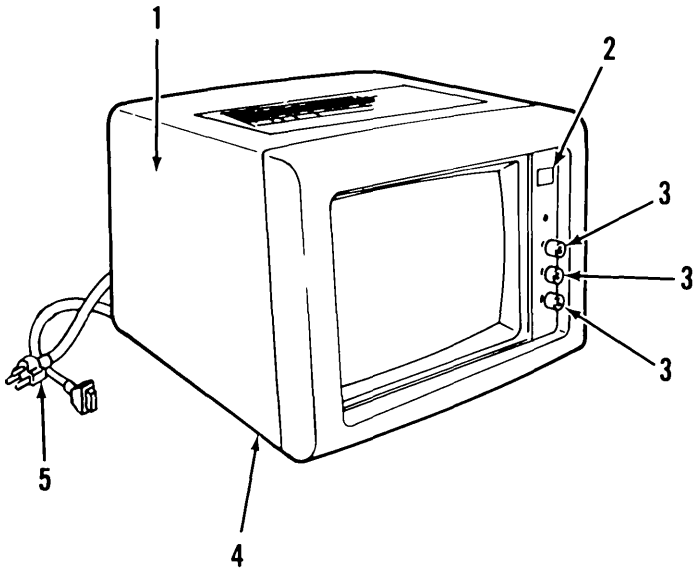
Use the following Test Patterns when you are running the display checkout program.

Test Pattern 1

Test Pattern 2



Parts Information



Index Number	Part Number	Description
1	6321035	IBM 5154 display, Model 001, low voltage
1	6321049	IBM 5154 display, Model 002, high voltage, Northern Hemisphere
1	6321036	IBM 5154 display, Model 003, high voltage, Southern Hemisphere
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

IBM 6153 Advanced Monochrome Graphics Display

The IBM 6153 Advanced Monochrome Graphics Display displays black characters on a white background.

The display is a single field-replaceable unit.

The IBM 6153 display 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

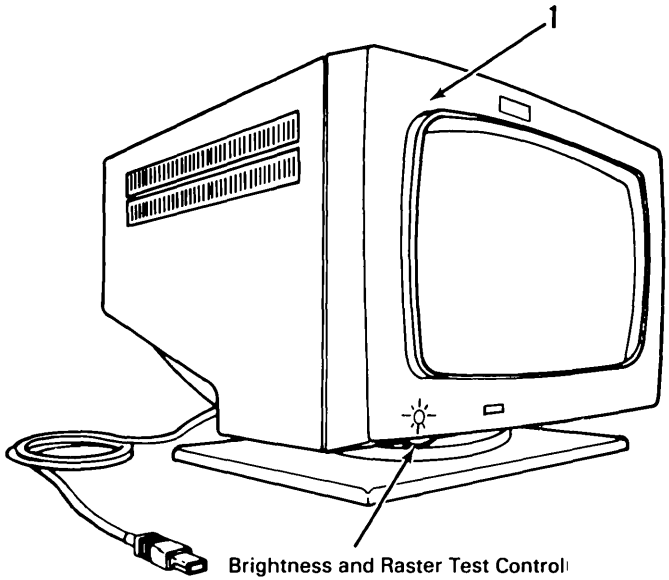
Input voltage	Low voltage, 90 - 137 V ac High Voltage, 180 - 259 V ac
Power frequency	48 - 62 Hz
Adapter	RT PC Advanced Monochrome Graphics Display Adapter

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	IBM 6153 display, low voltage
1	6299241	IBM 6153 display, high voltage

IBM 6154 Advanced Color Display

The IBM 6154 Advanced Color Display is a color graphics display.

The internal parts of the display are not field replaceable.

Specifications

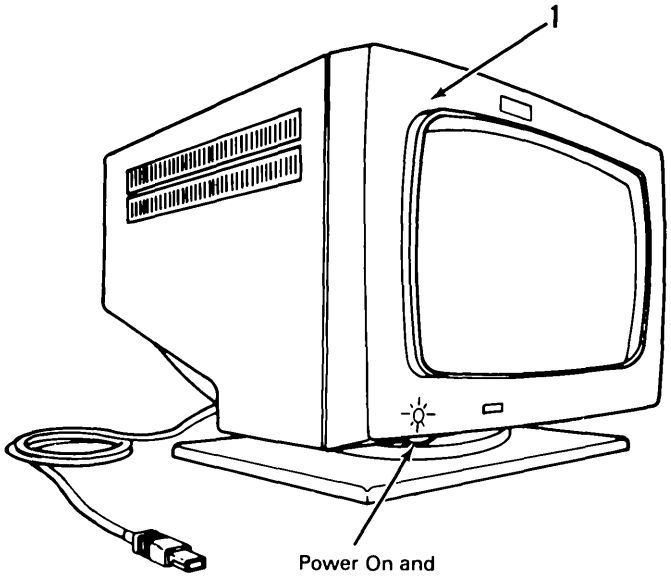
Input voltage	Low voltage, 90 - 137 V ac High Voltage, 190 - 259 V ac
Power frequency	48 - 62 Hz
Adapters	RT PC Advanced Color Display Adapter

