



*Personal Computer
Hardware Reference
Library*

Guide to Operations

68X2523

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Guide to Operations

First Edition (August 1986)

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FEDERAL COMMUNICATIONS COMMISSION RADIO FREQUENCY INTERFERENCE STATEMENT

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

INSTRUCTIONS TO USER

This equipment generates and uses radio frequency energy and if not installed and used properly, that is, in strict accordance with the operating instructions, reference manuals, and the service manual, may cause interference to radio or TV reception. It has been type tested and found to comply with the limits for a Class B computing device in accordance with Subpart J of Part 15 of FCC rules, which are designed to provide reasonable protection against such interference in a residential installation. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause interference to radio or TV reception, 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 computer with respect to the receiver.
- Move the computer away from the receiver.
- Plug the computer into a different outlet so that computer and receiver are on different branch circuits.

If necessary, the user should consult the dealer or an experienced radio/television technician for additional suggestions. The user may find the following booklet prepared by the Federal Communications Commission helpful: *How to Identify and Resolve Radio-TV Interference Problems*.

This booklet is available from the US Government Printing Office, Washington, DC 20402, Stock No. 004-000-00345-4.

CAUTION

This product is equipped with a line cord and plug for the user's safety. It is to be used in conjunction with a properly grounded receptacle to avoid electrical shock.

The following FCC statement applies to the:

- IBM Binary Synchronous Communications Adapter
- IBM Synchronous Data Link Control Adapter
- IBM PC General Purpose Interface Bus Adapter
- IBM PC Data Acquisition and Control Adapter
- IBM PC Network Adapter

FEDERAL COMMUNICATIONS COMMISSION RADIO FREQUENCY INTERFERENCE STATEMENT

Warning: This equipment generates, uses, and can radiate radio frequency energy and if not installed and used in accordance with the instruction manual, 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.

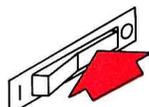
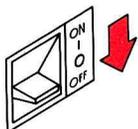
Electrical Safety

Electrical current from power, telephone, and communications cables is hazardous. Connect and disconnect cables as shown when installing, moving, or opening the covers of personal computers or attached devices.

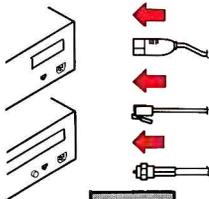
To Connect

To Disconnect

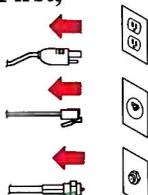
Turn Everything OFF.



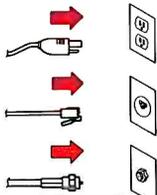
Devices First,



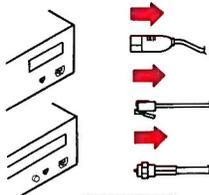
Outlets First,



Then Outlets.



Then Devices.



OK

OK



Notes:

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Section 1. Introduction

The IBM Personal Computer XT Model 286 system unit is the central part of your IBM computer and supports a variety of options. The keyboard, which is used to send data to your system, is attached by a coiled cable.

To tailor a system to your particular needs, you can choose internal and external options that perform the functions you need. An example of an internal option is the Color/Graphics Monitor Adapter that allows a Color Display, an external option, to be attached to your system. You can add a display, a printer, additional memory, or other options to expand your system.

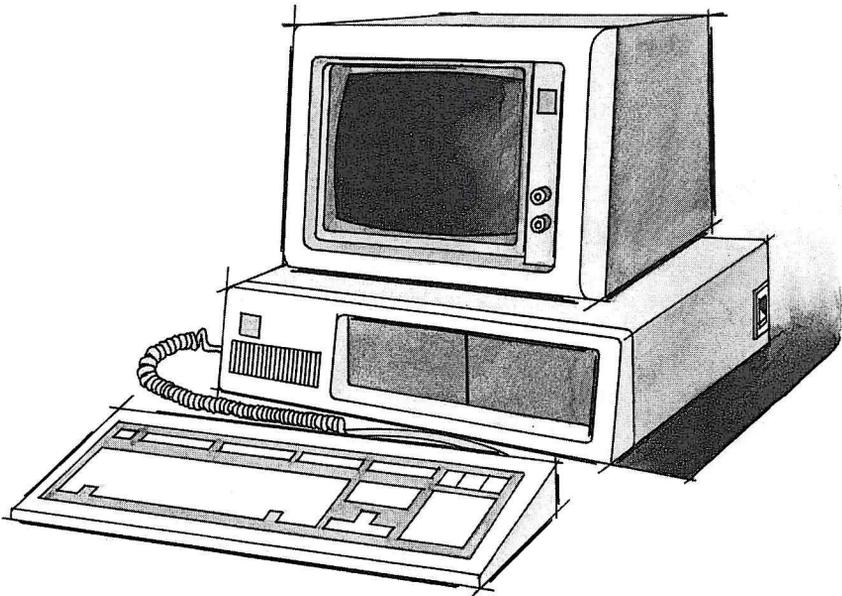
Hardware alone does not form a completely functioning system. Three elements must be present in order to have a functioning IBM Personal Computer XT Model 286:

- Hardware
- Software
- You.

Hardware

Minimum hardware requirements are:

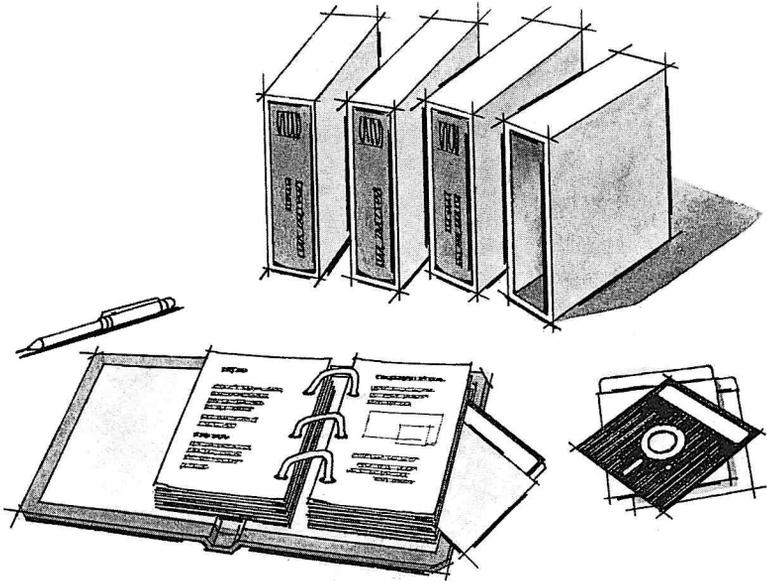
- System unit with one diskette drive
- Keyboard
- Display.



Software

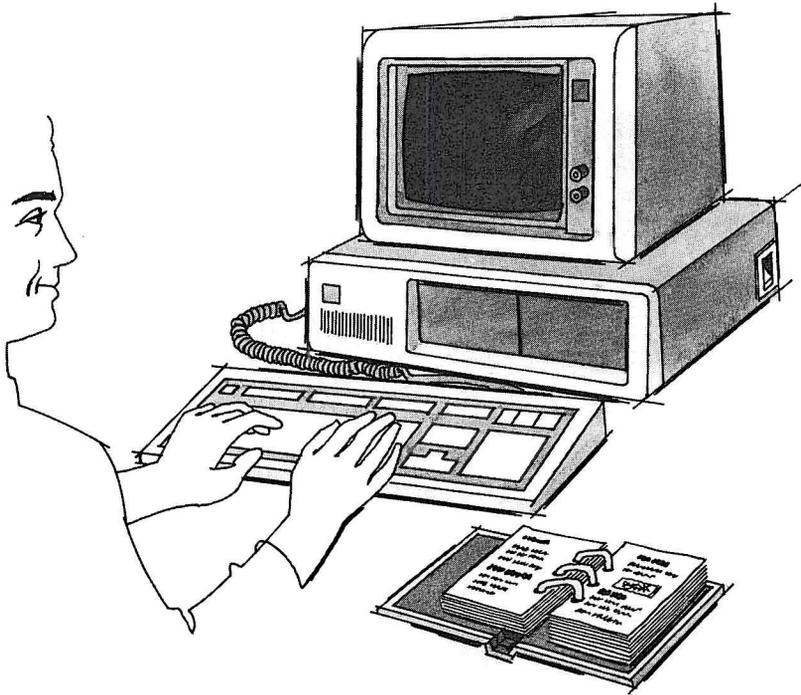
Software can be any of the following:

- Disk operating system
- Game program
- Financial program
- Programming language such as BASIC
- Other programs of your choice.



You

You are the most important element of a properly working IBM computer system. You bring the elements of hardware and software together. This manual, *Guide to Operations*, will help you become familiar with the hardware.



The *Guide to Operations* can be used as a reference manual. You will probably use only a portion of the information it contains each time you open the book. By answering the questions in the next section, "Getting Started," you will be led through the book.

Continue with the next section.

Section 2. Getting Started

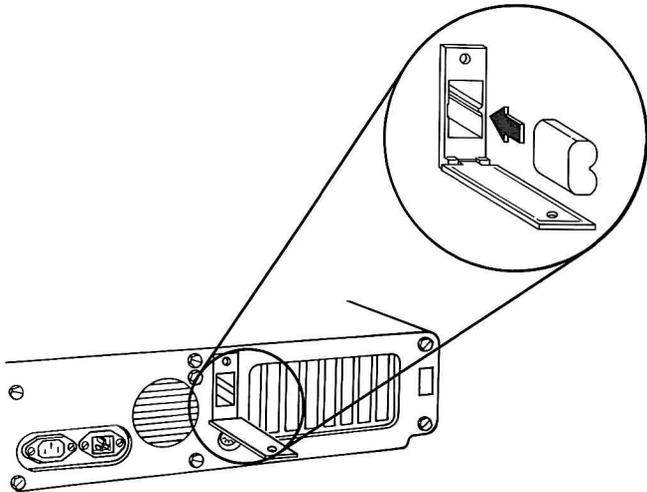
The display screen drawings used in this book are intended to be representative rather than replicas.

You are ready to get started. The following steps will help you determine which sections in the *Guide to Operations* to use.

The battery is installed backwards in the battery compartment when shipped.

- 1 Install the battery as shown below.

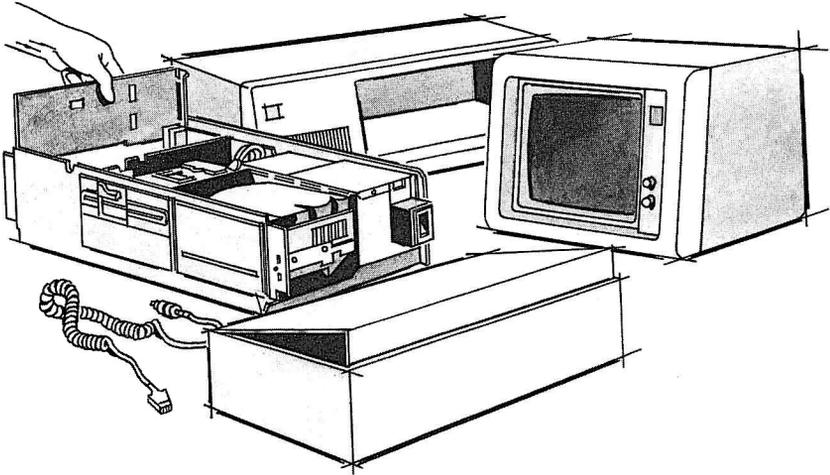
Note: If you need help go to “Battery Installation” on page 3-17.



Continue with the next step.

2 Have all your *internal* options been installed in your system unit?

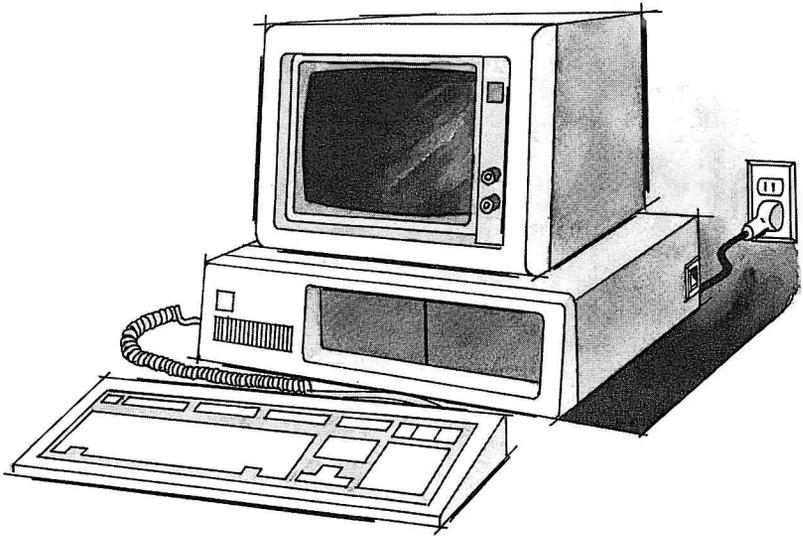
Note: Internal options are parts installed *inside* the system unit such as the adapter your display is attached to.



YES Continue with the next step.

NO Go to "Internal Options," page 4-3.

3 Is your system unit cabled and ready to use?



YES Go to “Operating Your System” on page 3-1.

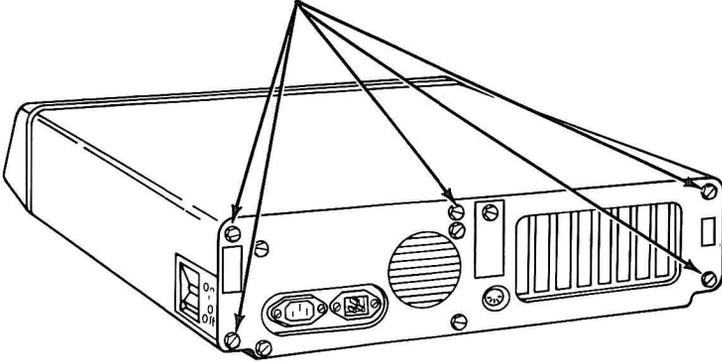
NO Continue with “System Checklist,” page 2-4.

System Checklist

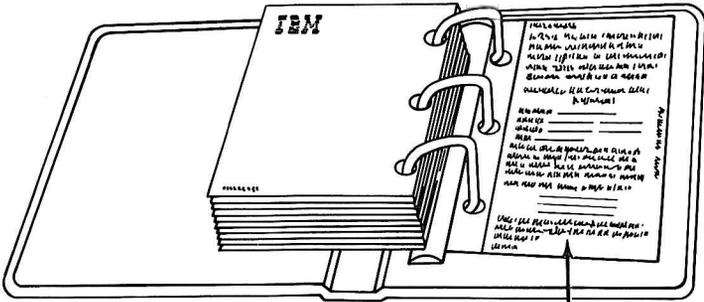
IMPORTANT: Before you connect the power cord to your system unit be sure:

- The system unit cover is on and the cover mounting screws are installed.

Cover Mounting Screws

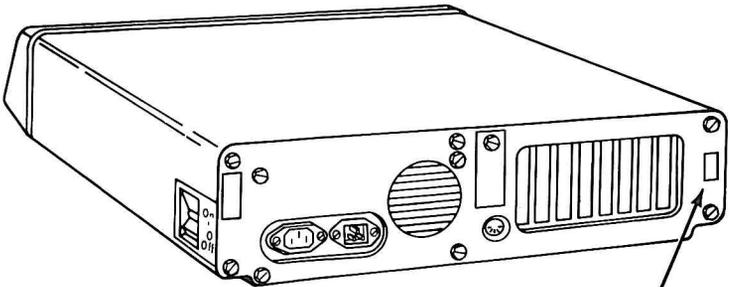


- Equipment serial numbers are recorded on the “Setup Information” foldout found in this manual.



**Setup Information
Foldout**

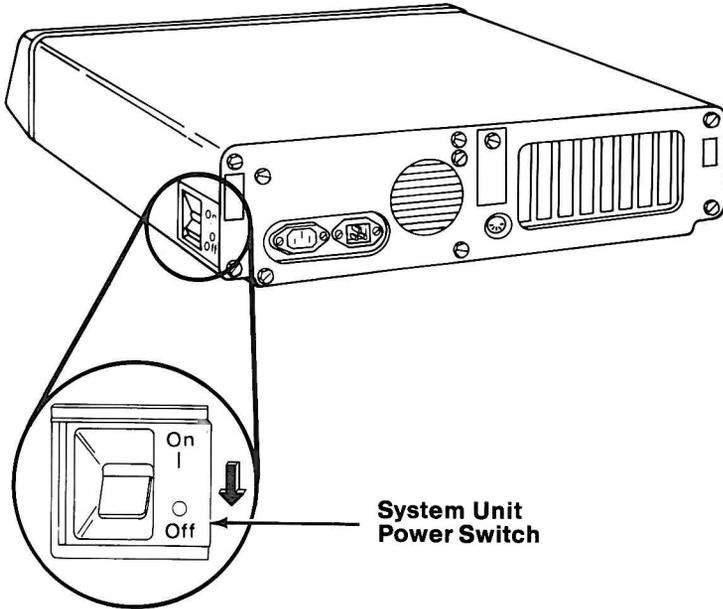
The location of the system unit serial number is shown below.



**System Unit
Serial Number**

Cabling

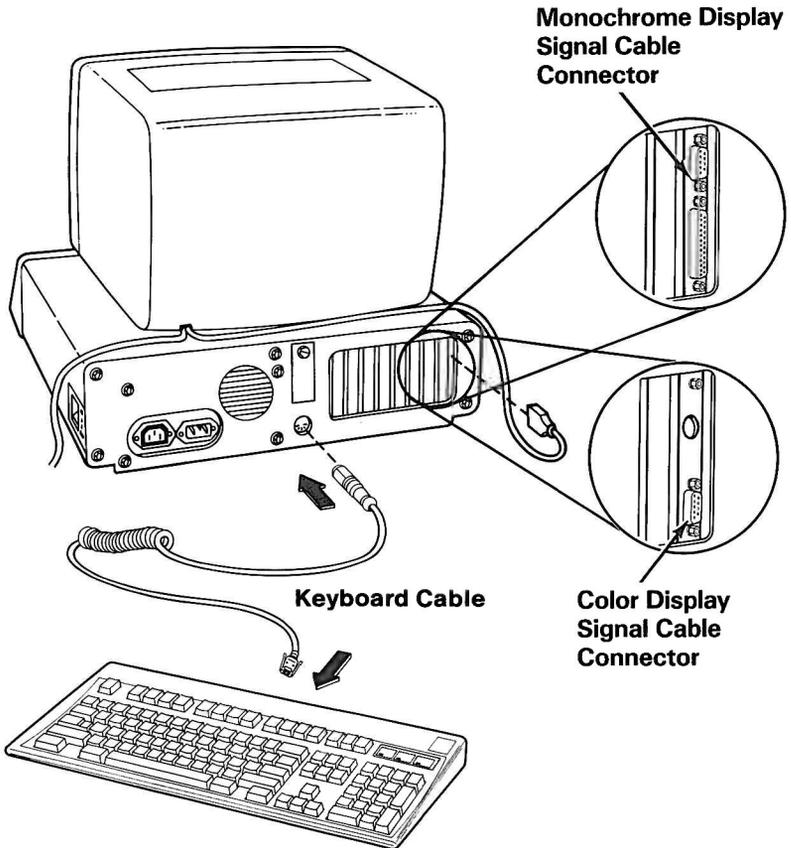
- 1 Turn off the system unit.
- 2 Turn off the power to all external options (printer, display and others).



3 Connect display and keyboard cables to the system unit and keyboard as shown below.

Warning: Damage to your IBM Monochrome Display may result if it is connected to an IBM Color/Graphics Monitor Adapter.

Note: If you do not have an IBM Monochrome Display or IBM Color Display, refer to the instructions that come with the display to complete its installation.



4 Are you installing a printer at this time?

YES Continue with the next step.

NO Go to Step 9 on page 2-10.

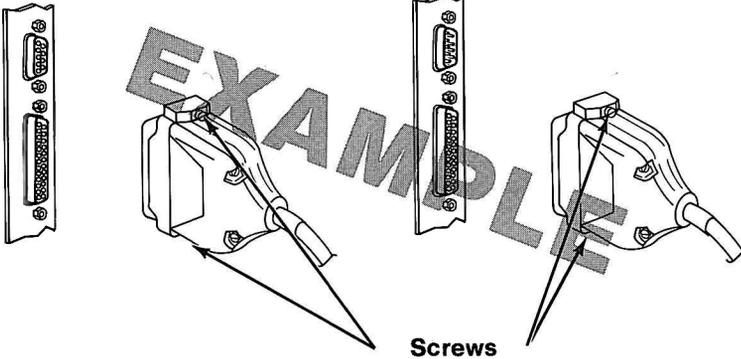
5 Connect the printer cable to the appropriate adapter on your system unit.

Note: Connect your printer to the IBM Monochrome Display and Printer Adapter, if you have one. Otherwise, connect your printer to any parallel adapter.

**IBM Monochrome Display
and Printer Adapter**

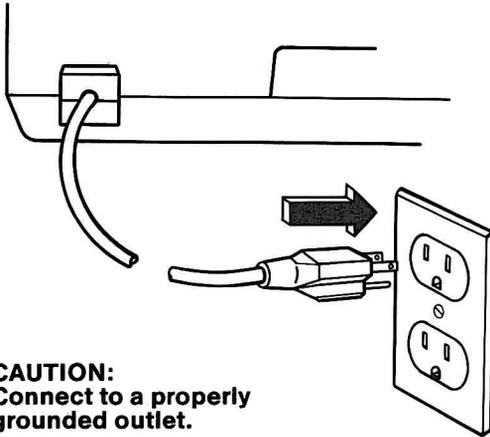
or

**Serial/Parallel
Adapter**



6 Tighten the screws.

- 7 If your printer is not already set up, refer to the instructions that come with it to complete its installation.
- 8 Connect the printer power cord to the printer, then plug it into the electrical outlet.