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	6848113	IBM 6154 display, low voltage group 1
1	6848114	IBM 6154 display, low voltage group 2
1	6848115	IBM 6154 display, low voltage group 3
1	6848116	IBM 6154 display, high voltage group 1
1	6848117	IBM 6154 display, high voltage group 2
1	6848118	IBM 6154 display, high voltage group 3
1	6848119	IBM 6154 display, high voltage group 4
		Power cable, see Section 5.

IBM 6155 Extended Monochrome Graphics Display

The IBM 6155 Extended Monochrome Graphics Display displays black characters on a white background.

The display is a single field-replaceable unit.

Specifications

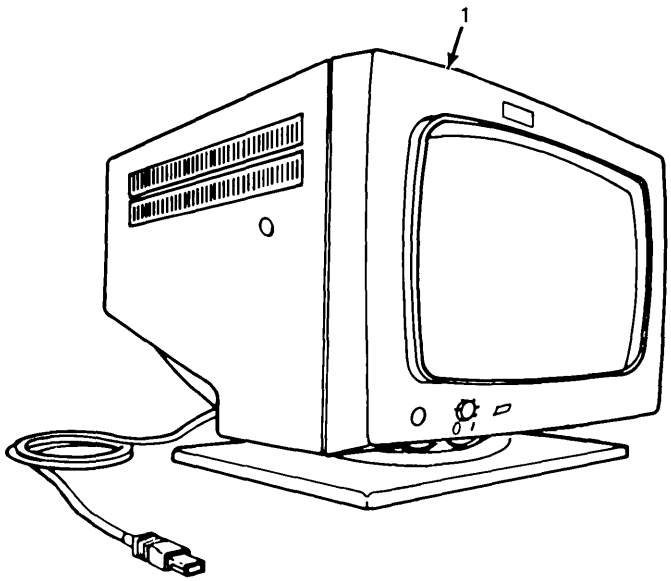
Input voltage	Low voltage, 90 - 137 V ac High Voltage, 180 - 259 V ac
Power frequency	48 - 62 Hz
Adapter	RT PC Extended Monochrome Graphics Display Adapter

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	6848215	IBM 6155 display, low voltage
1	6848216	IBM 6155 display, high voltage
		Power cable, see Section 5.

Section 12. Tape Drive

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IBM 6157 Streaming Tape Drive 12-170-1
Specifications 12-170-1
Removal and Replacement Procedures 12-170-1
Tape Cartridge 12-170-2
Parts Information 12-170-3

About this Section

This section contains information about the IBM 6157 Streaming Tape Drive used by the IBM 6150 System Unit.

Pages in this section contain a 3-digit product code in the page number to make future updating easier.

IBM 6157 Streaming Tape Drive

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

Specifications

Tape cartridges	3M DC300XLP, DEI 400442, DEI 402555, or an equivalent cartridge
Input voltage	U.S., 90 - 137 V ac WT low voltage, 90 - 137 V ac WT high voltage, 180 - 259 V ac
Maximum number	1
Adapter	RT PC Streaming Tape Drive Adapter

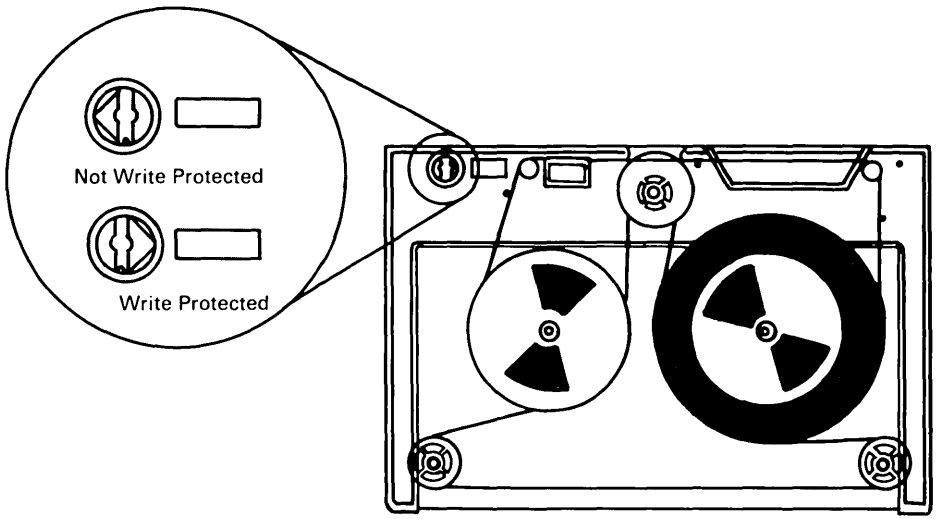
Removal and Replacement Procedures

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

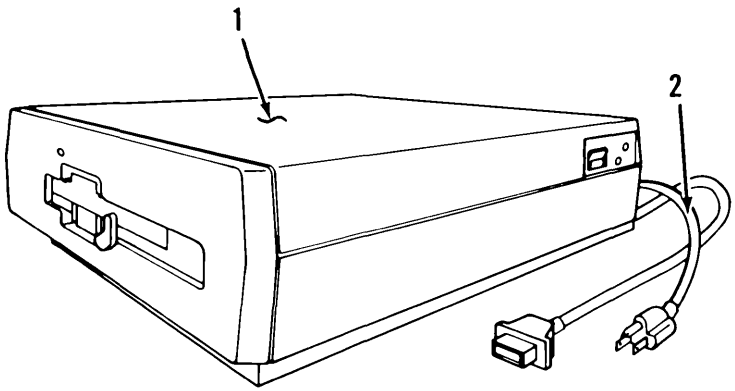
Use the "Attached Device Replacement" on page 4-21 procedure for replacement.

Tape Cartridge

The tape cartridge shown is typical. The write protect switch positions are shown.



Parts Information



Index Number	Part Number	Description
1	6299237	IBM 6157 tape drive, U.S., WT low voltage
1	6298375	IBM 6157 tape drive, 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
	61X6836	WT cable, ac
	61X6837	WT cable, dc
	61X6838	WT cork pads
	61X6839	WT cover, power switch
	61X6840	WT standoff, short
	61X6841	WT standoff, long
	61X6842	WT screw, fan mounting
	61X6843	WT cover, torroid
	61X6844	WT plate, power supply
	61X6845	WT clamp, signal cable
		-List continues on the next page

Restricted Availability Parts (continued)

Index Number	Part Number	Description of the Restricted Availability Parts
	61X6846	WT strain relief
	61X6847	WT cable tie
	61X6848	WT cable tie (0.625 inch)
	61X6849	WT cable tie (1.25 inch)
	61X6850	WT plate, low voltage U.S.
	61X6851	WT plate, low voltage Singapore
	61X6852	WT plate, high voltage U.S.
	61X6853	WT plate, high voltage Singapore
	61X6854	WT caution label
	61X6855	WT cable shell
	61X6856	WT thumb screw

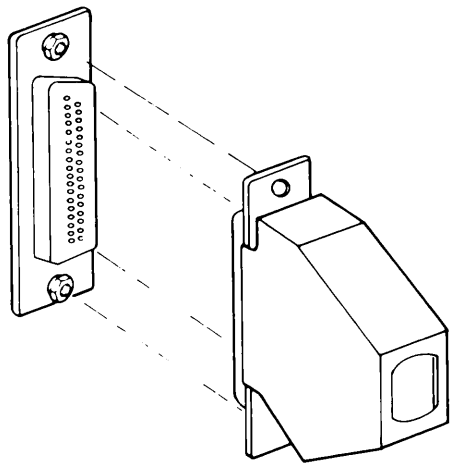
Appendix A. Tool Requirements

This appendix contains the descriptions and part numbers for special tools used to service the IBM 6150 System Unit.

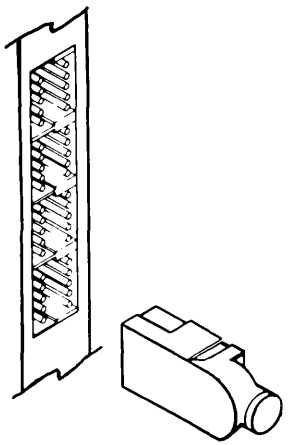
Wrap Plugs for the Service Representative

The wrap plugs used by the service representative are stored in the back of this manual. The wrap plugs used by the customer are stored in the back of the *Problem Determination Guide*. You are directed by the diagnostic program when to install or remove a wrap plug.