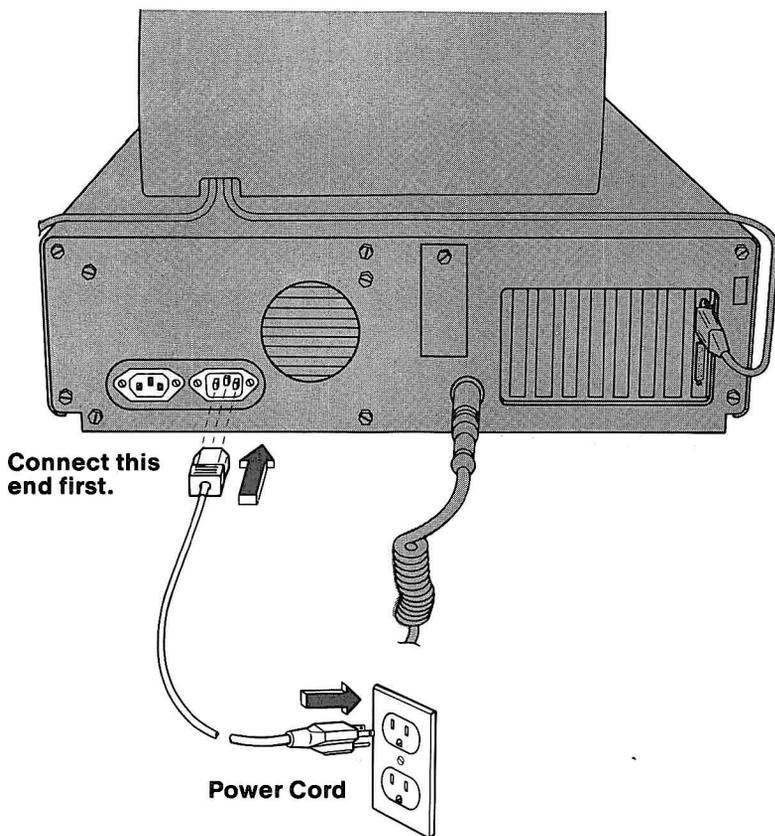


CAUTION:
Connect to a properly
grounded outlet.

CAUTION

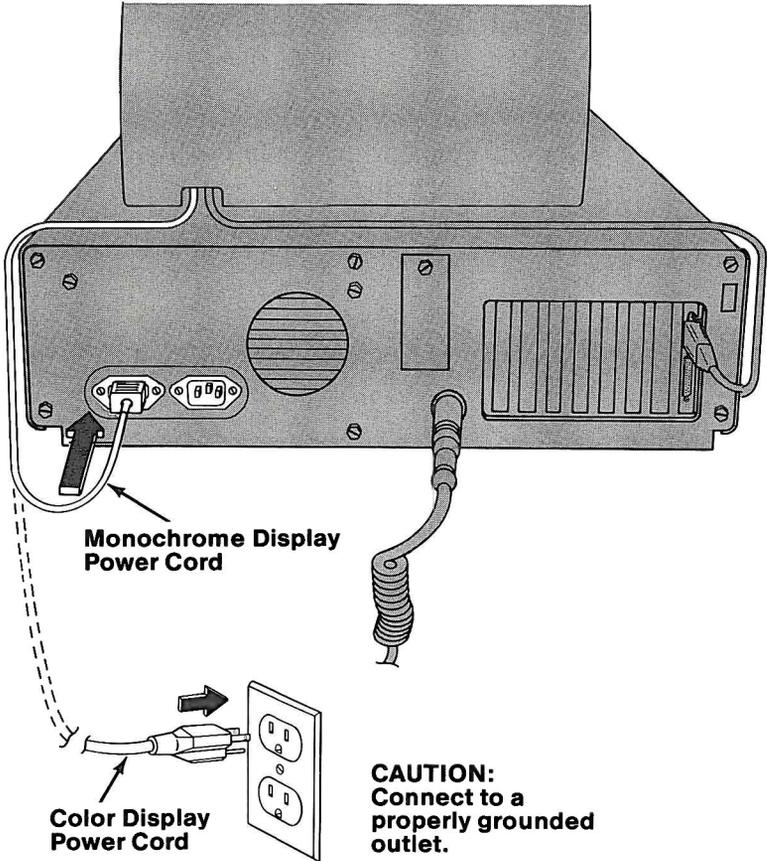
This product is equipped with a line cord and plug designed for the user's safety. It is to be used with a properly grounded receptacle to avoid possible electrical shock.

- 9 Connect the power cord to the system unit, then plug it into the electrical outlet.



10 Connect the power cords for other external options as shown.

Note: If your external option has a detachable power cord, connect it to the external option first and then plug it into the electrical outlet.



11 Did IBM or an authorized IBM dealer install all of your *internal options*?

Internal options are parts installed *inside* the system unit such as the adapter your display is attached to.

YES Go to “Operating Your System” on page 3-1.

NO Continue with “Setup Program” next in this section.

Setup Program

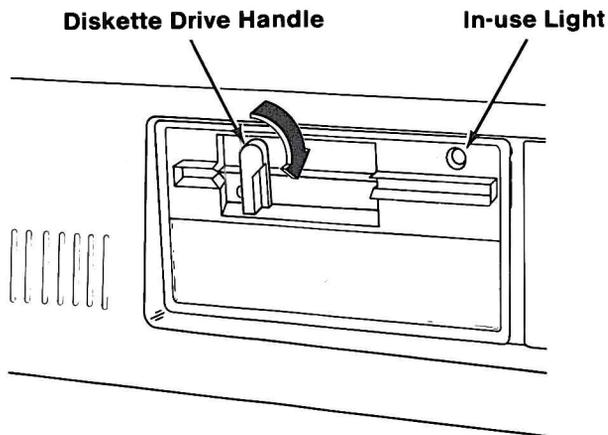
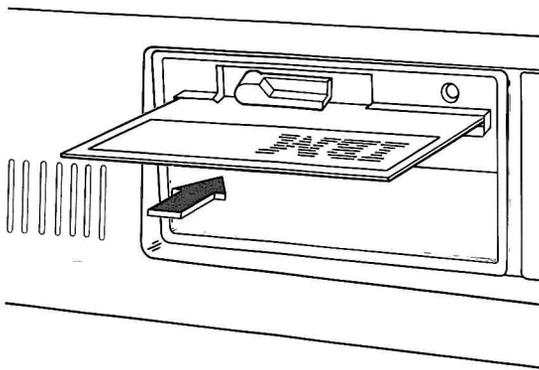
You need to run the Setup program on the Diagnostics diskette to set the date, time, and store information about some installed options. A battery keeps a small portion of memory active to retain this data even when the power is off. Run the Setup program when you:

- Install your system unit for the first time
- Install certain options
- Wish to set date and time
- Wish to set the display mode
- Replace the battery.

To set the system options you must know which options are installed. These options are listed on the "Setup Information" foldout in this manual.

- 1 Turn off the system unit.
- 2 Turn off all external options (printer, display and others).
- 3 Get the Diagnostics diskette located at the back of this manual.

- 4** Insert the Diagnostics diskette into drive A.



- 5** Turn your display controls clockwise.
- 6** Turn on all external options (printer, display and others).

- 7 Turn on the system unit.
- 8 Adjust the controls on your display for eye comfort.
- 9 Did a screen appear with a message similar to the following?

XXX KB OK
16X – System Options Not Set (Run Setup)
(RESUME="F1"KEY)

EXAMPLE

(X can be any number.)

YES Press F1 and follow the instructions on your screen. Refer to the "Setup Information" foldout as you answer the Setup program questions.

This program allows you to tell your system the date, time, and which options you have installed. Your installed options are listed on the "Setup Information" foldout in the back of your manual.

NO Continue with the next step.

10 Did the following screen appear?

**The IBM Personal Computer
DIAGNOSTICS
Version X.XX
(C)Copyright IBM Corp. XXXX, XXXX**

SELECT AN OPTION

**0 – SYSTEM CHECKOUT
1 – FORMAT DISKETTE
2 – COPY DISKETTE
3 – PREPARE SYSTEM FOR MOVING
4 – SETUP
9 – END DIAGNOSTICS**

SELECT THE ACTION DESIRED
?

YES Continue with the next step.

NO Remove the diskette and go to “Testing Your System,” Section 5.

11 Do you want to set the time, date, display mode, or run the Setup program?

YES Press 4 then Enter (↵), and follow the instructions on your screen. Refer to the “Setup Information” foldout as you answer the Setup program questions.

NO Remove the diskette and go to “Operating Your System” on page 3-1.

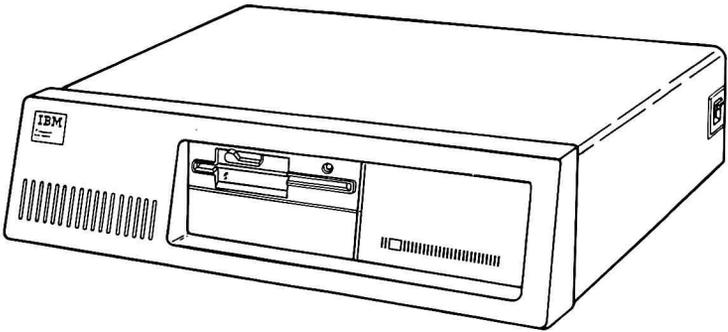
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Notes:

System Unit

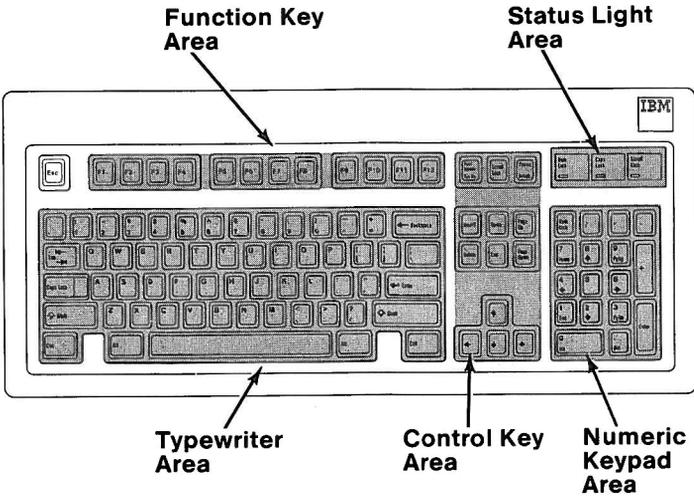
The main part of your IBM computer is the system unit. It processes data and controls the operations of your system through a set of instructions called a *program* or *software*. The IBM Personal Computer XT Model 286 comes with an installed program language called IBM BASIC. A wide variety of programs is available from your dealer.



Keyboard

The keyboard is divided into five sections: the typewriter area, the function keys, the numeric keypad, the control key area, and the status light area.

Note: The 101-key keyboard is used in these examples. The keytop characters for the 102-key keyboard are shown in the “Keyboard Templates” section of this manual.



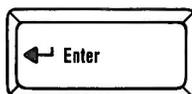
Typewriter Area

Most of the keys are typematic; that is, they repeat as long as you hold them down. The keys in the typewriter area are similar to those of a standard typewriter with the following exceptions.

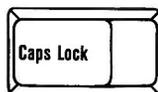
There are two home row identifiers. These identifiers are horizontal ridges located on the F and J keys that allow you to locate the home row without looking at the keyboard.



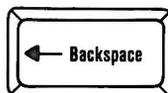
The **Enter** key is used for data input and is controlled by the operating system or application program that you are using.



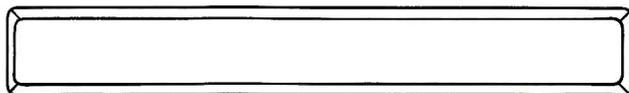
The **Caps Lock** key when pressed once, locks the characters A through Z in the uppercase position. To shift to lowercase while **Caps Lock** is on, press the Shift key. Press the Caps Lock key again to release the uppercase mode for characters A through Z.



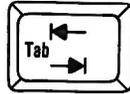
The **Backspace** key moves the cursor one position to the left. The character to the left of the cursor is erased.



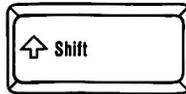
The **Spacebar** moves the cursor to the right. Any character the cursor moves over is replaced with a blank.



The **Tab** key moves the cursor to the next tab stop. Tab stops are defined in your operating system or application program manual.



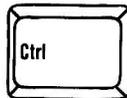
Pressing either **Shift** key changes the keys in the typewriter area to the uppercase mode. When alphabetic keys are pressed, the characters appear as capital letters. When other keys are pressed, the characters shown on the upper portion of the keys appear.



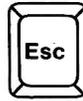
The **Alt** key performs a variety of functions. These are described in your operating system manual or application program manual. ASCII codes can be entered by holding down either **Alt** key and then entering the 3-digit ASCII code on the numeric keypad.



The **Ctrl** key performs a variety of functions. These are described in your operating system manual or application program manual.



The **Esc** key functions are described in your operating system or application program manual.



When the **Print Screen** key is pressed, a copy of the screen presentation is printed.



The purpose of the **Scroll Lock** key is defined in your operating system manual or application program manual.



The **Pause** key temporarily stops your program. Press any other key to continue.



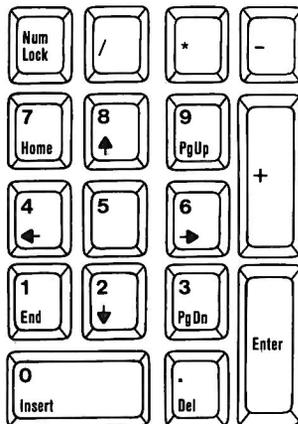
Function Key Area

Twelve function keys, above the typewriter area, are under program control. Their operation is defined in your operating-system or application-program manual.



Numeric Keypad Area

Pressing the Numeric Lock (Num Lock) key one time switches the number keys to cursor control keys. While in the **Num Lock** mode, the shift key must be held down to use the numeric keypad as cursor control keys. The keypad is arranged like a calculator to save time when typing many numbers. Pressing **Num Lock** again changes cursor control keys back to number keys.

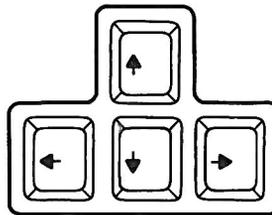
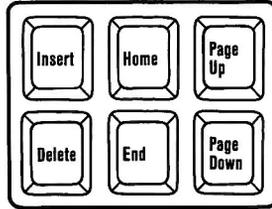


The numeric keypad has an identifier on the **5** key. This identifier is a horizontal ridge located on the center of the key that allows you to locate the center of the numeric keypad without looking at the keyboard.



Control Key Area

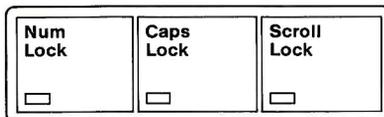
The control keys are used for cursor and program control.



The cursor controls are separate from the numeric keypad and function the same as the cursor controls on the numeric keypad. These keys function as cursor controls only, and are not affected by the **Num Lock** key.

Status Light Area

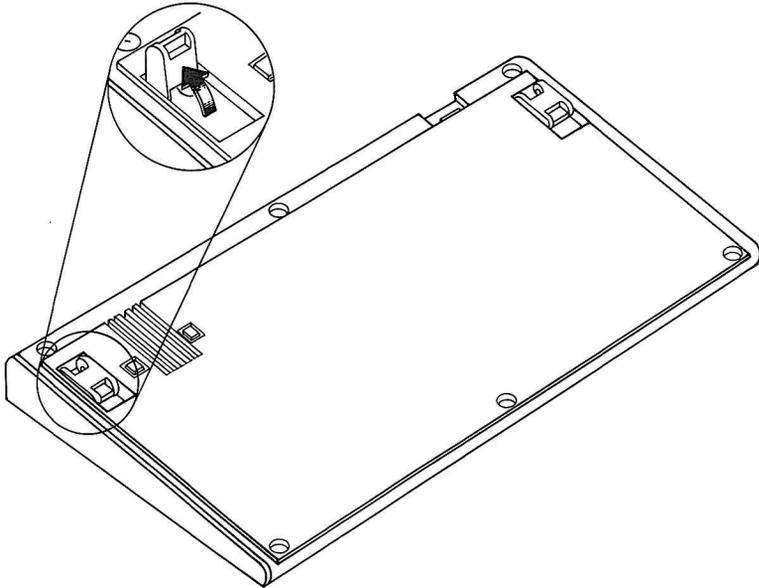
The **Num Lock** light indicates the status of the numeric keypad. The **Scroll Lock** light comes on when you press the Scroll Lock key or when your program is in the scroll lock mode. The **Caps Lock** light is controlled by the Caps Lock key.



Keyboard Height Adjustment

You can adjust your keyboard to two different positions for typing comfort.

To adjust, turn your keyboard over and set both keyboard legs into the desired position.



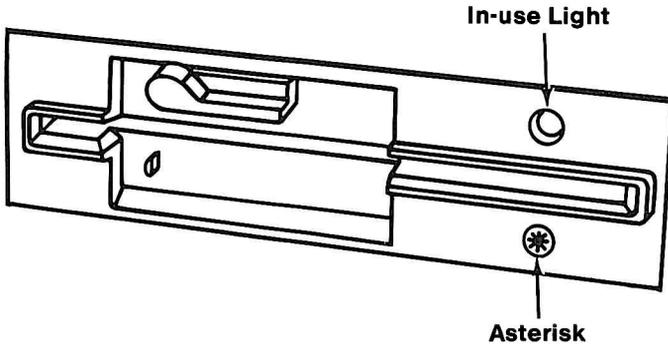
5-1/4 Inch Diskette Drives

Diskette drives are used to read data from and record data on diskettes.

Two types of 5-1/4 inch diskette drives are available for your IBM computer system:

- The High Capacity Diskette Drive comes installed in your IBM computer. It stores approximately 1.2MB of data on a 5-1/4 inch high capacity diskette.
- The 5-1/4 inch -360KB Diskette Drive is an option for your system. It stores approximately 360KB of data on a 5-1/4 inch double sided diskette.

The 5-1/4 inch -360KB Diskette Drive is identified by an asterisk below the in-use light. The High Capacity Diskette Drive has no special markings.



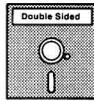
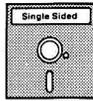
About Diskettes and Drive Compatibility

A diskette is a 5-1/4 inch magnetic disk inside a protective plastic jacket. Diskettes are used to store data.

Your selection of the correct diskette is *important* to the successful operation of your IBM computer.

You can READ the following diskettes:

with a
Double Sided
Drive



with a
High Capacity
Drive



You can WRITE on the following diskettes:

with a
Double Sided
Drive



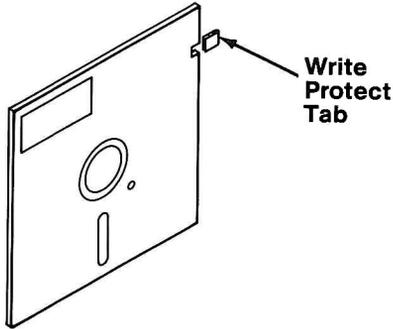
with a
High Capacity
Drive



Once you write on these
diskettes, you can use
them only in a High
Capacity drive.

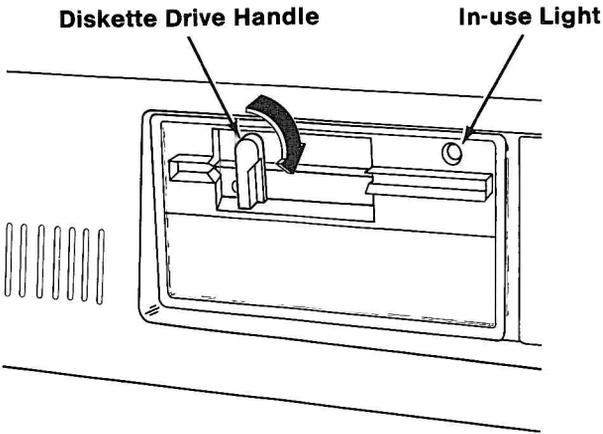
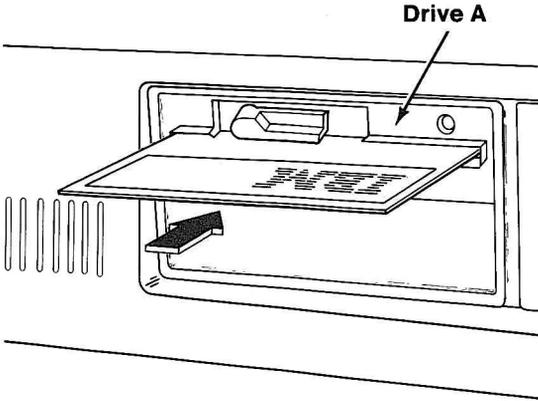
Write Protect

When a diskette is write protected, no information can be written (recorded) on the diskette. To write protect a diskette, cover the notch on the side of the diskette with a write-protect tab. If you want to write (record) information on a diskette, remove the write-protect tab.



Loading Your Diskette Drive

- 1 When you have fully inserted the diskette, it clicks into place. When the in-use light is on, it indicates the system unit is using the diskette drive.

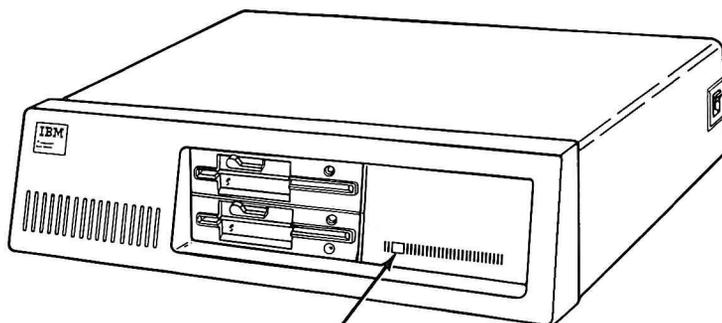


- 2 To remove a diskette from the diskette drive, rotate the diskette drive lever counterclockwise and pull your diskette out. Do not remove your diskette when the in-use light is on.

Fixed Disk Drive

You can use an operating system such as the *IBM Disk Operating System* (DOS) to store and retrieve data from your fixed disk.

When the system unit is using the fixed disk drive, its in-use light is on.



In-use Light

Displays

All IBM color displays have a Power control. The Power control turns your display on and off. The Power-on indicator lights when your display is turned on.

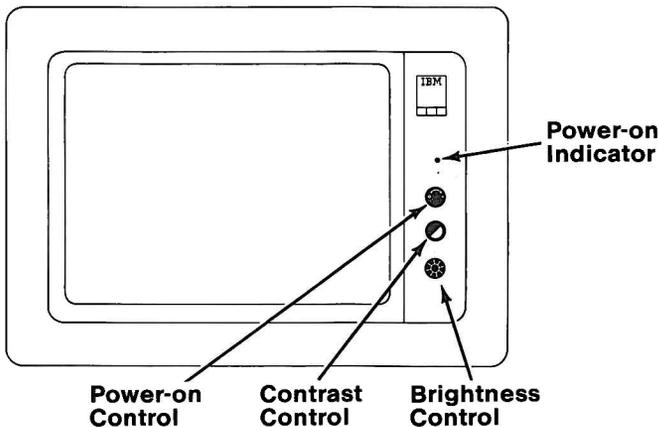
Color displays have two modes of operation.