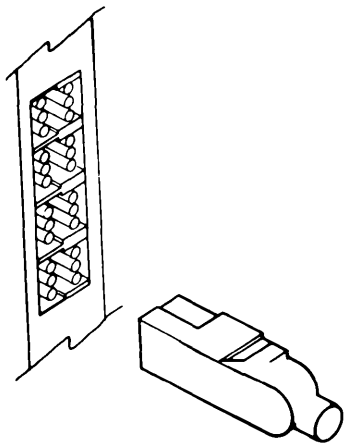
The Printer Adapter Wrap Plug (Part Number 8259228) is not shipped with this manual or the *Problem Determination Guide*. This is the same wrap plug used with the IBM Personal Computer.



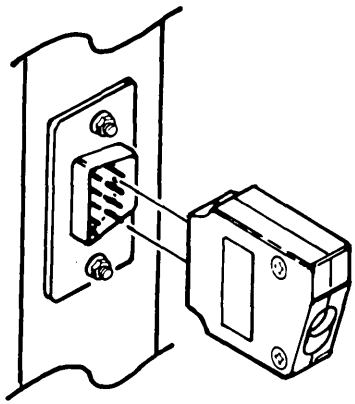
Printer Adapter Wrap Plug (Part Number 8529228)



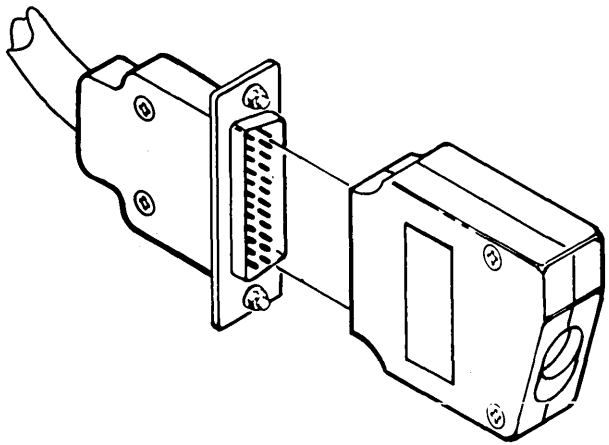
4-Port Asynchronous RS232C Adapter Wrap Plug (Part Number 6298966)



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



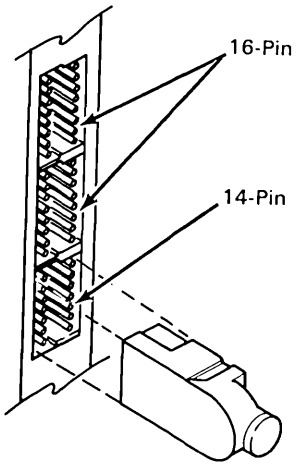
Serial Port Wrap Plug, 9-pin (Part Number 6298965)



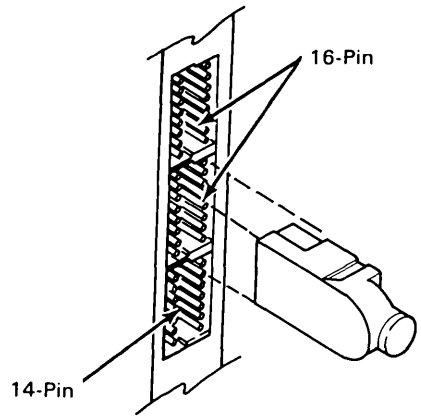
Serial Port Cable Wrap Plug, 25-pin (Part Number 6298964)

Wrap Plugs for the Customer

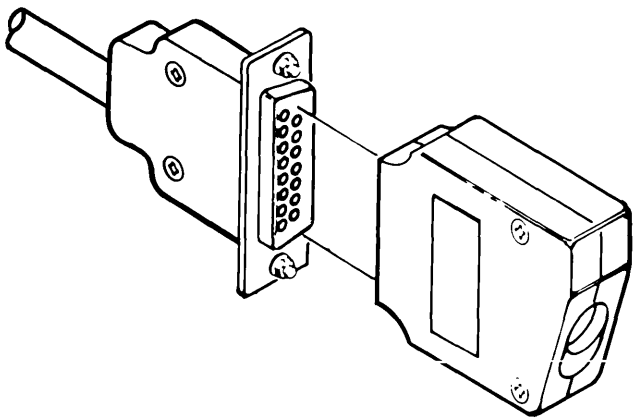
The wrap plugs used by the customer are stored in the back of the *Problem Determination Guide*. You are directed by the diagnostic program when to install or remove a wrap plug.



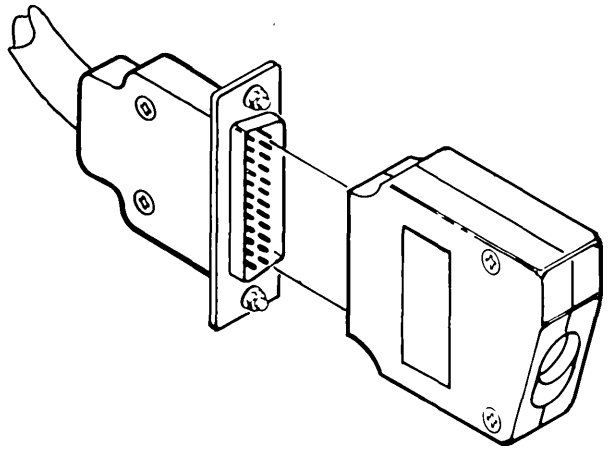
Multiprotocol 14-Pin Wrap Plug (Part Number 6487608)



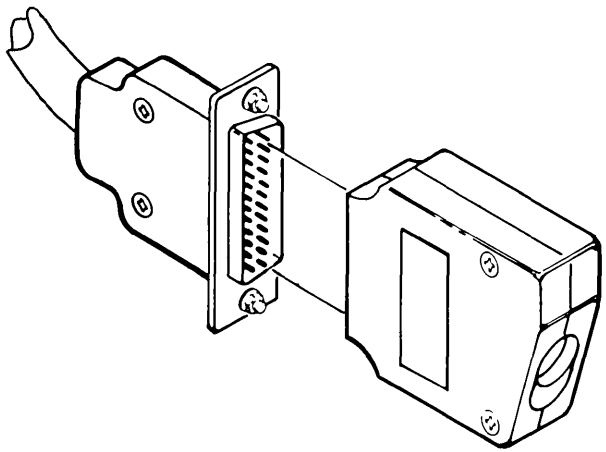
Multiprotocol 16-Pin Wrap Plug (Part Number 6487609)



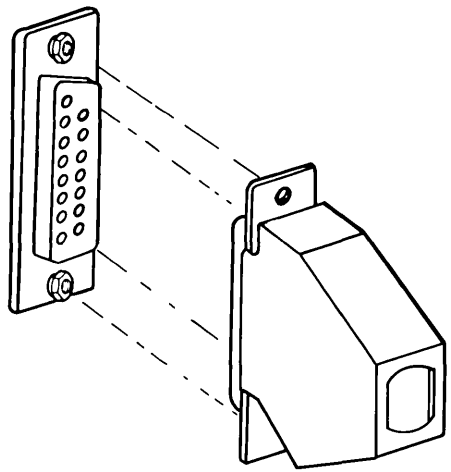
Multiprotocol X.21 15-Pin Cable Wrap Plug (Part Number 6487605)



Multiprotocol RS-232 Cable Wrap Plug (Part Number 6487606)



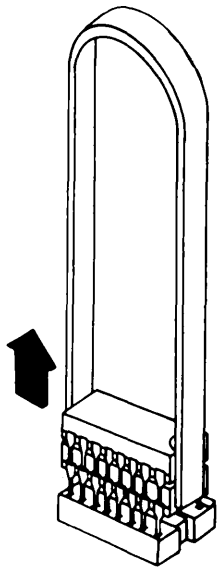
Multiprotocol RS-366 Cable Wrap Plug (Part Number 6487607)



Baseband Adapter Wrap Plug (Part Number 6299189)

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 on the IBM 6150 and IBM 6151 System Units. Use this list to determine the FRU part number or service action each SRA number represents.

SRA Number	Part Number	Description
10x	6299232	System board (IBM 6150)
10x	60X5712	System board, WT (IBM 6150)
10x	6299231	System board (IBM 6151)
12x	6848223	1MB Memory Expansion Option
15x	6299228	2MB Memory Expansion Option
16x	61X6157	4MB Memory Expansion Option
19x	6299220	RT PC Floating-Point Accelerator
1Cx	61X6814	RT PC Advanced Floating-Point Accelerator
1Dx	61X7005	4MB Fast Memory Expansion Option
1Ex	61X7009	8MB Fast Memory Expansion Option
20x	6299226	RT PC AT Coprocessor Option
21x	8286115	AT 512 KB Memory Expansion Option
22x		I/O memory error. Check for nonsupported memory.
23x	8286147	AT Serial/Parallel Adapter
24x	8286127	AT Math Co-Processor module
26x		I/O memory error. Check for nonsupported memory.
28x	6299350	Multiprotocol Adapter
2Bx	6299232	System board (IBM 6150)
2Bx	60X5712	System board, WT (IBM 6150)
2Bx	6299231	System board (IBM 6151)
2Cx	6299232	System board (IBM 6150)