- 40-column mode allows 40 large characters across the screen.
- 80-column mode allows 80 smaller characters across the screen.

You can change the mode by using the Setup program on your Diagnostics diskette. For more information refer to "Setup Program" in Section 2.

The IBM Monochrome display plugs into the rear of the system unit. It is turned on or off when the system unit is turned on or off.

Note: If you do not have an IBM Color Display, refer to the instructions that come with the display for control locations.



Battery Installation

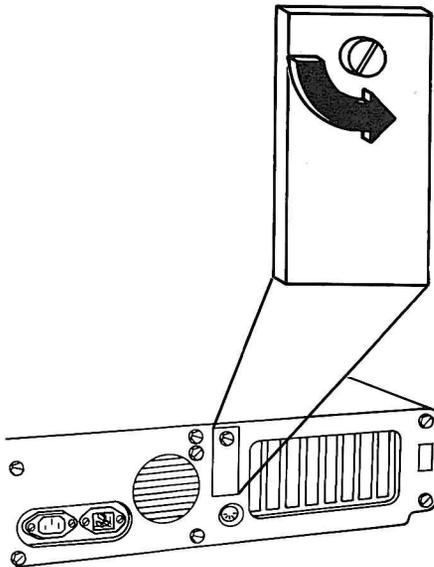
CAUTION

The lithium battery must be replaced with Part Number 62X0339. Use of another battery could result in ignition or explosion of the battery. Replacement batteries can be ordered from an IBM authorized dealer.

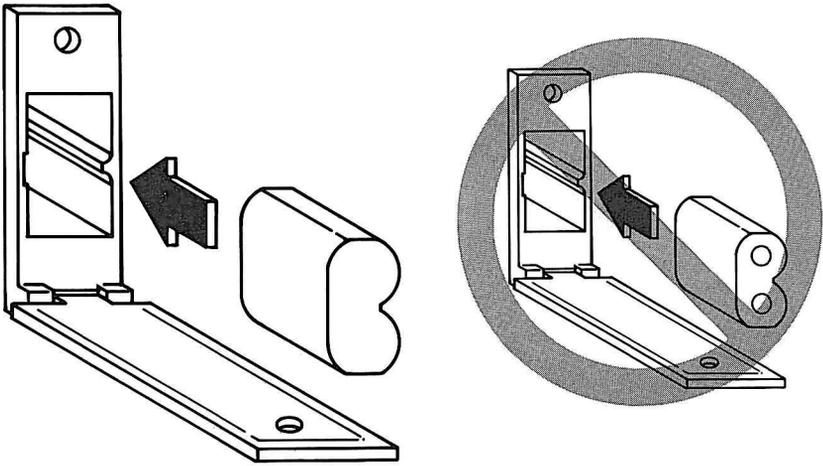
CAUTION

The lithium battery presents a fire, explosion, or severe burn risk. Do not recharge, remove the polarized connector, disassemble, heat above 100°C (212°F), incinerate, or expose contents to water.

- 1 Turn off the system unit and all external options.
- 2 Remove the screw and open the battery compartment door.



- 3** Install the battery as shown.



- 4** Close the battery compartment door and install the screw.

Time and Date

The time and date for your IBM computer can be set using the Setup program on your Diagnostics diskette. For more information refer to "Setup Program" on page 2-13.

Moving Your System

To prevent a loss of data stored on a fixed disk drive, back up all the files before moving your system. (See your disk operating system manual for backup instructions.)

When you have completed backing up your files, continue with Step 1.

- 1 Load the Diagnostics diskette (found at the back of this manual) into drive A.
- 2 Turn on the system unit.

3 The following appears on your screen.

**The IBM Personal Computer
DIAGNOSTICS
Version X.XX
(C)Copyright IBM Corp. XXXX, XXXX
SELECT AN OPTION
0 – SYSTEM CHECKOUT
1 – FORMAT DISKETTE
2 – COPY DISKETTE
3 – PREPARE SYSTEM FOR MOVING
4 – SETUP
9 – END DIAGNOSTICS
SELECT THE ACTION DESIRED
?**

4 Press **3** and then press Enter (↵).

- 5 When the following message appears on your screen, your fixed disk drive is ready to be moved.

The IBM Personal Computer
DIAGNOSTICS
Version X.XX
(C)Copyright IBM Corp. XXXX, XXXX

SELECT AN OPTION

0 – SYSTEM CHECKOUT
1 – FORMAT DISKETTE
2 – COPY DISKETTE
3 – PREPARE SYSTEM FOR MOVING
4 – SETUP
9 – END DIAGNOSTICS

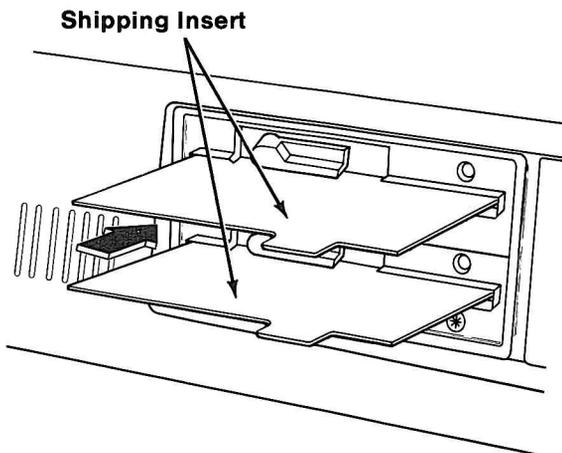
SELECT THE ACTION DESIRED

? 3
DRIVE C
IS PREPARED FOR MOVING
TURN SYSTEM OFF
?

- 6 Remove the Diagnostics diskette.
- 7 Turn off the system unit.
- 8 Turn off all external options.

- 9 Put a shipping insert into each diskette drive. Rotate the diskette drive lever clockwise.

Note: If you do not have a shipping insert, use a blank diskette.



- 10 Unplug your system unit power cord from the electrical outlet. Also, unplug any external options.
- 11 Disconnect and secure all cables and cords.

Long-Distance Move

If you saved the original shipping cartons and packing materials that your IBM computer system came in, use them to pack your units.

If you are using different cartons, cushion your units well to avoid any damage.

Setup at Your New Location

When your system arrives at the new location, unpack it carefully.

To set up and cable your system, refer to “Cabling,” page 2-6.

Notes:

Section 4. Installing Your Options

Internal Options	4-3
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Memory Module Kit	4-15
Display Adapter Installation	4-16
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Enhanced Graphics Adapter	4-29
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Notes:



Internal Options

Internal options are parts installed inside the system unit. Some of the internal options available for your system are listed below.

- Memory expansion options
- Display adapters
- Diskette drives
- Printer or communication adapters.

Some options do not include installation instructions for your IBM Personal Computer XT Model 286. You will find these options listed on the Contents page of this section. If you are installing one of these options, use the instructions in this section. If the option you are installing is *not* listed on the Contents page, use the instructions enclosed with that option. Some of the option's illustrations may differ slightly from your system.

Before you begin installing any internal options, remove the cover using the procedure in this section.

Required Tools

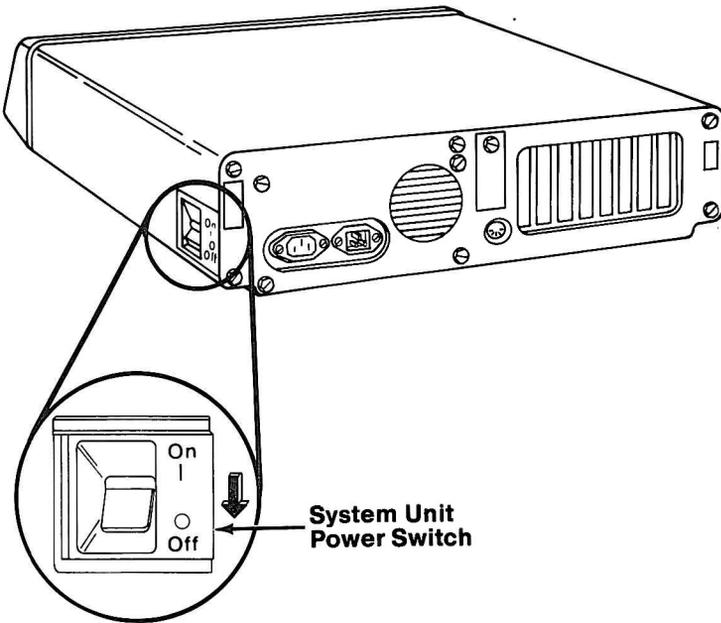
- Medium-size, flat-blade screwdriver
- Small-size, flat-blade screwdriver.

Cover Removal

Warning: To prevent a loss of data stored on a fixed disk drive, back up all the files before moving your system. (See your disk operating system manual for backup instructions.)

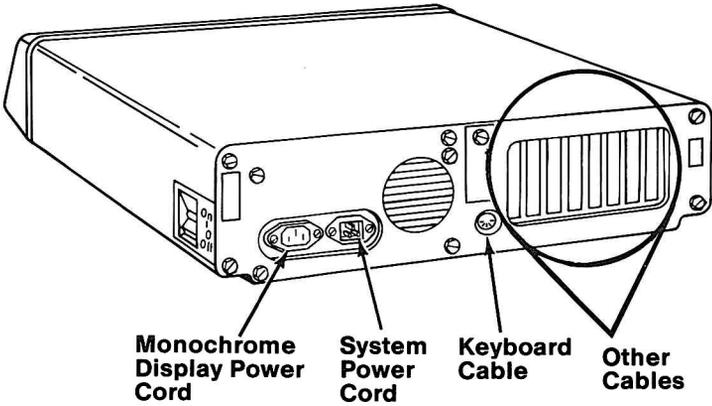
When you have completed backing up your files, continue with Step 1.

- 1 Turn off your system unit.



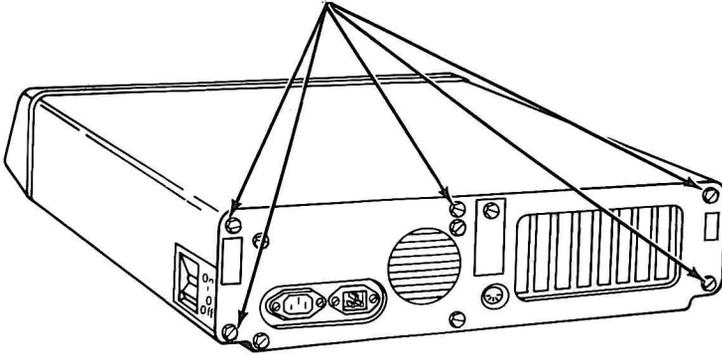
- 2 Turn off all external options (printer, display and others).
- 3 Unplug your system unit power cord from the electrical outlet.
- 4 Unplug any external options from the electrical outlet.

- 5 Note the locations of all cables or cords, and disconnect them from the back of your system unit.

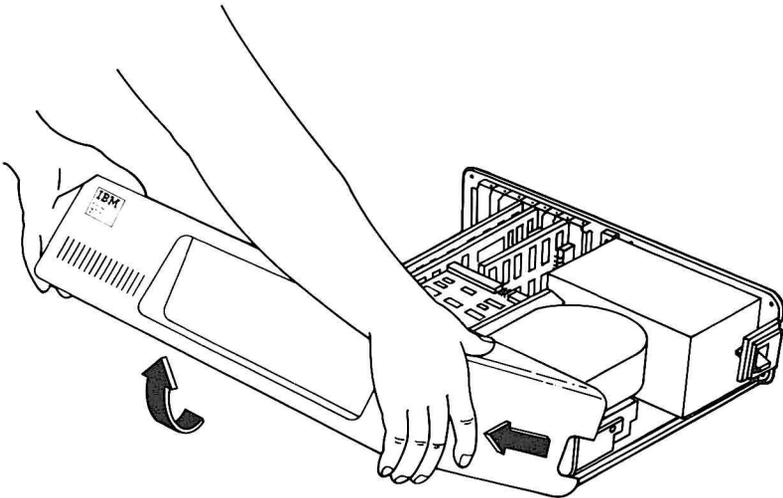


- 6 Remove the cover mounting screws.

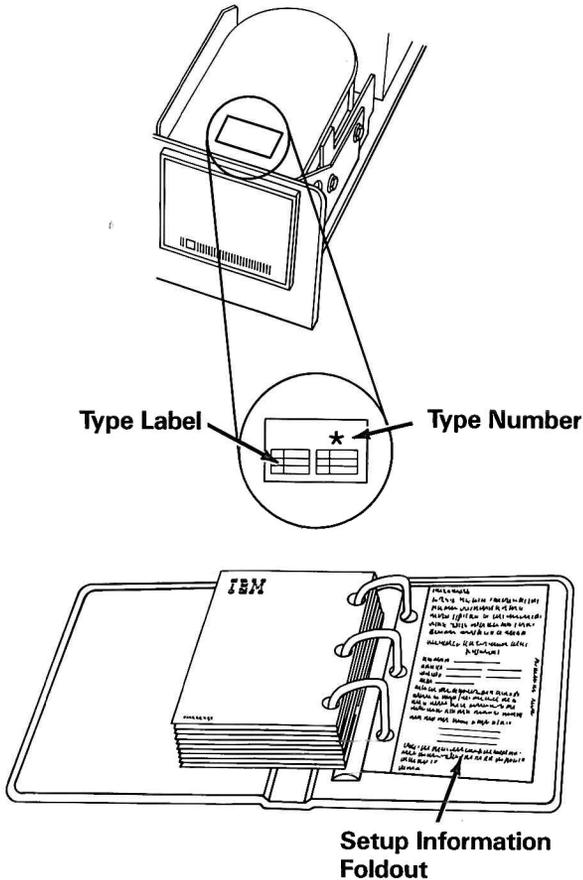
Cover Mounting Screws



- 7 To remove the cover:
- Slide the cover to the front until it stops.
 - Tilt the cover up to remove it from the base.



- 8 If you have not recorded the fixed disk **drive type**, record the **drive type** on the “Setup Information” foldout in this manual.

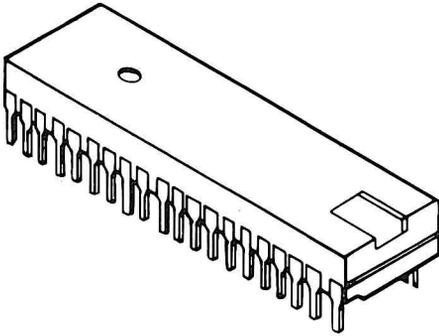


- 9 Continue with the instructions for the option you are installing.

Notes:

- a. This section's table of contents gives page numbers for options listed in this manual.
- b. If your option is not listed in this manual, use the installation instructions that came packaged with it. Some of the illustrations differ slightly from your system.

IBM Personal Computer AT Math Coprocessor



Note: If the cover is not already removed, go to “Cover Removal,” page 4-4.

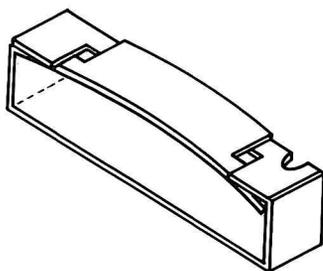
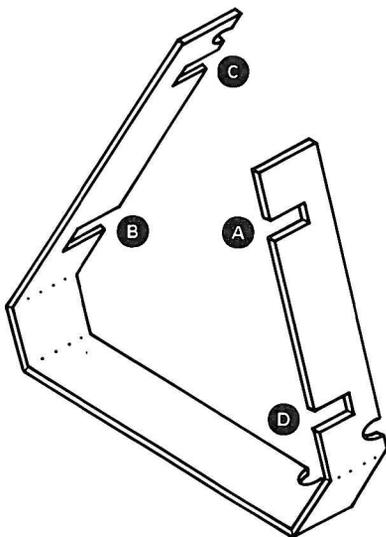
Warning: IBM’s Limited Warranty applies only to properly installed options. The installation for this option should be performed by a technically skilled person. IBM recommends that IBM or an Authorized IBM Personal Computer Dealer install this option.

- 1 Remove all adapters installed in the expansion slots.

Note: Some adapters have cables attached. Carefully disconnect the cables noting connector locations.

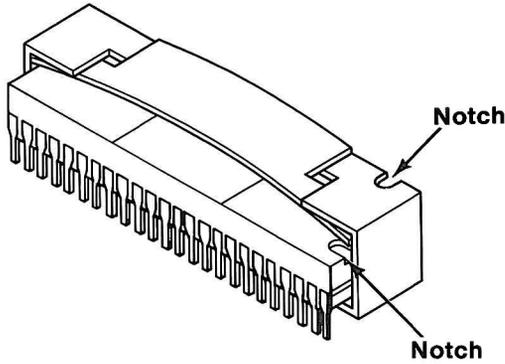
- 2 Assemble the safety protector as shown below.

- Insert slot **A** into slot **B**.
- Insert slot **C** into slot **D**.



3

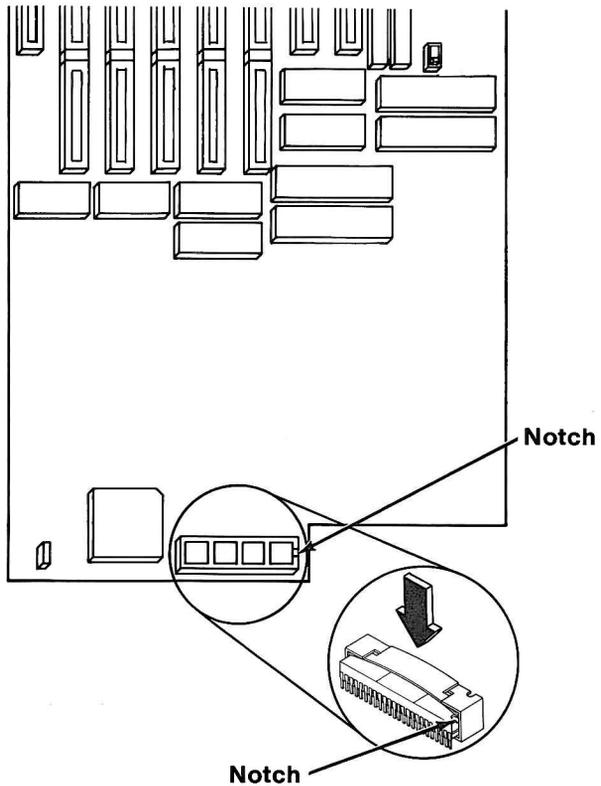
Insert the coprocessor into the safety protector as shown. Make sure that the notch in the safety protector is on the same end as the notch in the coprocessor. The overlapped portions of the safety protector should be on the top of the coprocessor.



Warning:

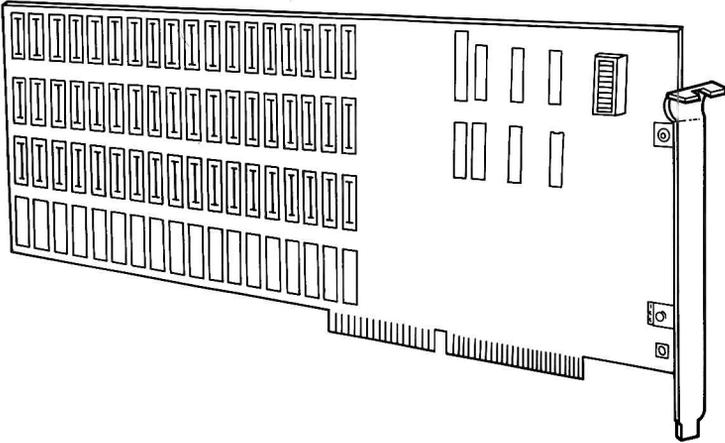
- The coprocessor is static sensitive. Reduce static by touching the system frame with one hand while installing the coprocessor in your system unit.
- Incorrect placement of the coprocessor can result in damage to the system board or the coprocessor.
- The pins on the coprocessor are bent easily.

- 4 Make sure the notch on the coprocessor lines up with the notch on its connector. Align the pins of the coprocessor with the connector and press the coprocessor firmly into place.



- 5 **IMPORTANT:** Run the Setup program on your Diagnostics diskette after all your options are installed and verify that the installed devices list is correct.
- 6 If you have other internal options that need to be installed, continue with the installation procedures for those options. If not, go to "Cover Installation," page 4-42.

Memory Expansion Adapter Installation

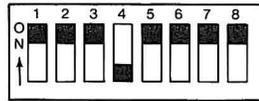


Note: If the cover is not already removed, go to “Cover Removal” page 4-4.

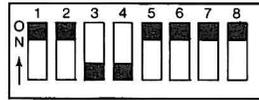
1 Using the following table set the switches on your option. Then go to the next step.

Note: The 512KB/2MB Memory Expansion Adapter must be filled to its capacity of 2MB (2048KB) before you install additional memory expansion adapters.

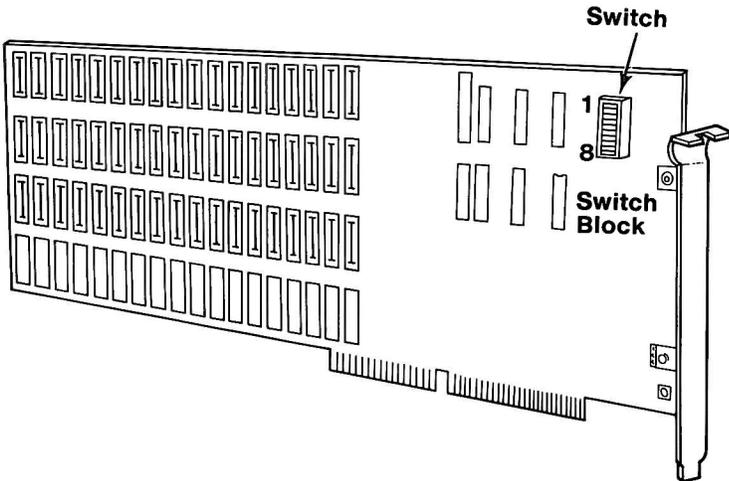
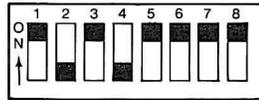
First Adapter



Second Adapter

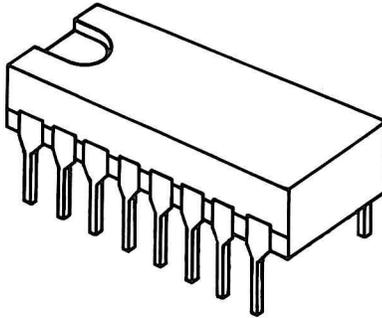


Third Adapter



- 2 You can install the Memory Expansion Adapter in any available dual-connector expansion slot.
- 3 Go to “Adapter Installation,” page 4-39.