SRA Number	Part Number	Description
2Cx	60X5712	System board, WT (IBM 6150)
2Cx	6299231	System board (IBM 6151)
30x	69X8142	IBM Token-Ring Network RT PC Adapter
31x	8286171	IBM PC Network Adapter
32x	6247851	RT PC 5080 Attachment Adapter
34x	8665792	3278/79 Emulation Adapter
35x	61X6339	4-Port Asynchronous RS-232C Adapter
36x		I/O memory error. Check for nonsupported memory.
37x	8286139	AT 512 KB Memory Expansion Option module
38x	6487562	RT PC 5080 Peripheral Adapter
39x	79X3782	4-Port Asynchronous RS-422A Adapter
3Ax	6247891	IBM S/370 Host Interface Adapter
40x	61X6809	Baseband 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)
45x	6299392	Advanced Color Graphics Display Adapter
47x	6299351	Extended Monochrome Graphics Display Adapter
49x	8529148	IBM Monochrome Display and Printer Adapter
4Ax	6247662	IBM Megapel display processor board
4Bx	6247666	IBM Megapel display controller board
52x	79X3431	AT Fixed-Disk and Diskette Drive Adapter
53x	6299201	Battery
54x	8529171	IBM 5151 Display, low voltage
54x	8529209	IBM 5151 Display, high voltage
58x	6321035	IBM 5154 Display, Model 001, low voltage
58x	6321049	IBM 5154 Display, Model 002, high voltage, Northern Hemisphere
58x	6321036	IBM 5154 Display, Model 003, high voltage, Southern Hemisphere
59x	6848113	IBM 6154 Display, low voltage group 1
59x	6848114	IBM 6154 Display, low voltage group 2

SRA Number	Part Number	Description
59x	6848115	IBM 6154 Display, low voltage group 3
59x	6848116	IBM 6154 Display, high voltage group 1
59x	6848117	IBM 6154 Display, high voltage group 2
59x	6848118	IBM 6154 Display, high voltage group 3
59x	6848119	IBM 6154 Display, high voltage group 4
5Bx	61X7001	RT PC SCSI Adapter
5Cx	0855253	RT PC SCSI Adapter Fuse (1A 250V)
60x	6299240	IBM 6153 Display, low voltage
60x	6299241	IBM 6153 Display, high voltage
61x		IBM 5081 Display, low voltage
61x		IBM 5081 Display, high voltage
62x	6848215	IBM 6155 Display, low voltage
62x	6848216	IBM 6155 Display, high voltage
63x	6453886	Operator panel board
64x	8286130	AT High Capacity Diskette Drive
64x	68X3752	AT High Capacity Diskette Drive, WT
66x	8286131	AT Dual-Sided Diskette Drive (IBM 6150)
66x	68X3753	AT Dual-Sided Diskette Drive, WT (IBM 6150)
70x	61X6942	Fixed-Disk Drive Type R70
74x	6299235	Fixed-Disk Drive Type R40
77x	79X3989	Fixed-Disk Drive Type E70
78x	6299238	Keyboard, United States English
78x	6299315	Keyboard, United Kingdom English
78x	6299316	Keyboard, French
78x	6299317	Keyboard, German
78x	6299318	Keyboard, Spanish
78x	6299319	Keyboard, Italian
78x	6487676	Keyboard, Portuguese
78x	6487677	Keyboard, Danish
78x	6487678	Keyboard, Norwegian
78x	6487679	Keyboard, Finnish/Swedish
78x	6487680	Keyboard, Belgian-French/Dutch
78x	6487681	Keyboard, Swiss German/French

SRA Number	Part Number	Description
78x	6487682	Keyboard, Canadian-French
79x	6299239	Mouse
7Ax	6248436	IBM 5085 Dials Feature
7Bx	6246799	IBM 5085 LPFK Feature
7Cx	6248522	Stylus for Models 11, 11A, 12, 12A
7Dx	6248523	Cursor for Models 11, 11A, 12, 12A
7Ex	6248514	IBM 5083 Model 11 Tablet
7Ex	6248516	IBM 5083 Model 11A Tablet
7Ex	6248524	Cable, IBM 5083 to RT PC
80x	6248513	IBM 5083 Model 12 Tablet
80x	6248515	IBM 5083 Model 12A Tablet
80x	6248524	Cable, IBM 5083 to RT PC
81x	6299237	IBM 6157 tape drive, U.S., WT low voltage
81x	6298375	IBM 6157 tape drive, WT high voltage
82x	61X6351	ESDI Magnetic Media Adapter
84x	79X3766	Processor board
85x	6299222	Streaming Tape Drive Adapter
86x	6848231	Extended ESDI Magnetic Media Adapter
87x	6299485	Keylock
88x	6080446	Power supply, U.S. low voltage (IBM 6150)
88x	6080447	Power supply, WT low voltage (IBM 6150)
88x	6080448	Power supply, WT high voltage (IBM 6150)
88x	6298452	Power supply, U.S. (IBM 6151)
88x	6298454	Power supply, WT low voltage (IBM 6151)
88x	6298453	Power supply, WT high voltage (IBM 6151)
88x	6952300	Power cable, U.S., Venezuela, Canada, Japan, Saudi Arabia
88x	6952301	Power cable, Cook County, Illinois
88x	6952311	Power cable, Australia, New Zealand, Argentina
88x	6952320	Power cable, Northern Europe, Greece, Turkey
88x	6942347	Power cable, South Africa
88x	6952356	Power cable, U.K., Ireland, Hong Kong, Singapore
88x	6952365	Power cable, Switzerland