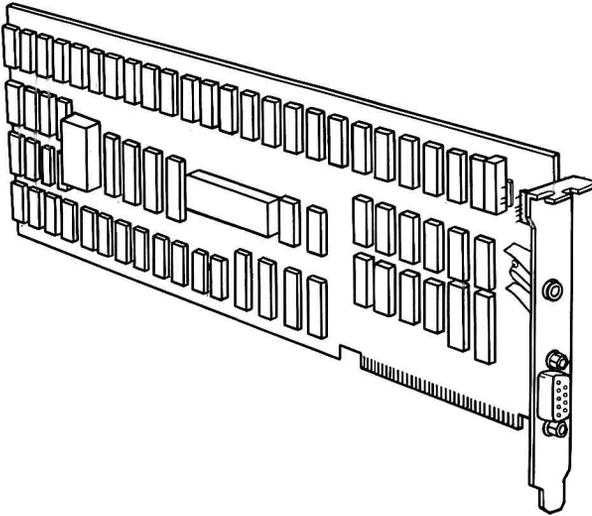
Memory Module Kit



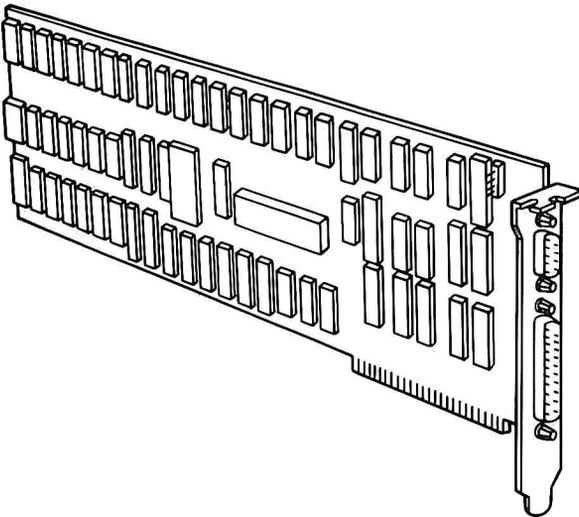
- 1 If the cover is not already removed, go to “Cover Removal,” page 4-4.
- 2 Option installation instructions come with your kit.
- 3 Install your memory module kit as described in the kit installation instructions.
- 4 If you have other internal options that need to be installed, continue with the installation procedures for those options. If not, go to “Cover Installation,” page 4-42.

Display Adapter Installation

Color/Graphics Monitor Adapter



IBM Monochrome Display and Printer Adapter

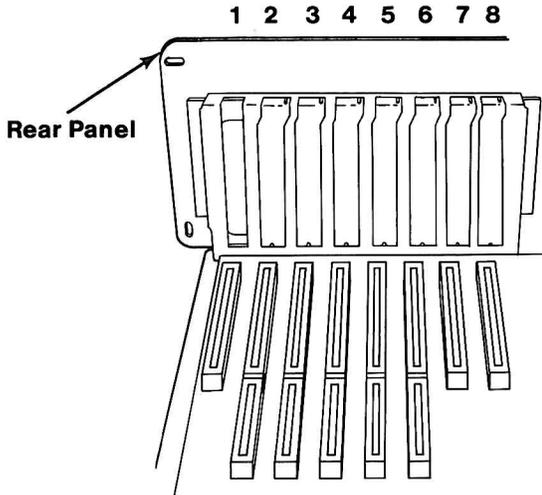


Note: If the cover is not already removed, go to "Cover Removal," page 4-4.

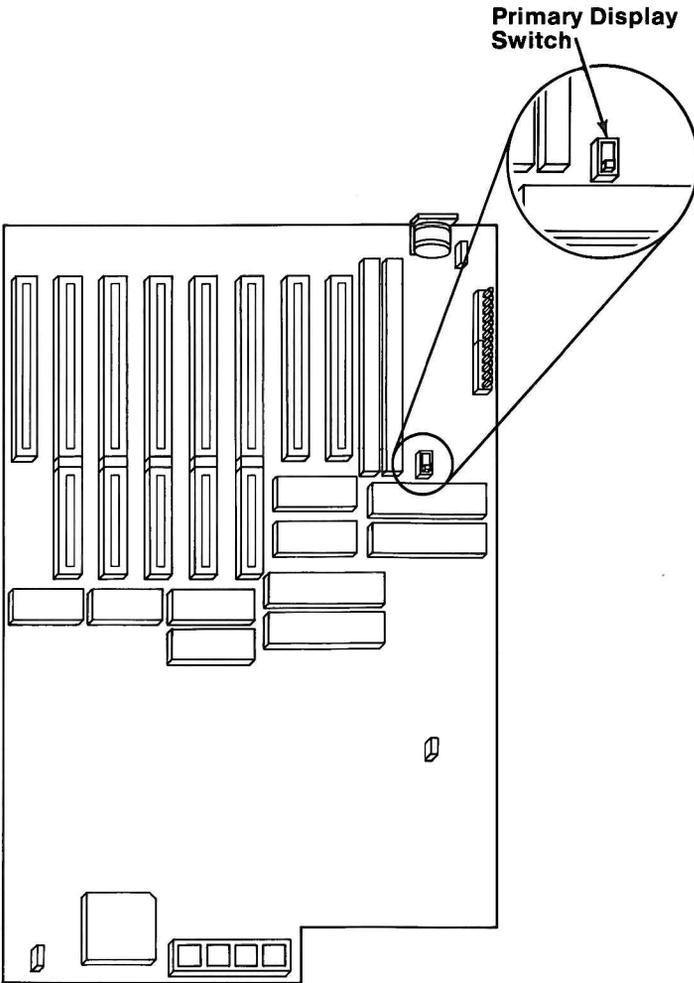
Installation Requirements

If you install an IBM Monochrome Display and Printer Adapter, its printer port becomes the primary printer port.

The IBM Color/Graphics Monitor Adapter must be installed in expansion slot 1.



- 1 Locate the primary display switch on your system board. The exact location of this switch may vary slightly.



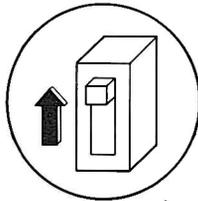
2 Is there more than one display adapter installed in your system?

YES Set the switch for the primary display (the display that you want to come on when you turn your system unit on).

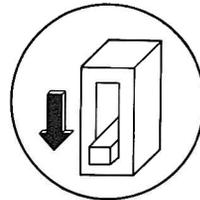
NO Set the switch for the display adapter installed in your system unit.

Note: Use a ballpoint pen to set the primary display switch if necessary.

Monochrome Display



Color Display



**Primary
Display
Switch**

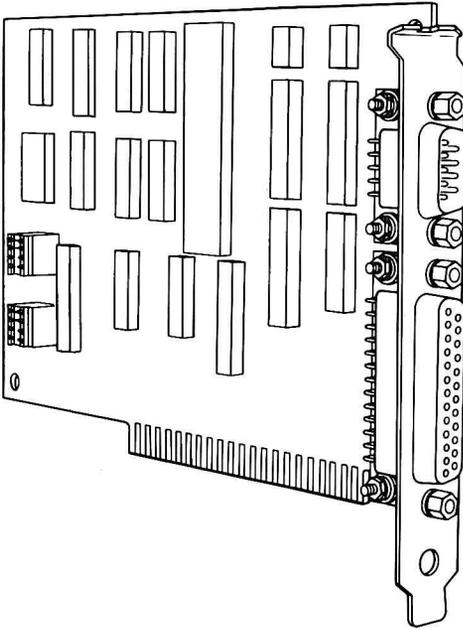
Front of System Unit

3 Locate the “Setup Information” foldout in this manual. Indicate the primary display type.

4 **IMPORTANT:** Run the Setup program on your Diagnostics diskette after all your options are installed.

5 Go to “Adapter Installation,” page 4-39.

IBM Personal Computer AT Serial/Parallel Adapter

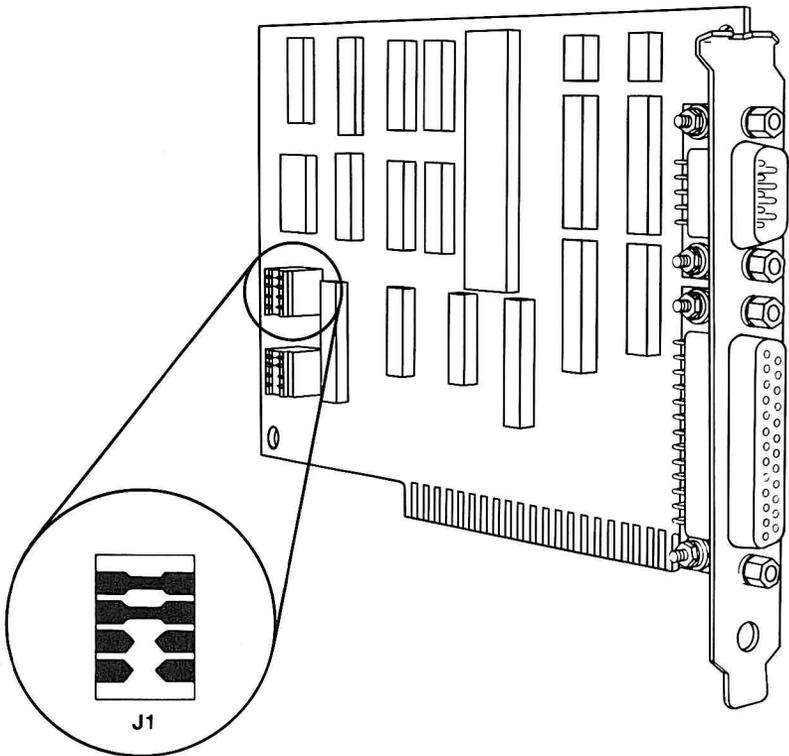


Note: If the cover is not already removed, go to “Cover Removal,” page 4-4.

The Serial Portion of the Serial/Parallel Adapter

- Your Serial/Parallel Adapter comes set to be used as serial adapter number 1. If this is your first serial adapter, no action is required.
- If this is your second serial adapter, remove module J1 and install it as shown below.

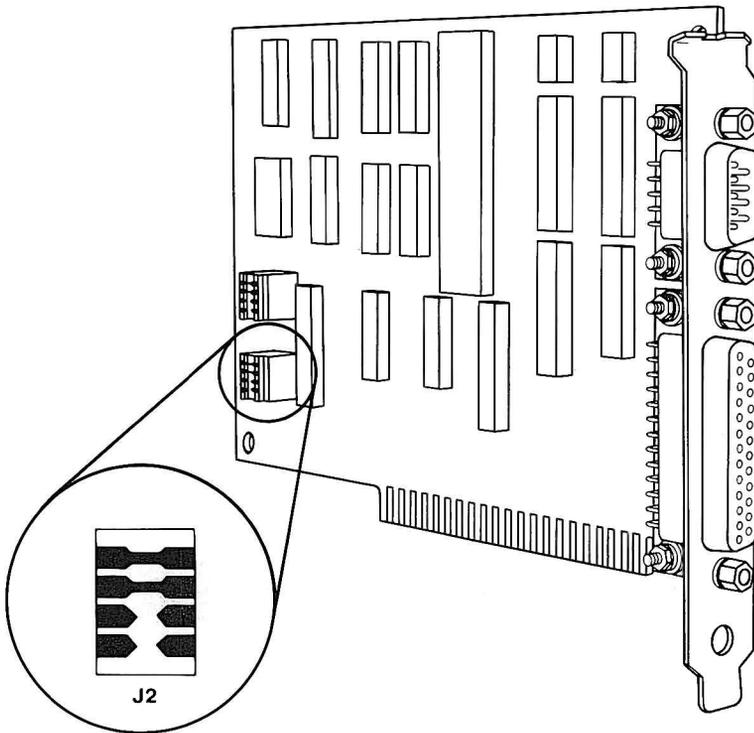
Note: To remove the module, insert a small, flat-blade screwdriver between the module and the socket and lift.



The Parallel Portion of the Serial/Parallel Adapter

- Your Serial/Parallel Adapter comes set to be used as parallel adapter number 1. If this is your first Serial/Parallel Adapter, no action is required.
- If this is your second Serial/Parallel Adapter, remove module J2 and install it as shown below.

Note: To remove the module, insert a small, flat-blade screwdriver between the module and the socket and lift.



How your system assigns parallel printer ports:

The parallel portion of the Serial/Parallel Adapter can be used as parallel adapter LPT1 (printer number 1), LPT2 (printer number 2), or LPT3 (printer number 3).

Note: When an IBM Monochrome Display and Printer Adapter and a Serial/Parallel Adapter are used in your system unit, the IBM Monochrome Display and Printer Adapter is always used by your system unit as LPT1 (printer number 1).

The following combinations show how each parallel adapter is identified by your system unit.

- One Serial/Parallel Adapter

ADAPTERS INSTALLED	LPT1	LPT2	LPT3
One Serial/Parallel Adapter	X	—	—

- Two Serial/Parallel Adapters

ADAPTERS INSTALLED	LPT1	LPT2	LPT3
1st Serial/Parallel Adapter	X	—	—
2nd Serial/Parallel Adapter	—	X	—

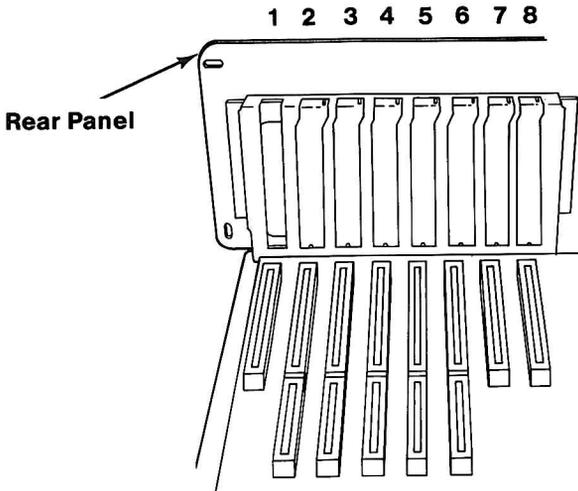
- Monochrome Display and Printer Adapter with one Serial/Parallel Adapter

ADAPTERS INSTALLED	LPT1	LPT2	LPT3
IBM Monochrome Display and Printer Adapter	X	—	—
Serial/Parallel Adapter	—	X	—

- Monochrome Display and Printer Adapter with two Serial/Parallel Adapters

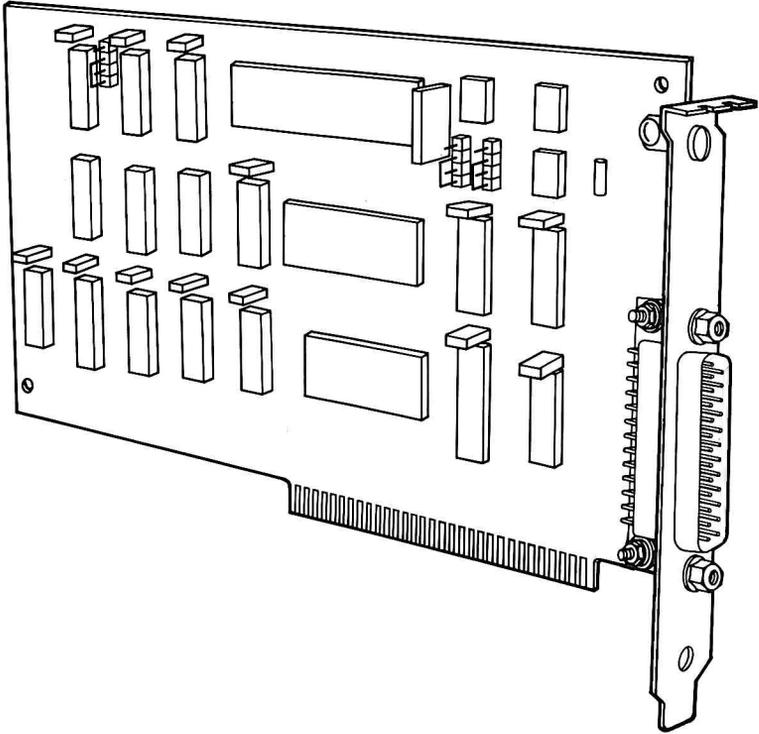
ADAPTERS INSTALLED	LPT1	LPT2	LPT3
IBM Monochrome Display and Printer Adapter	X	—	—
1st Serial/Parallel Adapter	—	X	—
2nd Serial/Parallel Adapter	—	—	X

- 1 You can install the Serial/Parallel Adapter in any available expansion slot.



- 2 Go to "Adapter Installation," page 4-39.

IBM Binary Synchronous Communications (BSC) Adapter

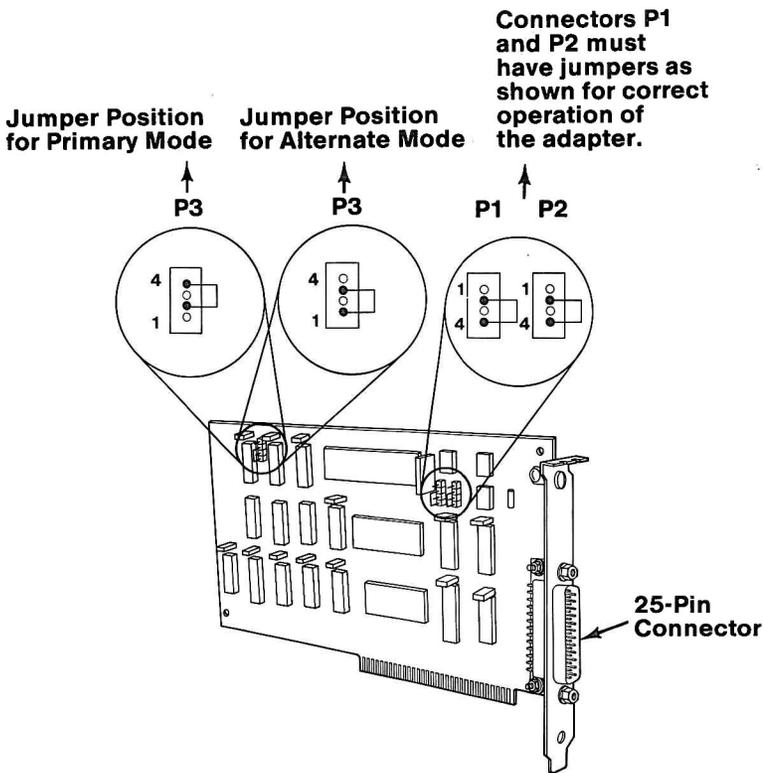


Note: If the cover is not already removed, go to "Cover Removal," page 4-4.

1 The Binary Synchronous Communications (BSC) Adapter is shown below. The primary and alternate modes are determined by the position of the jumper on connector P3.

- Installing the jumper on pins 2 and 4 selects the primary mode.
- Installing the jumper on pins 1 and 3 selects the alternate mode.

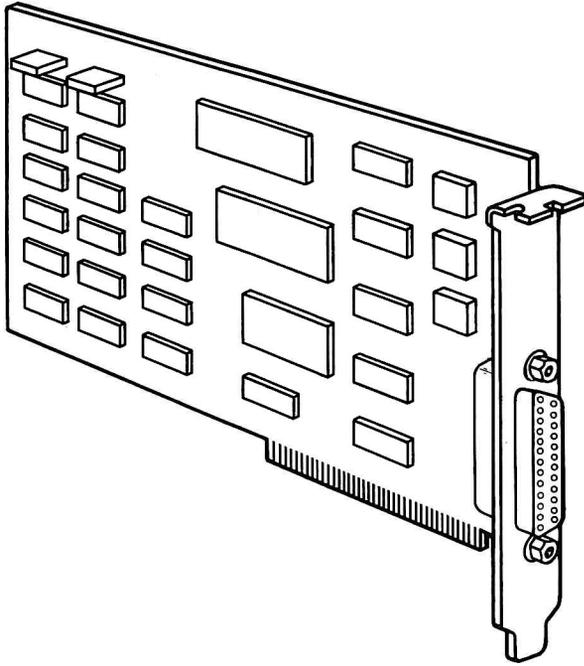
Install the jumper according to your needs.



2 You can install the Binary Synchronous Communications Adapter in any available expansion slot.

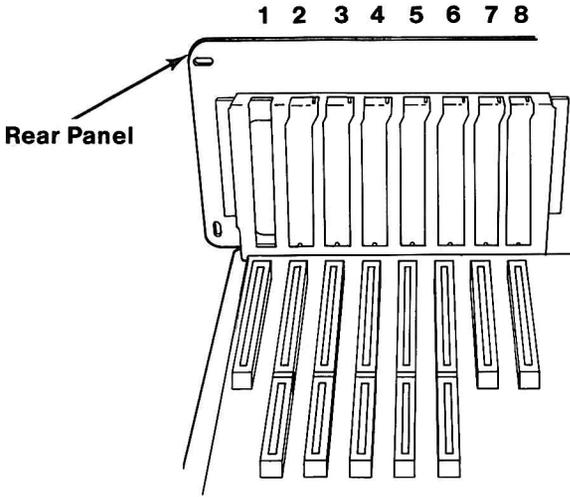
3 Go to "Adapter Installation," page 4-39.

IBM Synchronous Data Link Control (SDLC) Communications Adapter



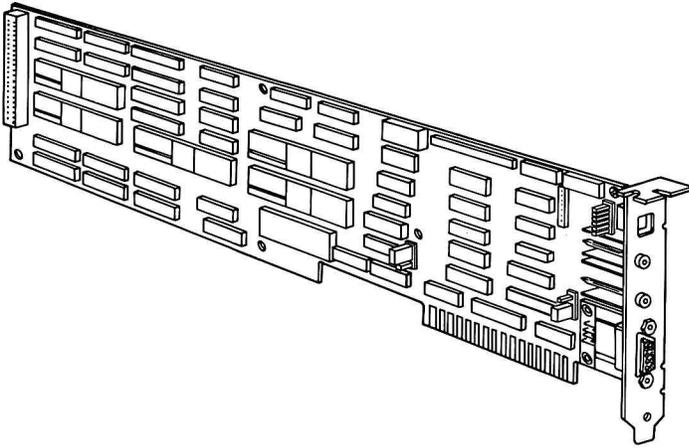
Note: If the cover is not already removed, go to “Cover Removal,” page 4-4.

- 1 You can install the Synchronous Data Link Control (SDLC) Communications Adapter in any available expansion slot.



- 2 Go to "Adapter Installation," page 4-39.

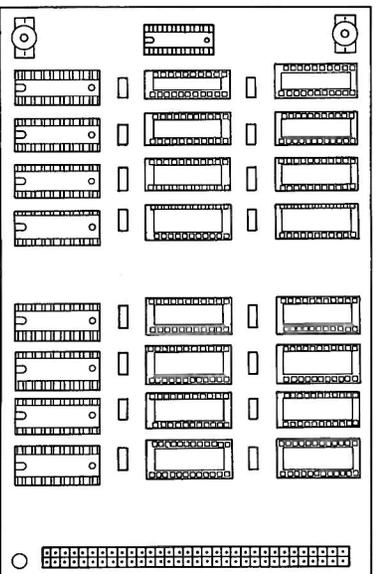
Enhanced Graphics Adapter



- 1 If the cover is not already removed, go to “Cover Removal,” page 4-4.
- 2 Option installation instructions come with your adapter. Use the instruction package for the IBM Personal Computer AT to install your option.
- 3 Discard Package 1.
- 4 Compare the version number of the Diagnostics diskette with the version number of the Diagnostics diskette in this manual. Keep the diskette with the higher version number.
- 5 Discard the first page of Package 2.

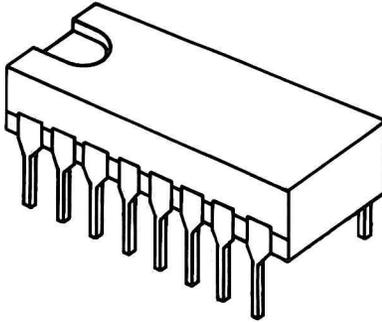
- 6 Insert the “IBM Personal Computer Enhanced Graphics Adapter Installation Instructions” after this page.
- 7 Install your adapter as described in the “IBM Personal Computer Enhanced Graphics Adapter Installation Instructions.”
- 8 If you have other internal options that need to be installed, continue with the installation procedures for those options. If not, go to “Cover Installation,” page 4-42.

Graphics Memory Expansion Card



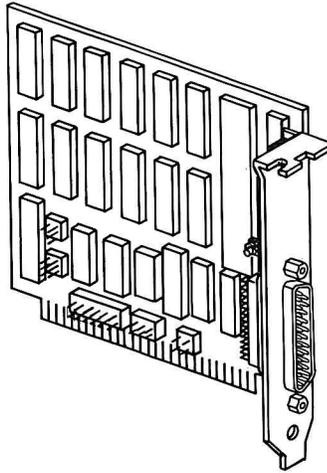
- 1** If the cover is not already removed, go to “Cover Removal,” page 4-4.
- 2** Option installation instructions come with your card. Use the instruction package for the IBM Personal Computer AT to install your option.
- 3** Install your expansion card as described in the installation instructions.
- 4** If you have other internal options that need to be installed, continue with the installation procedures for those options. If not, go to “Cover Installation,” page 4-42.

Graphics Memory Module Kit



- 1 If the cover is not already removed, go to “Cover Removal,” page 4-4.
- 2 Option installation instructions come with your kit. Use the instruction package for the IBM Personal Computer AT to install your option.
- 3 Install your memory module kit as described in the kit installation instructions.
- 4 If you have other internal options that need to be installed, continue with the installation procedures for those options. If not, go to “Cover Installation,” page 4-42.

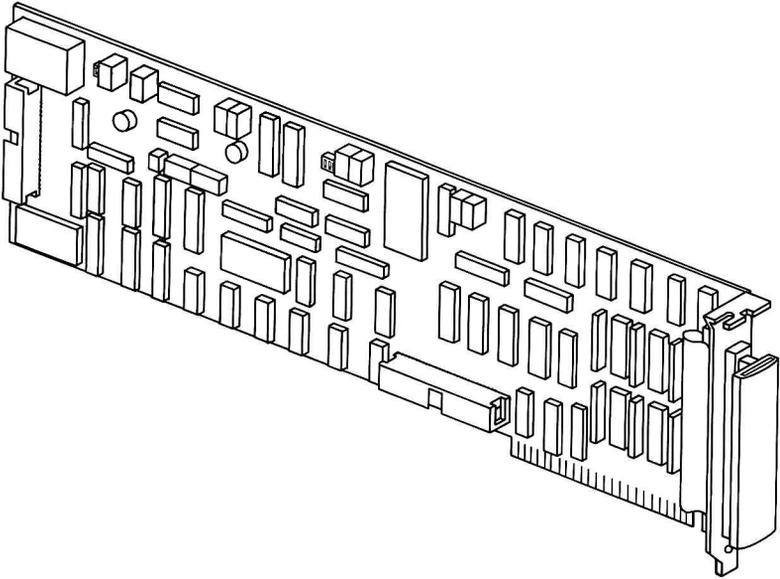
IBM Personal Computer General Purpose Interface Bus Adapter



- 1 If the cover is not already removed, go to "Cover Removal," page 4-4.
- 2 Option installation instructions come with your adapter. Use the instruction package for the IBM Personal Computer AT to install your option.
- 3 Discard Package 1.
- 4 Compare the version number of the Diagnostics diskette with the version number of the Diagnostics diskette in your manual. Keep the diskette with the higher version number.

- 5 Discard the first page of Package 2.
- 6 Insert the “IBM Personal Computer General Purpose Interface Bus Adapter Installation Instructions” after this page.
- 7 Install your adapter as described in the “IBM Personal Computer General Purpose Interface Bus (GPIB) Adapter Installation Instructions.”
- 8 If you have other internal options that need to be installed, continue with the installation procedures for those options. If not, go to “Cover Installation,” page 4-42.

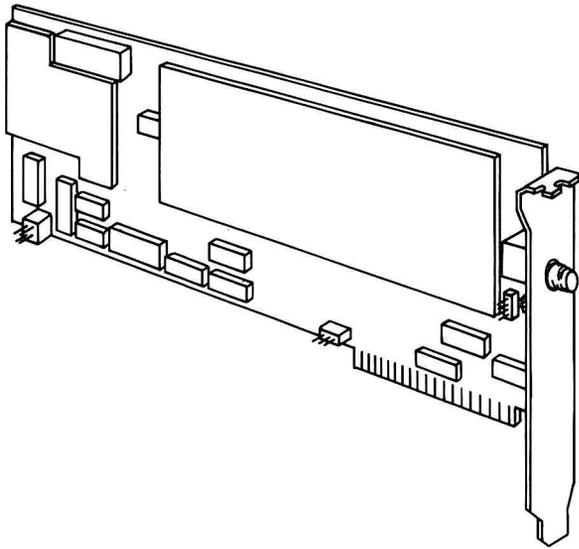
IBM Personal Computer Data Acquisition and Control Adapter



- 1 If the cover is not already removed, go to "Cover Removal," page 4-4.
- 2 Option installation instructions come with your adapter. Use the instruction package for the IBM Personal Computer AT to install your option.
- 3 Discard Package 1.
- 4 Compare the version number of the Diagnostics diskette with the version number of the Diagnostics diskette in your manual. Keep the diskette with the higher version number.
- 5 Discard the first page of Package 2.

- 6 Insert the “IBM Personal Computer Data Acquisition and Control Adapter Installation Instructions” after this page.
- 7 Install your adapter as described in the “IBM Personal Computer Data Acquisition and Control Adapter Installation Instructions.”
- 8 If you have other internal options that need to be installed, continue with the installation procedures for those options. If not, go to “Cover Installation,” page 4-42.

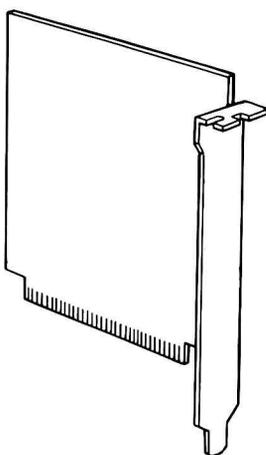
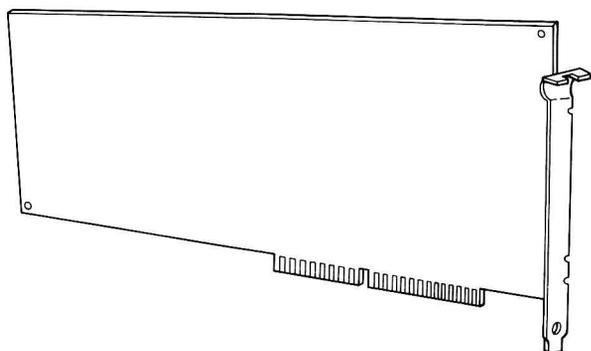
IBM PC Network Adapter



- 1 If the cover is not already removed, go to “Cover Removal,” page 4-4.
- 2 Option installation instructions come with your adapter. Use the instruction packages for the IBM Personal Computer AT to install your option.
- 3 Discard Package 1.
- 4 Compare the version number of the Diagnostics diskette with the version number of the Diagnostics diskette in your manual. Keep the diskette with the higher version number.
- 5 Discard the first page of Package 4.

- 6 Insert the “IBM PC Network Adapter Installation Instructions” after this page.
- 7 Install your adapter as described in the “IBM PC Network Adapter Installation Instructions.”
- 8 If you have other internal options that need to be installed, continue with the installation procedures for those options. If not, go to “Cover Installation,” page 4-42.

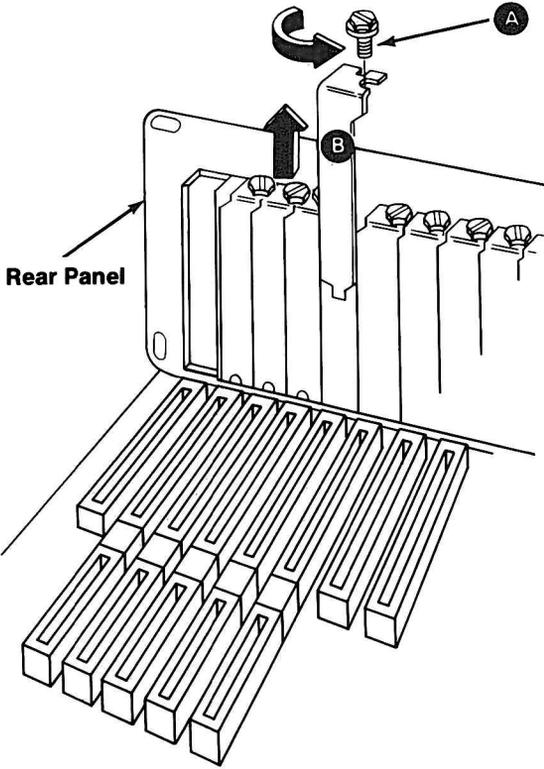
Adapter Installation



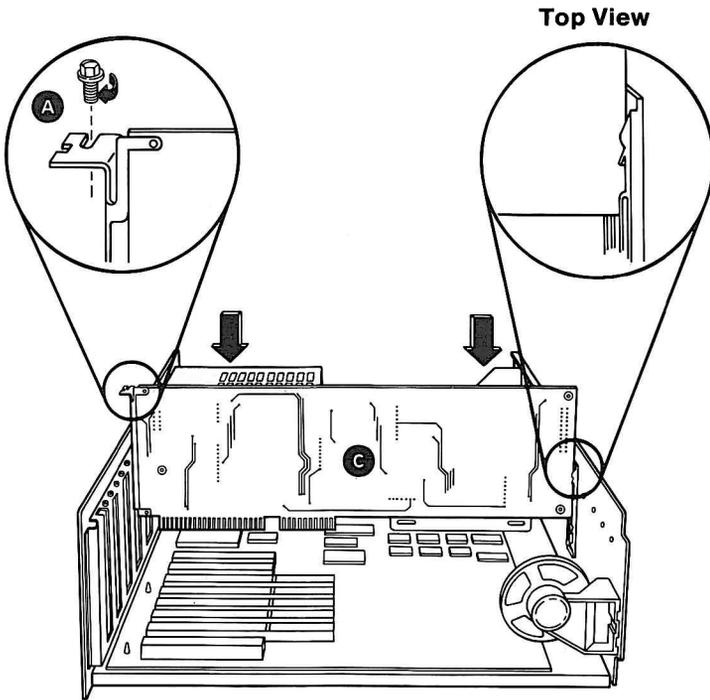
Notes:

1. Do not install the option before you read the installation procedures in this manual.
2. The table of contents gives page numbers for options listed in this manual.
3. If your option is not listed in this manual, read the installation instructions that came packaged with it. Some of the illustrations differ slightly from your system.

- 1 Remove the screw **A** and expansion slot cover **B**. Save the screw and discard the expansion slot cover.



- 2 Hold the adapter **C** by the top and firmly press it into the expansion slot.



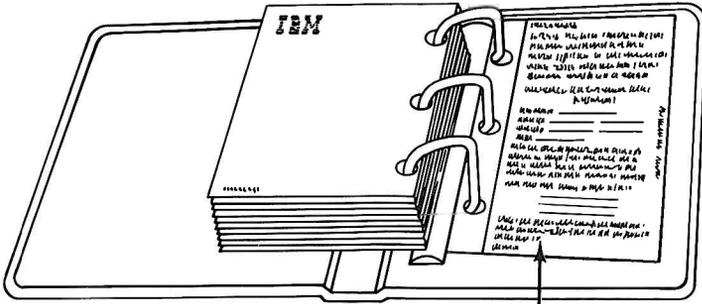
Note: Your IBM computer comes with support brackets installed for all expansion slots. If a support bracket came with your option, it is not needed.

- 3 Install the screw **A** you removed in Step 1.
- 4 If you have other internal options that need to be installed, continue with the installation procedures for those options. If not, go to "Cover Installation," page 4-42.

Cover Installation

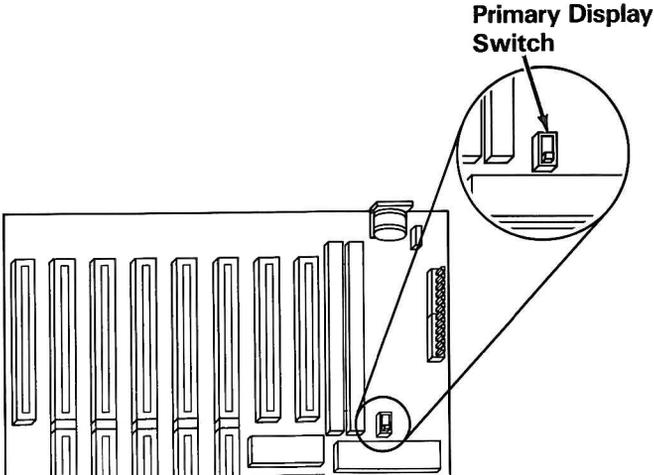
IMPORTANT: Before you install the system unit cover make sure you have:

- Recorded the Setup information. (See the “Setup Information” foldout.)



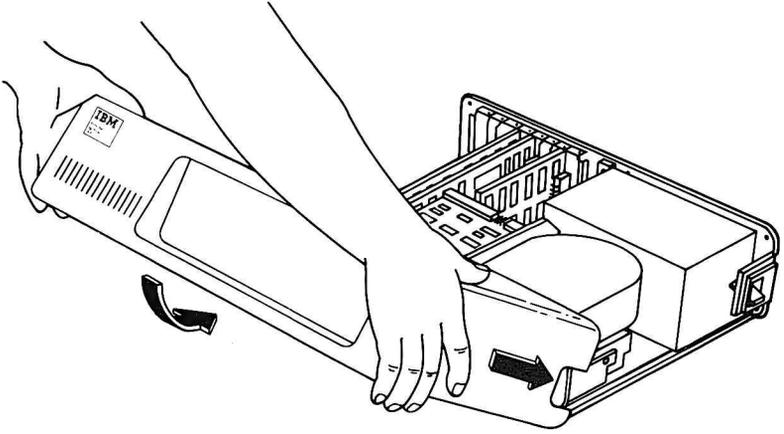
**Setup Information
Foldout**

- Set the primary display switch. (See “Display Adapter Installation” in this section.)



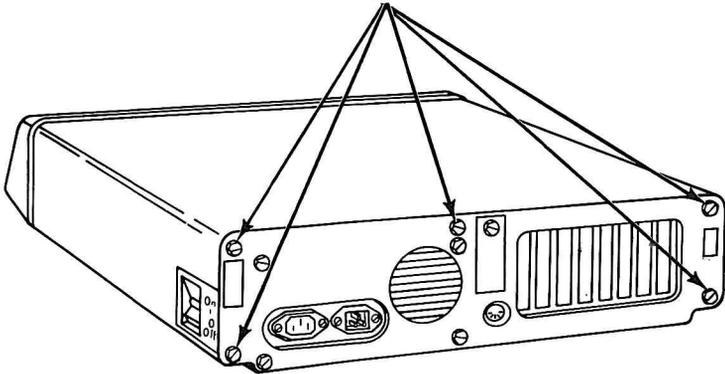
**Primary Display
Switch**

- 1 Install the system unit cover.



- 2 Install the cover mounting screws.

Cover Mounting Screws



- 3 If you have options to install that attach to the outside of your system unit, continue with "External Options," page 4-44. If not, go to "Cabling," page 2-6.

External Options

External options attach to the *outside* of your system unit. Some of the external options available for your system are listed below:

- Displays
- Printer or communication devices
- Cables.

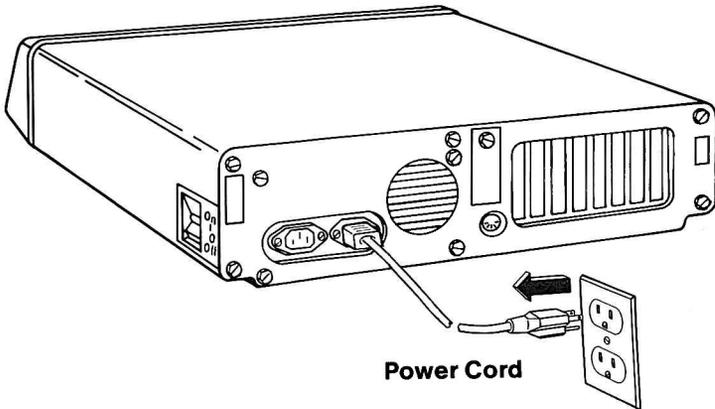
Use the procedures in this section along with the installation instructions that come with your option. Refer to this section's table of contents for specific page numbers. Install external options in any order that is convenient for you.

Note: When separate operating instructions come with your options, you may file them in this manual.

Required Tools

- Medium-size, flat-blade screwdriver
- Medium-size, Phillips screwdriver (printers only).

- 1 Turn off your system unit.
- 2 Turn off all external options (printer, display and others).
- 3 Unplug power cords (system, printer, display and others) from electrical outlets.

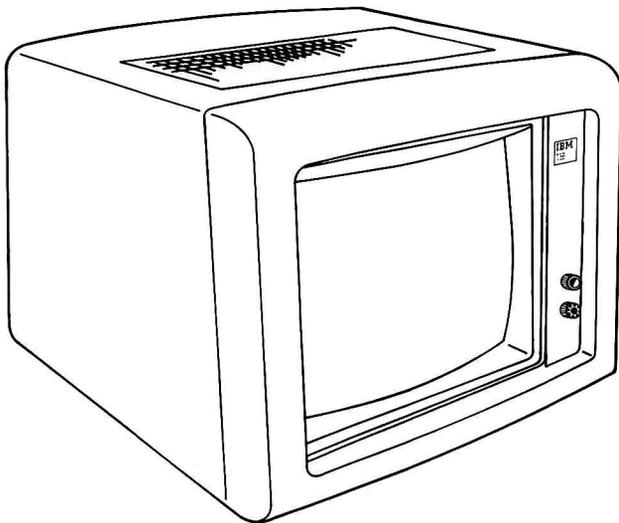


- 4 Continue with the instructions for the option that you are installing.

Notes:

- a. This section's table of contents lists page numbers for options listed in this manual.
- b. If your option is not listed in this manual, use the installation instructions that came packaged with it. Some of the illustrations may differ slightly from your system.

IBM Monochrome Display



Installation Requirements

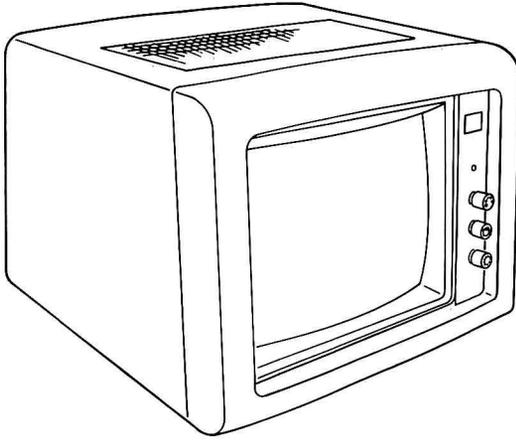
The monochrome display adapter to which you are connecting this option should already be installed in your system. If not, refer to the option instructions for the display adapter. Install the display adapter before continuing.

DANGER

Serious shock hazards exist within the covers of the IBM Monochrome Display. Do not open these covers under any circumstances. There are no user-serviceable parts inside.

- 1 Installation instructions come with your display.
- 2 Insert the Limited Warranty and Cabling Instructions after this page.
- 3 Record the display serial number on the "Setup Information" foldout in this manual.
- 4 Use the Cabling Instructions to connect the IBM Monochrome Display to your system unit.
- 5 If you have other external options that need to be installed, continue with the installation procedures for those options. If not, go to "Cabling," page 2-6.

IBM Color Display



Installation Requirements

The color display adapter to which you are connecting this option should already be installed in your system. If not, refer to the option instructions for the display adapter. Install the display adapter before continuing.

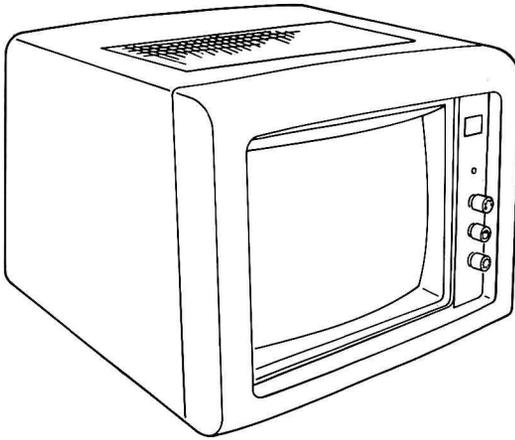
DANGER

Serious shock hazards exist within the covers of the IBM Color Display. Do not open these covers under any circumstances. There are no user-serviceable parts inside.