SRA Number	Part Number	Description
88x	6952374	Power cable, Italy, Chile
88x	6942383	Power cable, Israel
88x	1838574	Power cable, Thailand
8Ax	6248427	Stylus for Model 1
8Bx	6248428	Cursor for Model 1
8Cx	6248426	IBM 5083 Model 1 Tablet
8Dx		Network problem
8Ex	08F3628	Advanced Processor board
8Fx		SCSI bus problem
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
987		POST Error 5c
989		Missing Option
98A		Format fixed disk
98B		Compatability problem
991		Obvious problem
A1x	61X6937	Cable, drive positions A – D (IBM 6150)
A1x	6298359	Power distribution cable (IBM 6150)
A1x	61X6800	Cable, fixed-disk and diskette drive (IBM 6151)
A2x	61X6938	Cable, drive position E (IBM 6150)
A5x		External power cable (from error log entry)
A6x	8286182	Cable, PC Network 7.62m (25 foot)
A6x	8286172	Adapter, PC Network Cable
A6x	8286183	Cable, PC Network 15.24m (50 foot)

SRA Number	Part Number	Description
A6x	8286184	Cable, PC Network 30.48m (100 foot)
A6x	8286185	Cable, PC Network 60.96m (200 foot)
A7x	6298240	RT PC Modem Cable - RS-232C (10 Pin)
A8x	8286170	AT Modem Cable - RS232C/9 Pin
AAx	79X3777	Cable, fixed-disk and diskette drive positions A - E
B1x	6339088	IBM Token-Ring Network RT PC Adapter Cable
B2x	8529214	IBM PC Parallel Printer Cable
B3x	6298963	RT PC Serial Printer Cable (9 Pin)
B4x	6298526	RT PC ASCII Terminal Cable - RS-232C (10 Pin)
B4x	79X3914	RT PC ASCII Terminal Cable RS-232C (10/25M-Pin)
B5x	6298246	RT PC ASCII Terminal Cable - RS-422A (6 Pin), 20 m
B5x	6487640	RT PC ASCII Terminal Cable - RS-422A (6 Pin), 3 m
B6x	6298525	RT PC Serial Printer Cable (10 Pin)
B6x	8286194	AT Serial Adapter Connector (10 inch)
B6x	6848247	RT PC ASCII Terminal Cable (9-Pin)
B7x	6294813	RT PC Modem Cable - RS-232C (16 Pin)
B8x	6294815	RT PC Automatic Calling Cable - RS-366
B9x	6294817	RT PC Modem Cable - X.21
CCx		Software problem
CDx		External power problem (from error log entry)
CEx		DMA channel error (from error log entry)
CFx		I/O channel error (from error log entry)
D1x		Data link problem
D2x		Modem problem
D3x		Modem interface problem (from error log entry)
D6x		Electrostatic discharge problem
D7x		Media problem (from error log entry)
D8x		Autocalling unit interface problem (from error log)
F4x		Unidentified processor board
F6x		Unidentified memory option
F7x		Unidentified drive cable
F8x		Unidentified fixed-disk and diskette drive adapter

SRA Number	Part Number	Description
F9x		See supplemental information
FAx		See supplemental information
FBx		Unidentified fixed-disk drive
FCx		Unidentified diskette drive

Appendix C. Error Log Information

This appendix provides a brief overview of the ***Error Log*** and the associated commands used by the AIX[1] Operating System. Additional information and detailed descriptions are provided in the *AIX Operating System Commands Reference* manual and the software problem determination part of the *Problem Determination Guide.*

The Error Log Information is useful in determining the failing area of the system unit or the software. Where possible, both intermittent and permanent failures are recorded in the Error Log. Intermittent failures of the hardware and software may not be detected by the diagnostic programs.

The **errdemon** command is used to start logging error data in the Error Log.

The **errstop** command is used to stop the logging of error data in the Error Log.

The **errpt** command is used by the AIX Operating System to read the data in the Error Log and display or print a report from that data.