- 1 Installation instructions come with your display.
- 2 Discard the update pages for Problem Determination Procedures.
- 3 Insert the Limited Warranty and the Installation and Operating instructions after this page.
- 4 Install your IBM Color Display following the "Installation and Operating" instructions.
- 5 Locate the "Setup Information" foldout in this manual and indicate the display mode.
 - 40-column mode allows 40 large characters across the screen.
 - 80-column mode allows 80 smaller characters across the screen.

Note: Some programs will run only in the 80 column mode. You can change the mode by using the Setup program on your Diagnostics diskette. For more information refer to "Setup Program" in Section 2.
- 6 Record the display serial number on the "Setup Information" foldout in this manual.
- 7 If you have other external options that need to be installed, continue with the installation procedures for those options. If not, go to "Cabling," page 2-6.

IBM Enhanced Color Display



Installation Requirements

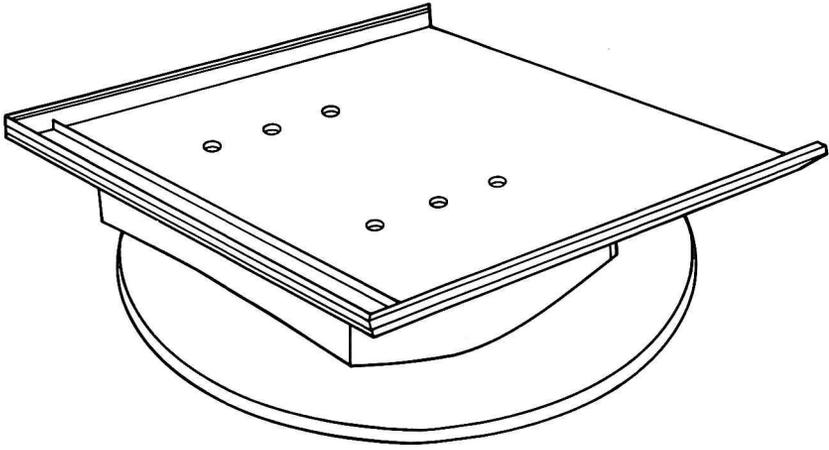
The display adapter to which you are connecting this option should already be installed in your system. If not, refer to the option instructions for the display adapter. Install the display adapter before continuing.

DANGER

Serious shock hazards exist within the covers of the IBM Enhanced Color Display. Do not open these covers under any circumstances. There are no user-serviceable parts inside.

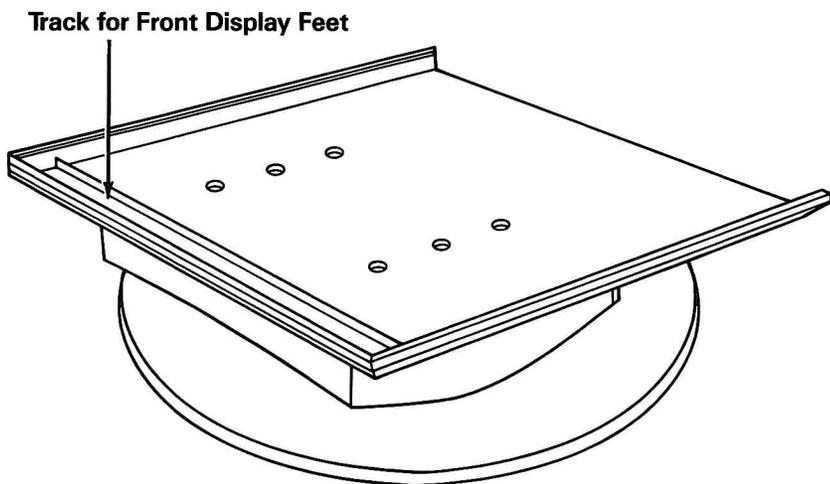
- 1 Installation instructions come with your display. Use the instruction package for the IBM Personal Computer AT to install your option.
- 2 Discard Package 1.
- 3 Discard Package 2.
- 4 Discard the first page of Package 3.
- 5 Insert the "IBM Enhanced Color Display Operating Instructions" after this page.
- 6 Discard the first page of Package 4.
- 7 Insert the "IBM Enhanced Color Display Installation Instructions" after this page.
- 8 Install your display as described in the "IBM Enhanced Color Display Installation Instructions."
- 9 Record the display serial number on the "Setup Information" foldout in this manual.
- 10 If you have other external options that need to be installed, continue with the installation procedures for those options. If not, go to "Cabling," page 2-6.

IBM Personal Computer Display Stand

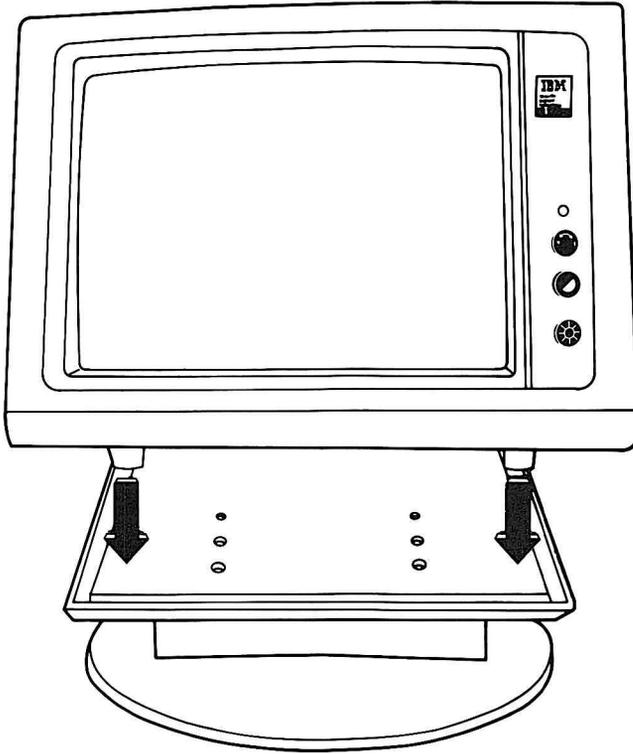


- 1 Place the display stand so the front track faces you.

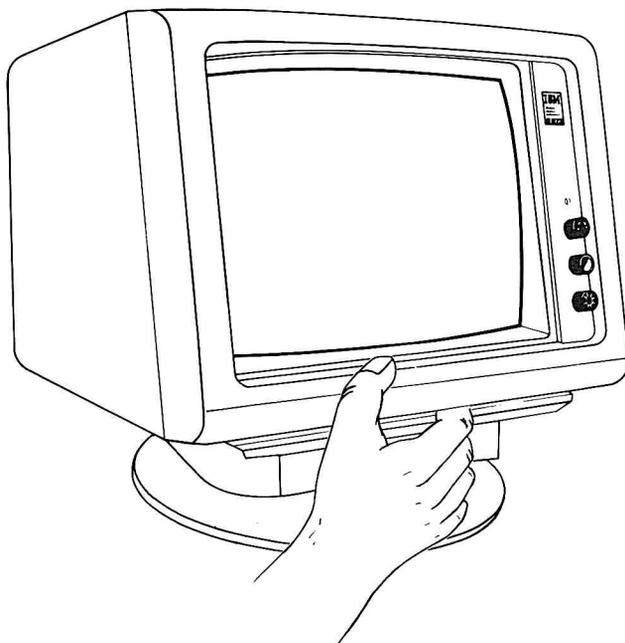
Note: You may find it easier to position your display on the stand with the display cables disconnected.



- 2 Lift and gently place the front feet of your display in the track of the display stand.

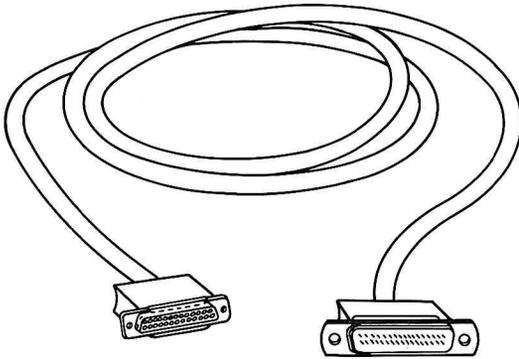


- 3** You can now adjust your display by pivoting the stand up or down and by rotating it.



- 4** If you have any other external options that need to be installed, continue with the installation procedures for those options. If not, go to “Cabling,” page 2-6.

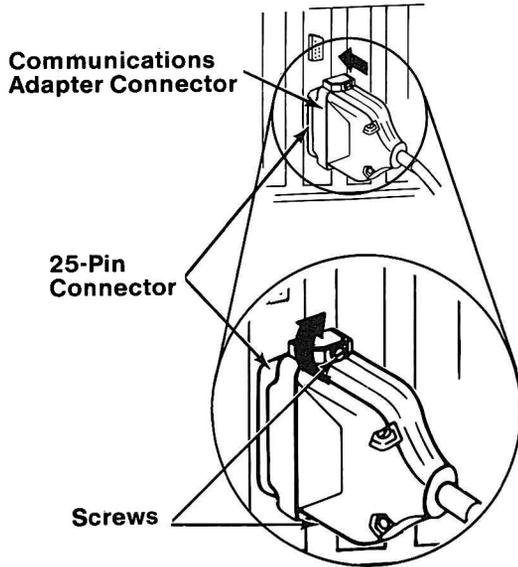
IBM Communications Cable



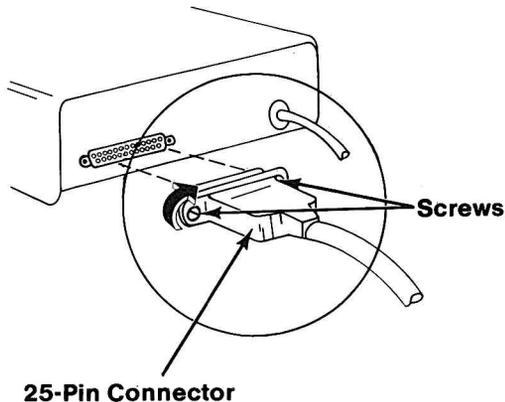
Installation Requirements

The communications adapter to which you are connecting this cable should already be installed in your system. If not, refer to the option instructions for the communications adapter, and install it before continuing.

- 1 Connect the communications adapter cable to the communications adapter connector.

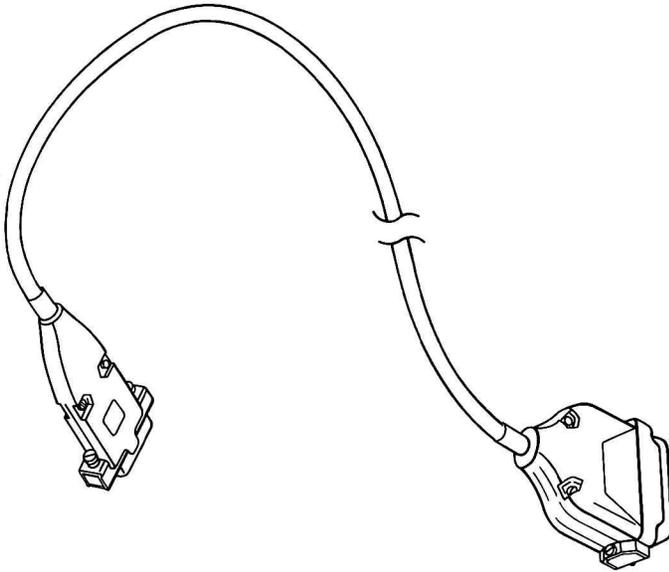


- 2 Connect the other end of the cable to the modem or any other RS-232C data communications equipment.



- 3 If you have other external options that need to be installed, continue with the installation procedures for those options. If not, go to "Cabling," page 2-6.

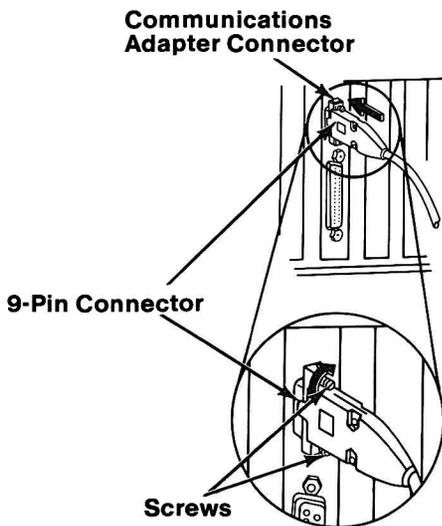
IBM Personal Computer AT Serial Adapter Cable



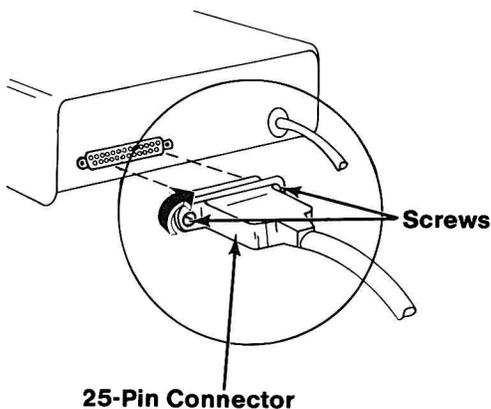
Installation Requirements

The communications adapter to which you are connecting this cable should already be installed in your system. If not, refer to the option instructions for the communications adapter, and install it before continuing.

- 1 Connect the serial adapter cable (9-pin end) to the communications adapter.

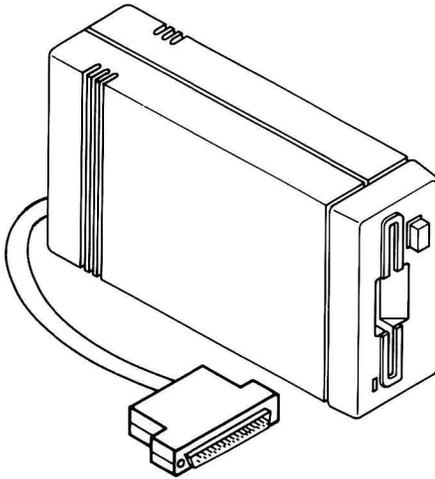


- 2 Connect the other end of the cable (25-pin end) to the modem or any other RS-232C data communications equipment.

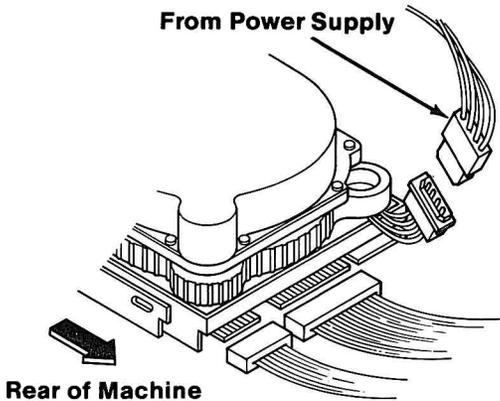


- 3 If you have other external options that need to be installed, continue with the installation procedures for those options. If not, go to "Cabling," page 2-6.

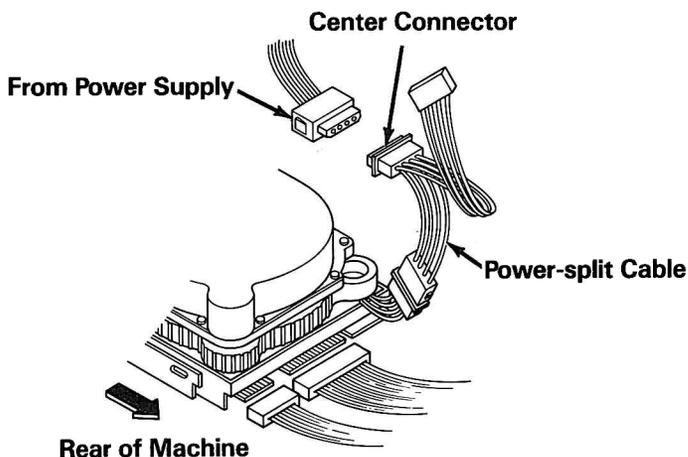
IBM 3.5 Inch External Diskette Drive



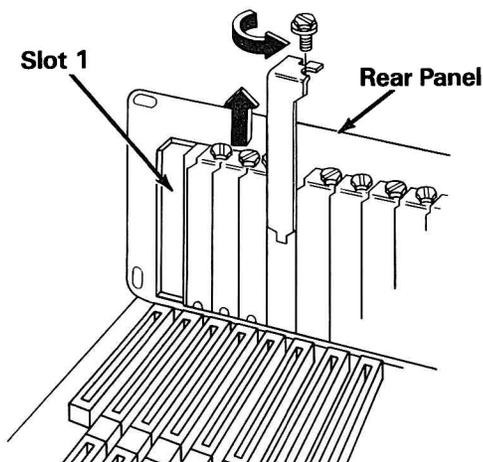
- 1 If the cover is not already removed, go to "Cover Removal," page 4-4.
- 2 Locate the cable from the power supply to the fixed disk drive. Carefully unplug the cable from the fixed disk drive.



- 3** Insert the center connector of the power-split cable into the cable coming from the power supply (disconnected in the previous step). Carefully insert the other wide connector into your fixed disk drive as shown.

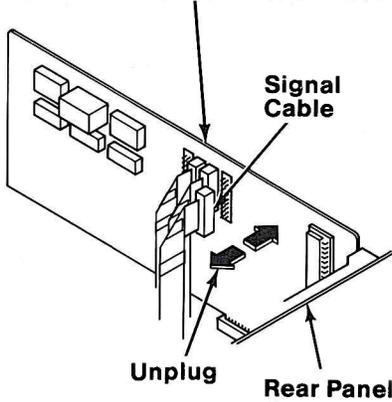


- 4** In Step 10 you will install the External Diskette Adapter in expansion slot 5. If a card is in this slot, move it to another unused slot in your unit. If slot 5 is empty, remove the screw that holds the expansion slot cover. Save the screw for the installation of the adapter. Discard the expansion slot cover.



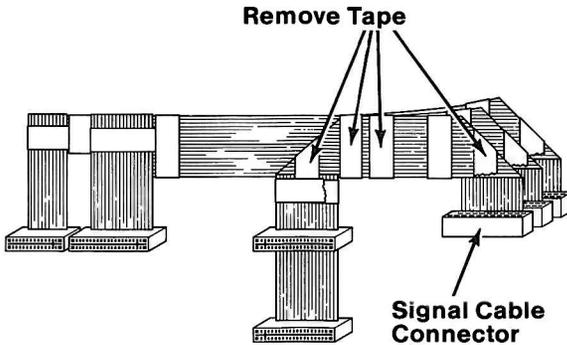
- 5 Unplug the signal cable from the Fixed Disk and Diskette Drive Adapter in Slot 6.

Fixed Disk and Diskette Drive Adapter

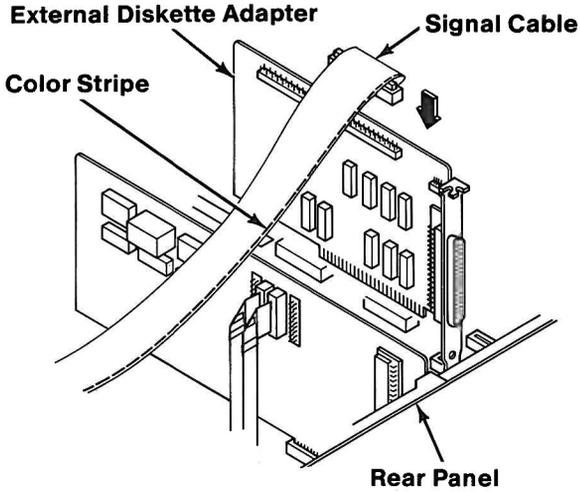


- 6 Refer to the figure below and remove or carefully cut several bands of tape from the cable assembly to allow the signal cable connector to reach the External Diskette Adapter.

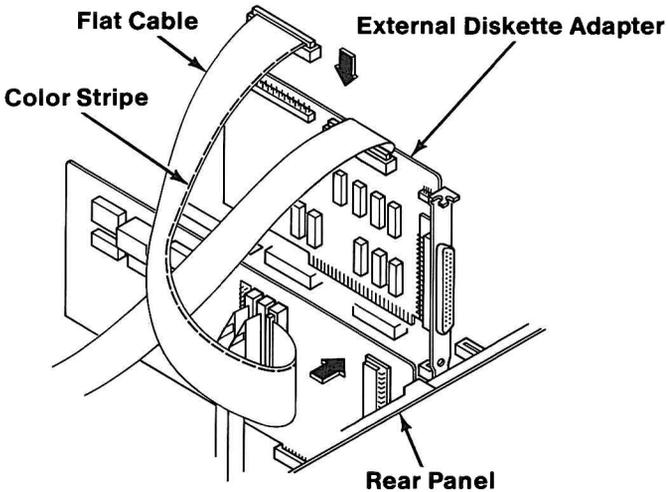
Note: It may be necessary to remove the Fixed Disk and Diskette Drive Adapter to allow access to the tape and cable.



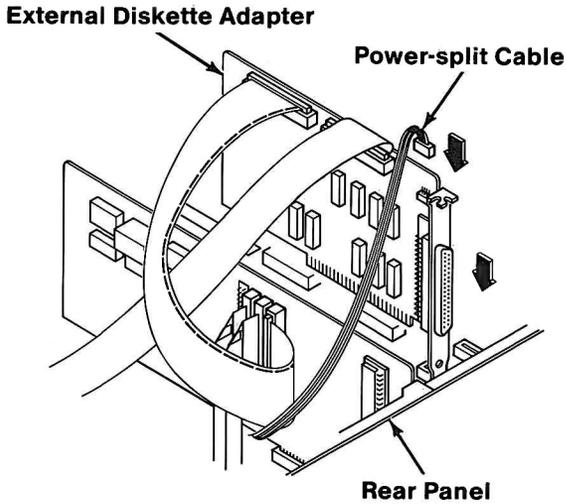
- 7** Plug the signal cable (disconnected in Step 5) into the External Diskette Adapter keeping the color stripe to the right, as shown below. Notice that one pin is blank and aligns with the plugged hole in the data cable.



- 8** Using the flat cable supplied with this option, connect the Fixed Disk and Diskette Drive Adapter to the External Diskette Adapter, as shown. The flat cable must be installed with the color stripe to the right, as shown.

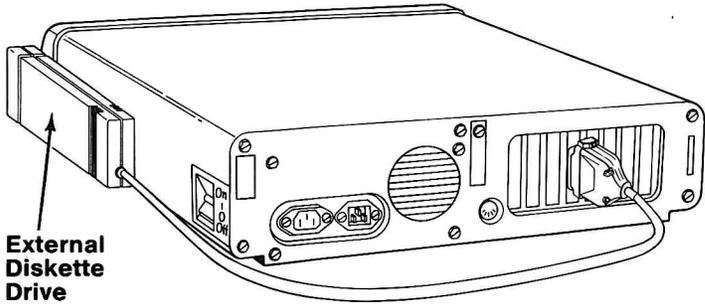


- 9 Attach the small connector on the power-split cable to the power pins on the External Diskette Adapter.
- 10 Hold the adapter card by the top, firmly press it into the expansion slot connector and install the screw.

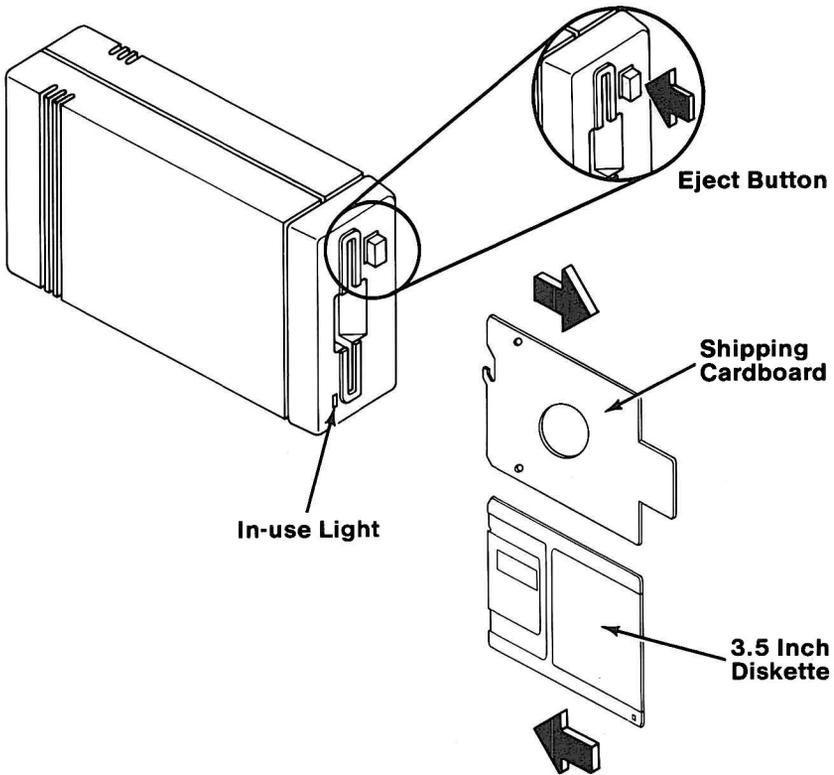


11 If you have other internal options that need to be installed, continue with the installation procedures for those options. If not, go to “Cover Installation,” page 4-42.

12 Insert the external diskette drive connector into the connector on the External Diskette Adapter and tighten the screws on the connector.



- 13 Remove the shipping cardboard by pressing the eject button.



To insert a 3.5 inch diskette, hold it as shown and slide it into the drive until it stops. To remove a diskette, press the eject button.

- 14 If you have other external options that need to be installed, continue with the installation procedures for those options. If not, go to "Cabling," page 2-6.

Note: When installing the 3.5 inch External Diskette Drive, Setup is *not* required to be run. If Setup is run for any reason the 3.5 Inch External Diskette Drive is not considered an installed diskette drive.

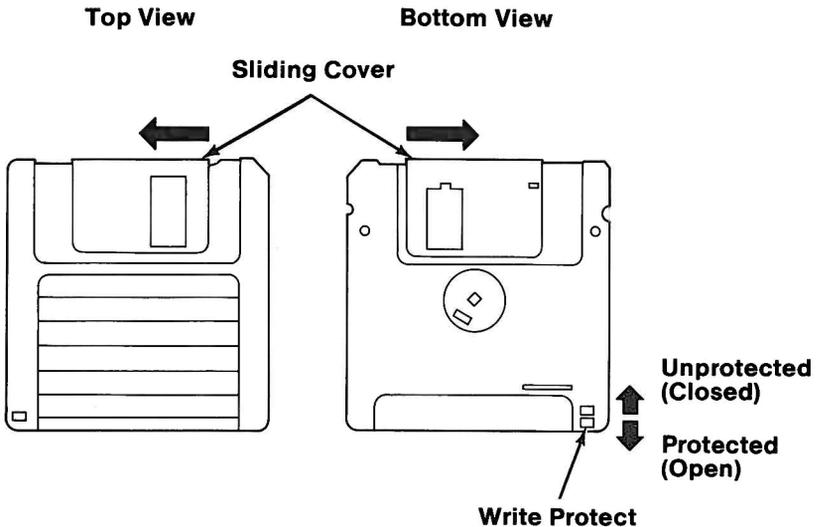
System Test

Compare the version number of the Diagnostics diskette with the version number of the Diagnostics diskette in your manual. Keep the diskette with the higher version number.

To test your system you need:

- A 5.25 inch scratch diskette (formatted)
- A blank 3.5 inch diskette.

Refer to the testing your system sections in your *Guide to Operations* and run the diagnostic tests.



After successfully completing the diagnostic tests, your system is ready for you to begin software installation.

Software Installation

You need the following:

- The Device Driver diskette supplied with your drive
- Either your DOS diskette or DOS on your fixed disk.

Note: The DOS level must be 3.2 or higher.

To use your 3.5 Inch External Diskette Drive, start your system from either a fixed disk, DOS diskette, or self-starting application diskette that is configured to support the external drive. The following procedure explains how to install the device driver program on either a fixed disk drive or on a diskette, if the system contains either one or two 1.2MB diskette drives.

Note: If your system has a second diskette drive (B) that is **not** a 1.2MB diskette drive, go to “Notes to Experienced Users” on page 4-72 and follow the instructions there.

Installation Instructions

- 1 Start your system from your DOS backup diskette or from DOS on your fixed disk if you want to configure your fixed disk. (See the instructions in your *DOS User's Guide* for starting DOS.)
- 2 If you want to configure a self-starting application program diskette, remove the DOS backup diskette and place your self-starting application program diskette in drive A.
- 3 Make sure the file DRIVER.SYS exists by typing:

DIR \DRIVER.SYS and pressing **Enter**. If the message **FILE NOT FOUND** appears on the screen, continue with Step 4, otherwise go to Step 5.

- 4** Insert your original DOS diskette into drive B, (if you do not have a drive B, insert the diskette into drive A) and type:

COPY B:DRIVER.SYS ** and press **Enter.

- 5** Type:

TYPE \CONFIG.SYS and press **Enter**. Look for the following lines on your screen:

```
DEVICE=\EXDSKBIO.DRV  
DEVICE=\DRIVER.SYS /D:2 /T:80 /S:9  
/H:2 /C
```

If these lines already exist, go to Step 10. If these lines are not present or if the file is not found, continue with Step 6.

- 6** Type:

**COPY \CONFIG.SYS + CON
\CONFIG.SYS** and press **Enter**.

- 7** Type:

DEVICE=\EXDSKBIO.DRV and press **Enter**.

8 Type:

**DEVICE=\DRIVER.SYS /D:2 /T:80 /S:9
/H:2 /C** and press **Enter**.

Check that the lines you typed in Steps 7 and 8 are correct before you continue with Step 9. *If the lines are not correct*, press and hold the **Ctrl** key while you press **C** (**Ctrl-C**) and go back to Step 6.

9 Press and hold the **Ctrl** key while you press **Z** (**Ctrl-Z**) and then press **Enter**.

10 Insert the Device Driver diskette (shipped with your drive) into drive A.

11 If you are performing the installation on a diskette, go to Step 12. If you are performing the installation on a fixed disk, go to Step 14.

12 Insert your DOS backup or your self-starting application program diskette into drive B. (If you do not have a drive B, insert the diskette into drive A when prompted.)

13 Type:

Copy A:EXDSKBIO.DRV B: and press **Enter**.

When this command is completed you should label the DOS backup diskette to indicate that it now supports the 3.5 inch drive. Go to Step 15.

14 Type:

Copy A:EXDSKBIO.DRV C: and press **Enter**.

- 15** Save the Device Driver diskette with your system backup diskettes. Your DOS backup or self-starting application diskette (or fixed disk) is now configured to support the 3.5 Inch External Diskette Drive.

This completes the software installation and you are now ready to use your 3.5 Inch External Diskette Drive. Refer to your DOS manuals for additional information.

- 16** Restart your system from either your new DOS working diskette, self-starting application diskette, or fixed disk (press **CTRL-ALT-DEL**).

Operation

The 3.5 Inch External Diskette Drive may be used in a side or flat position.

Warning: Locating the 3.5 Inch External Diskette Drive next to a display unit may cause data errors. To correct the problem, move the external drive to the opposite side or farther away from the display unit.

The in-use light on the diskette drive indicates when the system is using the drive. Do not power off the system or remove a diskette when the in-use light is on.

When you start DOS from a diskette or fixed disk that is configured for a 3.5 Inch External Diskette Drive, DOS assigns the next available drive letter to your 3.5 Inch External Diskette Drive. For example, if you previously had drives A and B, your external drive becomes drive C. If you had diskette drives A and B and a fixed disk as drive C, your external drive becomes drive D. When DOS is initialized, it displays the drive letter that it assigned to your external drive.

Also, you can determine the drive letter of your external drive by entering a DOS DIR command. For example, type DIR C: and press Enter; type DIR D:

and press Enter, and continue until the in-use light on the external drive comes on. When the light comes on, you know that the last drive letter entered is the letter of the external drive.

Be extremely careful to specify the correct drive letter when using DOS commands such as FORMAT and ERASE (DEL) to avoid unintentionally destroying data.

IBM PC Network Program

If you plan to use your 3.5 inch External Diskette Drive with the IBM PC Network program, make sure that you do *not* use the same drive letter DOS assigns to your external drive for a network device. For example, if DOS assigns drive E to your external drive, you may not assign a network device name as E if you want to access your external drive while using the network.

Notes to Experienced Users

Warning: Do not write on a 360KB diskette in your 1.2MB drive if you intend to use that diskette in a 360KB drive.

Support for 3.5 Inch External Diskette Drives is provided through the use of installable device drivers. For DOS to install the device drivers, three files must be present on any diskette or fixed disk from which DOS is started:

- EXDSKBIO.DRV

The EXDSKBIO.DRV file is an extension to BIOS that provides support for external diskette drives. The driver is installed when DOS is started and remains resident for AT systems only. Copy the EXDSKBIO.DRV file from the Device Driver diskette to your self-starting diskette.

- **DRIVER.SYS**

The DRIVER.SYS file is a generic diskette driver and an extension to DOS that provides DOS support for external diskette drives. The driver is installed with DOS and remains resident. Copy the DRIVER.SYS file from your original DOS diskette to your self-starting diskette.

- **CONFIG.SYS**

The CONFIG.SYS file contains commands that are used to configure your system. Two entries in the CONFIG.SYS file are required for DOS to install the 3.5 Inch External Diskette Device Drivers. The CONFIG.SYS file must be appended or created (if it does not exist) with the following entries:

```
DEVICE=\EXDSKBIO.DRV
```

```
DEVICE=\DRIVER.SYS /D:2 /T:80 /S:9  
/H:2 /C
```

(See the DOS manuals for an explanation of these switch options.)

To perform this installation insert your self-starting diskette in the appropriate drive and make it the default drive. Do Step 5 on page 4-69 and look for the files indicated. If these files exist, go to Step 15 on page 4-71. If these files do not exist, do Steps 6 on page 4-69 through 9 and then go to Step 15 on page 4-71.

Notes:

Section 5. TESTING YOUR SYSTEM

Testing

Problems with your system can be caused by software, hardware, or both. This section will help you determine the cause of a problem and what to do about it.

Note: Use this section to test *only* IBM products. Non-IBM products may give invalid errors or system responses.

Some devices that attach to your system have manuals with test instructions, which you should refer to when testing those devices.

If you are not having problems with your system and just want to verify that it is operating correctly, begin with "System Tests" on page 5-11.

If you decide to return your system for service, remember to bring the power cords and keys. This manual has the information you need for moving your system in Section 3.

Some options that you may add to your system have replacement or additional pages for this section and a Diagnostics diskette. Compare the date of the replacement pages with the date of the pages in this "Testing" section. Keep the pages with the later date. Compare the version number of the Diagnostics diskette with the version number of the Diagnostics diskette in this manual. Keep the diskette with the higher version number.

First, make a note of any symptoms or messages you may have received then continue with the next page.

Software

When using software, you may receive error messages. You should refer to the software manual for a description of those messages.

Before you continue, ensure that:

- The software is designed for your system.
- Your system meets the minimum requirements to use the software.
- Your software works on another system.

If the items listed above do not help, continue with “Hardware” on the next page.

Hardware

Before you continue, ensure that:

- The electrical outlet is working.
- All cables and power cords are connected properly.
- Everything is turned on.
- Contrast and Brightness controls are adjusted properly.

If you have just installed an option, ensure that:

- The option is designed for your system.
- The option was installed according to the instructions.

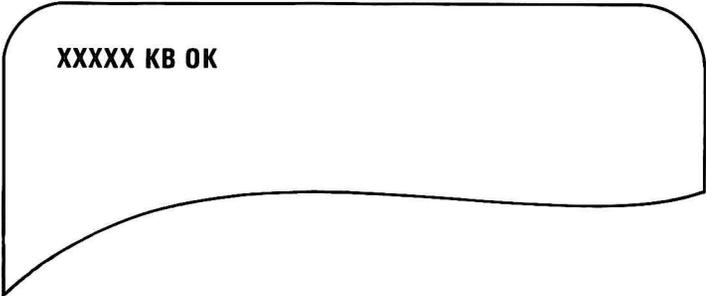
If the items listed above do not help, continue with “Self-Test” on the next page.

Self-Test

Your system performs an automatic self-test each time you turn it on. Follow these steps to observe the self-test.

Pay close attention to the beeps.

- 1 Turn off your system.
- 2 Get the Diagnostics diskette from the back of this manual.
- 3 Load the diskette into drive A.
- 4 Turn on your system.
- 5 The memory size appears in the top left corner of the screen and increases until it matches the amount of memory installed in your system.



XXXXX KB OK

6 **Did your system respond in the following manner?**

- Diskette drive light flashes.
- One clear BEEP.

YES Continue with the next step.

NO Go to "Setup Messages" on page 5-6.

7 The following screen appears.

**The IBM Personal Computer
DIAGNOSTICS
Version X.XX
(C)Copyright IBM Corp. XXXX, XXXX**

SELECT AN OPTION

- 0 – SYSTEM CHECKOUT**
- 1 – FORMAT DISKETTE**
- 2 – COPY DISKETTE**
- 3 – PREPARE SYSTEM FOR MOVING**
- 4 – SETUP**
- 9 – END DIAGNOSTICS**

SELECT THE ACTION DESIRED

?

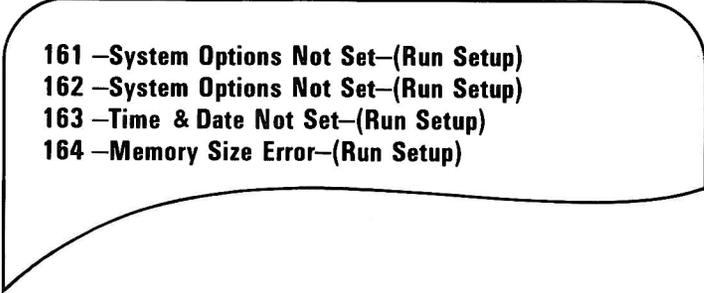
If your system did not respond as described, continue with “Setup Messages” on the next page.

If the correct responses occurred, but you still suspect a problem, go to “System Tests” on page 5-11.

Setup Messages

If you received any of the following messages, continue with “Running the Setup Program” on this page.

If you did *not* receive any of the following messages, continue with “Self-Test Error Messages” on page 5-7.



- 161 –System Options Not Set–(Run Setup)**
- 162 –System Options Not Set–(Run Setup)**
- 163 –Time & Date Not Set–(Run Setup)**
- 164 –Memory Size Error–(Run Setup)**

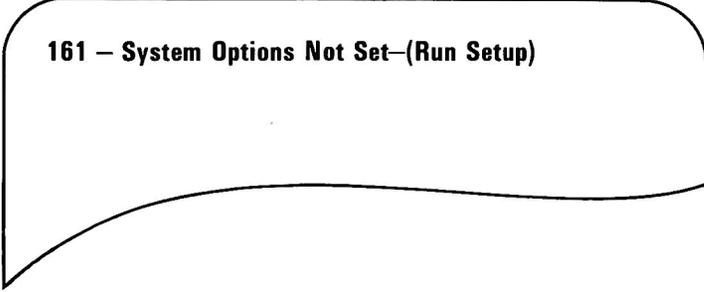
Running the Setup Program

This program allows you to tell your system the date, time, and what type of options you have installed. Press **F1** and follow the instructions on your screen. Refer to the “Setup Information” foldout as you answer the Setup program questions.

If you have problems running the Setup program, refer to “Setup Program” in Section 2 of this manual.

If you cannot correct the setup message, have the system unit serviced.

Note: If you have to run the Setup program each time you turn on your system because you receive the following message, replace your battery.



- 161 – System Options Not Set–(Run Setup)**

Self-Test Error Messages

Find the message you received and take the action described.

302 –System Unit Keylock is Locked

Action Unlock the system unit key lock and press **F1**.
If the key lock is unlocked, have the system unit serviced.

**6XX – Diskette Boot Record Error
or
Diskette Boot Failure**

(X can be any number.)

Action Make sure you are using the Diagnostics diskette and that it is loaded correctly.

Try to start the Diagnostics diskette again. If you still cannot start diagnostics, have the system unit serviced.

If you did not receive either of the error messages listed above, continue on the next page.

If you received any of the following messages, take the action described.

105 –Keyboard or System Unit Error
301 –Keyboard Error
303 –Keyboard or System Unit Error
304 –Keyboard or System Unit Error

Action Make sure nothing is resting on the keyboard holding a key down. If nothing is holding a key down, try the following:

1. Turn off the system unit.
2. Unplug the keyboard from the system unit.
3. Turn on the system unit.

If a **301** error remains, have the keyboard and keyboard cable serviced.

If a **105**, a **303** or a **304** error remains, have the system unit serviced.

If you did not receive any of the error messages listed above, continue on the next page.

If you received any of the following messages, have the system unit serviced. (X can be any number.)

1XX-System Board Error
20X-Memory Address Error
401-CRT Error
501-CRT Error
1780-Disk 0 Failure
1781-Disk 1 Failure
1782-Disk Controller Failure
1790-Disk 0 Error
1791-Disk 1 Error
22XX-Cluster Failure
30XX-Network Failure
 except 3015* and 3042*
31XX-Network Failure
 except 3115* and 3142*
ROM Error
????
Parity Check 1
Parity Check 2

If you did not receive any of the error messages listed above, continue with "Failure Symptoms" on the next page.

*If you receive one of these errors, have the network serviced.

Failure Symptoms

If your system has any of the following symptoms, take the action described. If your system has more than one of the symptoms, take the action described for the *first* symptom.

SYMPTOM	ACTION
No BEEP	Have the system unit serviced.
More than one BEEP	Have the system unit serviced.
None of the keys on the keyboard work	Have system unit, keyboard, and cable serviced.
Only some of the keys on the keyboard work	Have the keyboard and cable serviced.
Totally blank screen	Continue with "Display Problems" on page 5-17.
No cursor displayed	Have the system unit serviced.
Only the cursor is displayed	Have the system unit serviced.
Screen is unreadable	Continue with "Display Problems" on page 5-17.
Missing characters on the screen	Continue with "System Tests" on the next page.
Wrong characters on the screen	Have the system unit serviced.
Wrong Screen Appears	Have the system unit serviced.

If your system does not have any of the symptoms listed above, continue with "System Tests" on the next page.

System Tests

If you have already loaded the Diagnostics diskette, begin with Step 6 on page 5-12.

- 1 Turn off the system unit.
- 2 Get the Diagnostics diskette from the back of this manual.
- 3 Load the diskette into drive A.
- 4 Turn on the system unit.
- 5 If you receive the following message, press the F1 key and continue.

(RESUME="F1"KEY)

6 You will need a blank formatted diskette for each drive installed in your system. Before formatting a diskette remember:

- Use the correct diskette for each type of drive you have. For example, format only a high capacity diskette in a high capacity drive.
- If you cannot format the diskette, try another diskette. If the second diskette cannot be formatted either, have the system unit serviced.

7 Select **1 - FORMAT DISKETTE** and follow the instructions on the screen to format a diskette for *each* drive.

SELECT AN OPTION

- 0 - SYSTEM CHECKOUT**
- 1 - FORMAT DISKETTE**
- 2 - COPY DISKETTE**
- 3 - PREPARE SYSTEM FOR MOVING**
- 4 - SETUP**
- 9 - END DIAGNOSTICS**

ENTER THE ACTION DESIRED

?

8 When the screen above reappears, make sure the Diagnostics diskette is in Drive A.

9 Select 0 - SYSTEM CHECKOUT.

During testing, questions about your installed options may appear. Answer as required.

10 A list will appear describing installed devices. If the list is correct, press **Y** then **Enter** (↵) and continue with the next step.

Note: If your printer is missing from the list, press **Y** then **Enter** (↵) and continue with the next step. When you have completed "System Tests," go to "Printer Problems" page 5-21.

If the list is incorrect, have your system unit serviced.

12 Did the following screen appear indicating your system has finished testing?

SELECT AN OPTION

0 – SYSTEM CHECKOUT

1 – FORMAT DISKETTE

2 – COPY DISKETTE

3 – PREPARE SYSTEM FOR MOVING

4 – SETUP

9 – END DIAGNOSTICS

ENTER THE ACTION DESIRED

?

YES If you noted an error message or still suspect a problem, continue with the next step.

NO Have your system unit serviced.

- 13** Look for your symptom in the following figure. If your system has more than one of the symptoms, take the action described for the first symptom.

SYMPTOM	ACTION
Any 3XX error message	Have the keyboard and cable serviced.
Key lock does not lock out keyboard	Have the system unit serviced.
Display problems	Continue with "Display Problems" on the next page.
432 error message	Continue with "Printer Problems" on page 5-21.
Any printer error or problems	Continue with "Printer Problems" on page 5-21.
Tests stop and you cannot continue	Have the system unit serviced.
Any other error message	Have the system unit serviced.

(X can be any number.)

If you have reached this point and still suspect a problem, you may want to seek technical assistance. A focal person trained to help with specific technical problems, such as communications, may be available at your location or place of purchase.

Display Problems

Make sure that the display or television controls are adjusted properly.

If you are using a television, verify that it is working correctly by disconnecting the TV from the system and operating the TV normally.

Displays With Self-Test

Some displays have their own tests. Check the instructions that came with your display for any self-tests that may have been included.