The following pages briefly describe the commands and the reports they produce. See Error Log Command Examples in this appendix for examples of commands.

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1 Trademark of IBM

Error Log Reports

There are two basic types of Error Log Reports. They are the ***Summary Report*** and the ***Detail Report***.

Summary Report

The Summary Report is the default report of the **errpt** command. The Summary Report provides one-line descriptions of each error record or information record stored in the Error Log. The Summary Report can be limited to specific data such as; permanent errors or hardware errors. Examples of the commands to produce these reports are given under Error Log Command Examples in this appendix.

The following information is provided in a Summary Report:

Date/Time Provides the date and time the entry was logged.

Class Provides the class of the error such as; hardware or software.

Subclass Provides additional information about the error class such as; the device or component that caused the error.

Type Provides information about the severity of the error such as; permanent, or temporary.

Device For hardware errors the device is identified, if possible.

Cause If the cause for the error can be determined, the cause is listed here.

Detail Report

The Detail Report provides detail information on each error recorded in the Error Log. In addition the the information provided on the Summary Report, the Detail Report provides the following hardware service related information.

Service Request Number	Provides the Service Request Number (SRN) for the error. This number has from one to four Service Repair Action (SRA) numbers in it. Each SRA corresponds to a FRU. The SRA numbers are listed in the most to least likely failure order.
Probable Cause	Provides a description of the most likely cause of the failure.
User Action	Lists actions that the user can do to help isolate the failure.

The Error Report Command

The AIX Operating System recognizes the **errpt** command to display or print an error report. The **errpt** command is entered when the **#** or **$** prompt is displayed by the AIX Operating System.

The **errpt** command has several extensions to define the type report you want, type errors included, time period, and other limits on the data included.

The extensions described here are for service related information. If you need more information, see Error Log Command Examples in this appendix or see the *AIX Operating System Commands Reference* manual.

Use the following format and explanations as an example.

errpt ff ff ccc,ttt ffMMddhhmmyy ffMMddhhmmyy | ddddd

ff The flags are used to select the type report and the limits desired.

- **-a** Produces a detail report.
- **-d** Limits the report to a certain class (**ccc**) and type (**ttt**) of error. Separate the class and type with a comma.
- **-e** Include entries with earlier date and time.
- **-n** Include only entries from a specific node.
- **-s** Include entries with later date and time.

ccc The class of errors included in the report.

- **h00** All hardware errors. These errors are normally caused by the hardware or media.
- **s00** All software errors. These errors are normally caused by the software programs.
- **i00** All IPL/shutdown errors. These are not errors but provide data on the date and time a shutdown or IPL occurred.

ttt The type errors included in the report.

- **t01** All permanent errors. Permanent errors are errors that occur each time the operation is attempted.
- **t02** All temporary errors. Temporary errors are errors that do not prevent an operation from completing.
- **t03** Information only. Information entries in the error log provide data about an event.
- **t04** Counters. Counter errors are transient errors that exceed the threshold count for that error.

MMddhhmmyy Sets the date and time limits to be included in the error report. This allows you to print only errors that occurred before or after a certain date and time. See Error Log Command Examples for the use of this parameter.

- **MM** Month
- **dd** Day
- **hh** Hour
- **mm** Minute
- **yy** Year

dddd Specifies the device to print or display the report on.

- **pg** Display the selected report one page at a time. Press the **Enter** key to display the next page. An EOF is displayed at the end of the report. Press the **Enter** key to return to the AIX Operating System.
- **print** Print the selected report. The report prints on the printer assigned as the default printer for the AIX Operating System.

Error Log Command Examples

The following Error Log Command Examples illustrate some of the common reports. For details see the *AIX Operating System Commands Reference* manual. All commands can be issued when the # prompt is displayed.

The following example turns the Error Log On.

```
/usr/lib/errdemon
```

The following example turns the Error Log Off.

```
errstop
```

The following example displays a summary report of the complete error log, one page at a time.

```
errpt | pg
```

The following example prints a summary report of the complete error log.

```
errpt | print
```

The following example prints a detailed report of the permanent hardware errors that occurred between 10:05 AM June 1, 1985 and 2:25 PM June 3, 1985.

```
errpt -a -d h00,t01 -s0601100585 -e0603142585 | print
```

The following example displays a summary report of all the software errors in the error log, one page at a time.

```
errpt -d s00 | pg
```

The following examples delete the error log files.

```
rm -f /usr/adm/ras/errfile.0
```

```
rm -f /usr/adm/ras/errfile.1
```

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.

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 wich determines how data is recorded.

FRU. Field-replaceable unit.

hardware. The equipment, as opposed to the programming, of a computer system.

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 transminssion.. (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

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.

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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