IBM Monochrome Display

If you are having problems with a monochrome display and received one beep when you turned on the system unit, have the display serviced. If you received any other audio response, have the system unit serviced.

IBM Color Displays

If you are having problems with an IBM color display, continue on the next page.

1 Turn on the system unit.

2 Turn on the display.

3 Turn off the system unit.

Did the screen change to white?

YES Go to Step 7.

NO Continue with the next step.

4 Turn off the display.

5 Disconnect the display signal cable from the system.

6 Turn on the display.

Is the screen white?

YES Have the system unit serviced.

NO Have the display serviced.

7 While watching the screen, turn on the system unit.

Did the screen change from white to black?

YES Continue with the next step.

NO Have the display serviced.

- 8** If your display has one of the following symptoms, take the action described.

SYMPTOM	ACTION
Blank screen	Have the system unit serviced.
Wrong or missing colors	Have the display serviced.

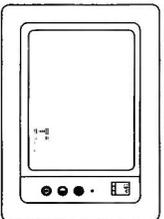
If the symptom is not listed, continue with the next step.

- 9** Operate the controls listed below:

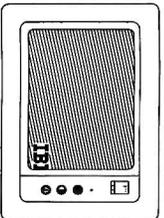
- Brightness
- Contrast
- Vertical Hold
- Vertical Size.

If any of the controls listed above do not work, have the display serviced. If all of the controls work, continue with the next step.

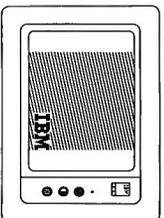
10 Is the problem similar to the examples shown below?



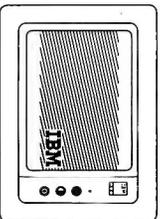
Too Dim



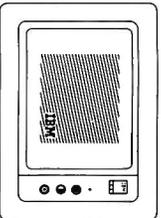
Too Wide



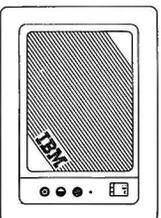
Too Narrow



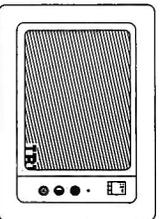
Too Short



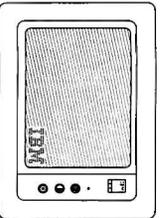
Too Small



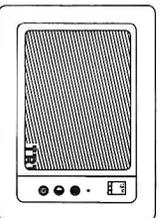
Tilted



Changes Size When Brightness Control Turned



Out of Focus



Characters Shifted Left or Right, or Up and Down Off the Display Area

YES Have the display serviced.

NO Have the system unit serviced.

Printer Problems

Refer to the manual that came with your printer and check to see if your printer is:

- Turned on
- Ready (Online).

Printers may have their own tests. Refer to the manual that came with your printer and run the printer tests. If the printer tests work, have the system unit serviced. If the printer tests do not work, have the printer and cable serviced.

Notes:

Appendix A. Keyboard Templates

Introduction	A-3
French	A-5
German	A-7
Italian	A-9
Spanish	A-11
U.K. English	A-13
U.S. English	A-15

Notes:

Introduction

This section contains layouts for some of the national language keyboards available for use with the IBM Personal Computer. They show keytop characters and key locations supported by a national language keyboard routine (KEYBxx). Additional available characters are listed on the back of each layout. All templates and languages (except U.S. English) are for the 102-key keyboard. If they are used with a U.S. English 101-key keyboard, not all characters will be available. The shaded areas on the keyboard templates are keys that are not available if used on the U.S. English keyboard.

If you do not use DOS, your keyboard converts all keystrokes as if you had a U.S. English keyboard. You should use the U.S. English template as a guide.

Note: To type a character that is on the front face of a keytop, press and hold the right **Alt** key, then press the key with the desired character.

Notes:

CARACTERES SUPPLEMENTAIRES



1. Appuyez et maintenez

2. Frappez le code de trois chiffres sur le clavier numérique.



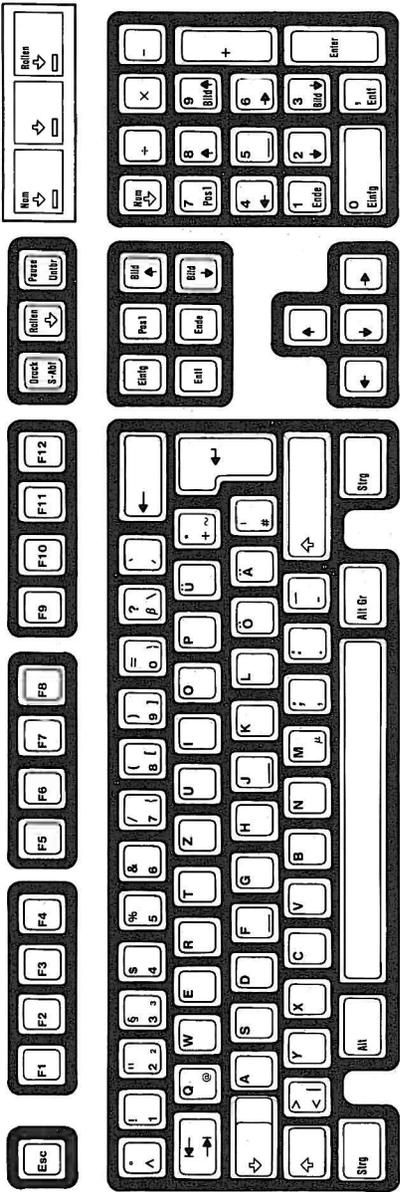
3. Relachez

096 ' 145 œ 164 ñ 175 » 234 Ω 245 J
123 ¡ 146 Æ 165 Ñ 224 ¼ 235 ó 246 +
124 ¨ 149 ö 166 ã 225 β 236 ∞ 247 ≈
125 ¡ 155 ç 167 ø 226 Γ 237 Ø 249 •
126 ~ 157 ¥ 168 ÷ 227 π 238 € 250 •
127 □ 158 Pts 169 — 228 Σ 239 ∩ 251 √
134 å 160 á 170 — 229 σ 240 ≡ 252 °
141 ï 161 í 172 ¼ 230 μ 241 ÷ 253 ²
143 Å 162 ó 173 ï 231 T 242 ≥ 254 ■
144 É 163 ú 174 « 232 Q 243 ≤ 244 ∫

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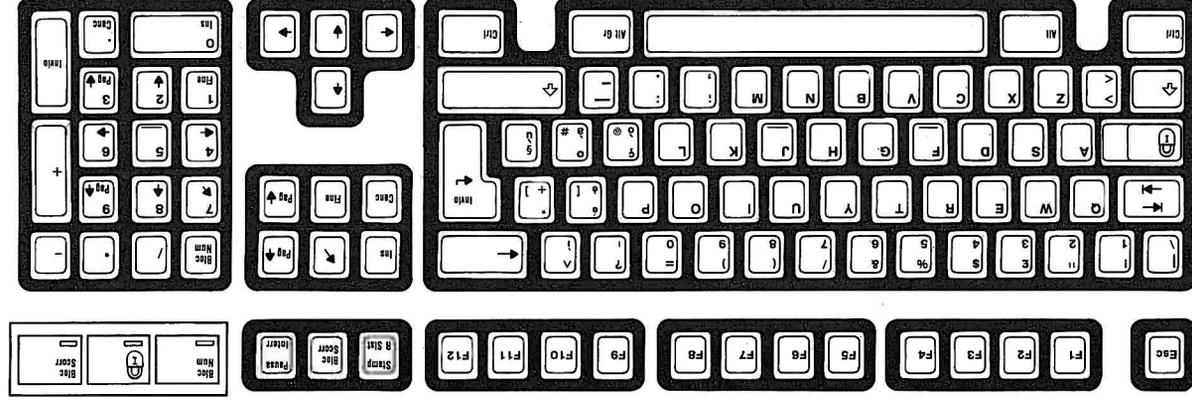
German

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Italian

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CARATTERI AGGIUNTIVI



1. Premere e tenere premuto il tasto

2. Battere un codice di tre cifre sulla tastiera numerica.



3. Rilasciare il tasto

096	!	143	Å	159	f	172	¼	233	Θ	246	+
127	△	144	É	160	á	173	ı	234	Ω	247	≈
128	Ç	145	œ	161	ı	174	«	235	δ	248	°
129	ü	146	Æ	162	ó	175	»	236	∞	249	•
131	ä	147	ö	163	ü	224	œ	237	∅	250	•
132	ä	148	ö	164	À	225	β	238	€	251	√
134	å	150	ü	165	Ñ	226	Γ	239	∩	252	π
135	ç	152	ÿ	166	ã	227	π	240	≡	253	²
136	é	153	Ö	167	ø	228	Σ	241	±	254	■
137	ë	154	Ü	168	ı	229	σ	242	≥	255	
139	ı	155	ç	169	┌	230	μ	243	≤		
140	ı	157	₣	170	┐	231	T	244	Γ		
142	Å	158	Pts	171	½	232	Φ	245	J		

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CARACTERES ADICIONALES



1. Pulse y manténga pulsada la tecla
2. Teclee un código de 3 dígitos en el teclado numérico (Lado derecho del teclado)
3. Libere

123	456 £	172 ¼	230 μ	239 ∩	248 °
124	157 ¥	174 «	231 T	240 ≡	249 •
125	158 Pls	175 »	232 ♂	241 ÷	250 •
126 ~	159 f	224 ∞	233 ⊗	242 ≥	251 \
127 □	166 ¢	225 β	234 Ω	243 ≤	252 n
134 &	167 ¢	226 Γ	235 δ	244 ∩	253 z
145 œ	169 —	227 π	236 ∞	245 J	254 ■
146 Æ	170 —	228 Σ	237 ∅	246 +	
155 ¢	171 ½	229 σ	238 €	247 ≈	

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ADDITIONAL CHARACTERS



1. Press and hold

2. Type 3-digit code on numeric keypad.



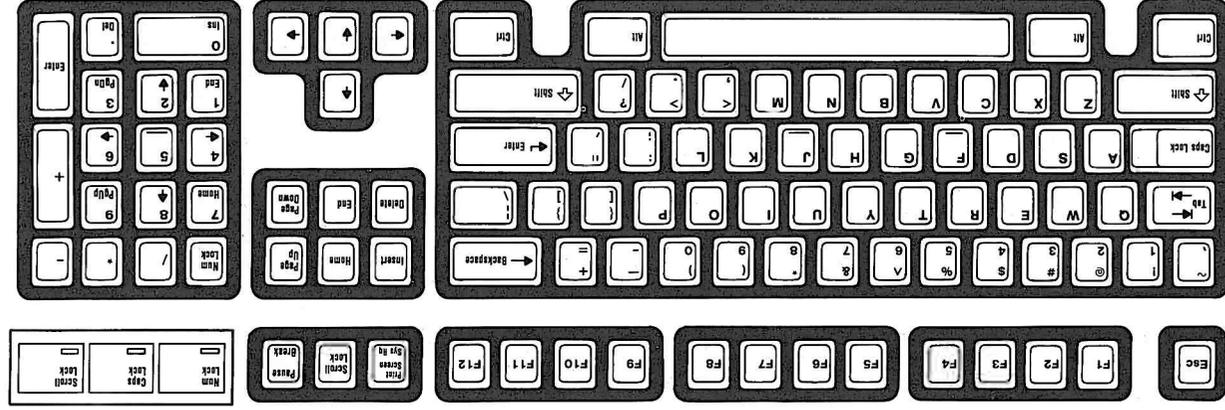
3. Release

127	△	141	;	155	¢	169	┌	231	┐	246	+
128	Ç	142	À	156	£	170	┐	232	◊	247	≈
129	ü	143	Á	157	¥	171	½	234	Ω	248	°
130	é	144	Ê	158	Pls	172	¼	235	ó	249	•
131	ä	145	æ	159	f	173	ı	236	∞	250	•
132	â	146	Æ	160	á	174	«	237	∅	251	√
133	ä	147	ö	161	ı	175	»	238	€	252	ˆ
134	ä	148	ö	162	ó	224	⇒	239	∩	253	z
135	ç	149	ö	163	ü	225	β	240	≡	254	■
136	é	150	ü	164	ñ	226	┌	241	±	255	
137	é	151	ü	165	N	227	π	242	≥		
138	é	152	y	166	ä	228	Σ	243	≤		
139	ı	153	ö	167	ö	229	σ	244	┌		
140	ı	154	ü	168	ç	230	μ	245	┐		

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U.S. English

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ADDITIONAL CHARACTERS

1. Press and hold



2. Type 3-digit code on numeric keypad.



3. Release

096	·	140	ı	154	ü	169	┌	231	T	245	J
127	□	141	ı	155	ç	170	┐	232	◊	246	+
128	C	142	À	157	Ź	171	½	233	⊖	247	≈
129	ü	143	Å	158	Pls	172	¼	234	Ω	248	°
130	é	144	É	159	f	173	ı	235	ó	249	•
131	ä	145	æ	160	ä	174	«	236	∞	250	•
132	ä	146	Æ	161	ı	175	»	237	∅	251	√
133	ä	147	ö	162	ö	224	↔	238	€	252	n
134	ä	148	ö	163	ü	225	β	239	∩	253	z
135	ç	149	ö	164	ñ	226	┌	240	≡	254	■
136	é	150	ü	165	N	227	π	241	±		
137	é	151	ü	166	ä	228	Σ	242	≥		
138	é	152	ÿ	167	ö	229	σ	243	≤		
139	ı	153	Ö	168	ü	230	μ	244	∫		

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Glossary

This glossary includes terms and definitions from the *IBM Vocabulary for Data Processing, Telecommunications, and Office Systems*, GC20-1699.

adapter. (1) A printed circuit board that plugs into the system board allowing an external option to be attached to the system unit. (2) Any printed circuit board that plugs into the system board.

backup. Duplicating data from a fixed disk drive or diskette to a diskette which ensures availability of data in the event of loss or damage to the original.

BASIC. (1) Beginner's all-purpose symbolic instruction code. (2) A programming language that uses common English words.

BSC (binary synchronous communications). A uniform procedure, using a standardized set of control characters and control character sequences for synchronous transmission of binary-coded data between stations.

computer. A functional unit that can perform substantial computation, including numerous arithmetic operations or logic operations, without human intervention during a run.

computer program. A sequence of instructions suitable for processing by a computer.

configuration. The devices and programs that make up a system, subsystem, or network.

CRT. Cathode ray tube. See display.

current. The rate at which electrical charges flows.

cursor. (1) In computer graphics, a movable marker that is used to indicate a position on a display. (2) A displayed symbol that acts as a marker to help the user locate a point in text, in a system command, or in storage. (3) A movable spot of light on the screen of a display device, usually indicating where the next character is to be entered, replaced, or deleted.

data. (1) A representation of facts, concepts, or instructions in a formalized manner suitable for communication, interpretation, or processing by human or automatic means.

device. An electronic piece of equipment with a specific purpose.

Diagnostics diskette. Diskette with programs designed to detect and isolate failing parts of the system.

diskette. A thin, flexible magnetic disk and a semirigid protective jacket, in which the disk is permanently enclosed. Synonymous with flexible disk.

diskette drive. A device for storing data on and retrieving data from a diskette.

diskette, double-sided. A thin, flexible disk treated magnetically to store data on both sides.

diskette, single-sided. A thin, flexible disk treated magnetically to store data on one side only.

display. A device for visual presentation of information on any temporary character imaging device.

DOS. See operating system.

double-sided diskette. See diskette, double-sided.

external option. See option, external.

FCC. Federal Communications Commission.

file. (1) A group of related records as a data file.
(2) To store data as a file, so that it can be retrieved.

fixed disk drive. In the IBM Personal Computer, a unit consisting of nonremovable magnetic disks, and a device for storing data on and retrieving data from the disks.

flexible disk. Synonym for diskette.

format. To prepare a diskette to receive data in an organized fashion.

hardware. (1) Physical equipment used in data processing, as opposed to programs, procedures, rules, and associated documentation. (2) Contrast with software.

internal option. See option, internal.

K. 1024 bytes.

KB. 1024 bytes.

key lock. A device that deactivates the keyboard and locks the cover on for security.

load. In programming, to enter data into storage or working registers.

M. 1,048,576 bytes.

MB. 1,048,576 bytes.

memory. Term for main storage.

modem (modulator-demodulator). A device that converts serial (bit by bit) digital signals from a business machine (or data communication equipment) to analog signals that are suitable for transmission in a telephone network. The inverse function is also performed by the modem on reception of analog signals.

monitor. Synonym for cathode ray tube display (CRT display).

monochrome display. A display on which data appears in only one color.

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.

option, external. Devices attached to the outside of the system unit which extend and enhance its operation. Examples: display, printer or modem.

option, internal. Parts installed inside the system unit covers which enhance operation of the system such as adapters and memory options.

parallel. (1) Pertaining to the concurrent or simultaneous operation of two or more devices, or to the concurrent performance of two or more activities. In this book, serial and parallel refers to devices, as opposed to sequential and consecutive, which refer to processes. (2) Contrast with serial.

parity check. (1) A redundancy check that uses a parity bit. (2) Synonymous with odd-even check.

peripheral. Device attached to a system unit.

personal computer. A home or business computer that has a processor and keyboard and that can be connected to a television or some other monitor.

port. An access point for data entry or exit.

program. (1) A series of actions designed to achieve a certain result. (2) A series of instructions telling the computer how to handle a problem or task. (3) To design, write, and test computer programs.

programming language. (1) An artificial language established for expressing computer programs. (2) A

set of characters and rules with meanings assigned prior to their use, for writing computer programs.

RS-232C. A standard by the Electronic Industries Association (EIA) for communication between computers and external equipment.

run. A single continuous performance of a computer program or routine.

serial. (1) Pertaining to the sequential performance of two or more activities in a single device. In this book, serial and parallel refer to devices, as opposed to sequential and consecutive, which refer to processes. (2) Contrast with parallel.

setup. The preparation of the system for normal operation.

Setup Program. One of several programs on the Diagnostics diskette that allows a user to set the date, time, and options.

single-sided diskette. See diskette, single-sided.

software. (1) Computer programs, procedures, and rules concerned with the operation of a data processing system. (2) Contrast with hardware.

store. (1) To place data into a storage device. (2) To retain data in a storage device.

storage. (1) A storage device. (2) A device, or part of a device, that can retain data. (3) Diskette. (4) Fixed disk drive.

synchronous transmission. (1) Data transmission in which the time of occurrence of each signal representing a bit is related to a fixed time frame. (2) Data transmission in which the sending and receiving devices are operating continuously at substantially the same frequency and are maintained, by means of correction, in a desired phase relationship.

system. A computer configuration including at least a system unit, a keyboard, and a display.

system unit. Main part of the computer configuration.

typematic. Keyboard key that repeats its function when held pressed.

V. Volts.

write. To make a permanent or transient recording of data in a storage device or on a data medium.

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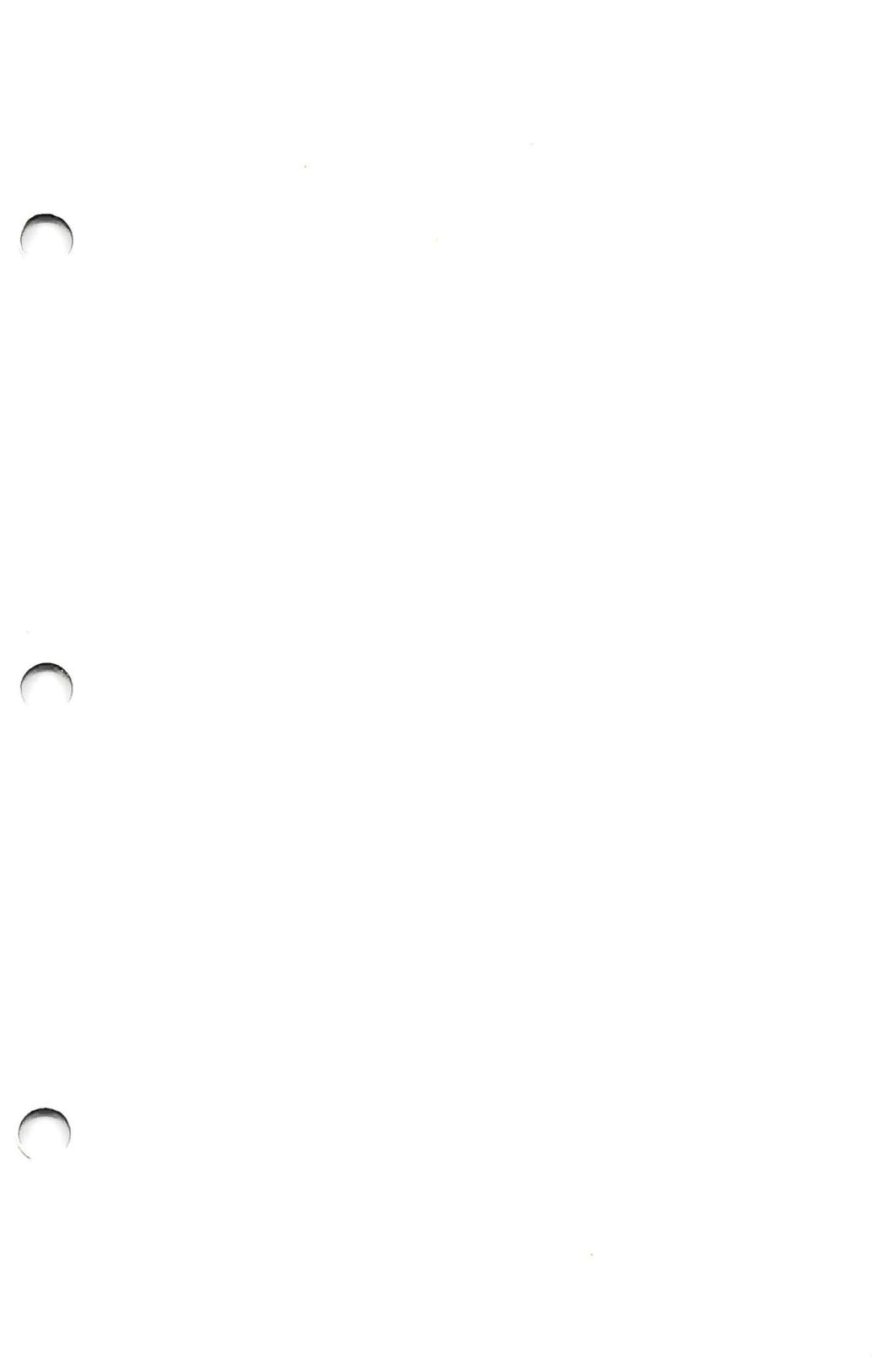
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Notes:







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