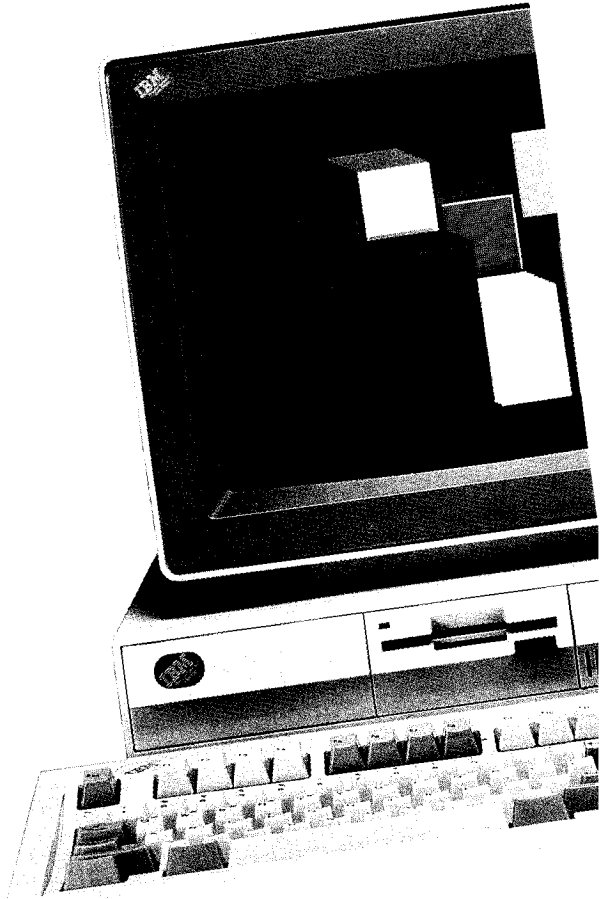IBM

Personal System/2
Model 30 286
Guide to Operations

™

First Edition (September 1988)

The following paragraph does not apply to the United Kingdom or any country where such provisions are inconsistent with local law:
INTERNATIONAL BUSINESS MACHINES CORPORATION PROVIDES THIS PUBLICATION "AS IS" WITHOUT WARRANTY OF ANY KIND, EITHER EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. Some states do not allow disclaimer of express or implied warranties in certain transactions, therefore, this statement may not apply to you.

Changes are periodically made to the information herein; these changes will be incorporated in new editions of the publication. IBM may make improvements and/or changes in the product(s) and/or the program(s) described in this publication at any time.

It is possible that this publication may contain reference to, or information about, IBM products (machines and programs), programming, or services that are not announced in your country. Such references or information must not be construed to mean that IBM intends to announce such IBM products, programming, or services in your country.

Requests for copies of this publication and for technical information about IBM products should be made to your IBM Authorized Dealer or your IBM Marketing Representative.

IBM is a registered trademark of the International Business Machines Corporation.

Personal System/2 is a trademark of the International Business Machines Corporation.

The warranty terms and conditions applicable in the country of purchase in respect of an IBM product are available from the supplier. Please retain them with your proof of purchase.

No statements contained in this documentation shall affect the statutory rights of consumers.

CAUTION

This product is equipped with a 3-wire power cord and plug for the user's safety. Use this power cord in conjunction with a properly grounded electrical outlet to avoid electrical shock.

Before You Begin

The following information should be recorded and retained.

IBM Product Name	_____
IBM Model Number	_____
IBM Serial Number	_____
IBM Key Number	_____
Address	_____
	_____
	_____

- The product name is on the front of the product.

- The model number is located on the outside of the product and has a preface of *Type* or *Model*.

- The serial number is located on the outside of the product and has a prefix of *S/N*.

  (See "Hardware Features" on page A-1 if you need assistance in locating the model number and serial number.)

- The key number and address are located on the tag attached to the cover-lock keys. A cover lock is provided only on a system that has a fixed disk drive installed.

  You can obtain information for ordering replacement cover-lock keys by writing to the address listed on the key tag. If you are a customer outside the U.S. and Puerto Rico, contact your place of purchase for information on ordering replacement keys.

Section 1. Getting Started

To get started, unpack and install your system. Instructions for installing your system are included in this section.

After your system is installed, use the Starter Diskette to view the learning program, set the system date and time, make a copy of the Starter Diskette, and set the system configuration. Instructions for these tasks are included in this section and on the Starter Diskette.

Installing Your System

Note: Your system may appear slightly different from those shown in this guide and on the Starter Diskette.
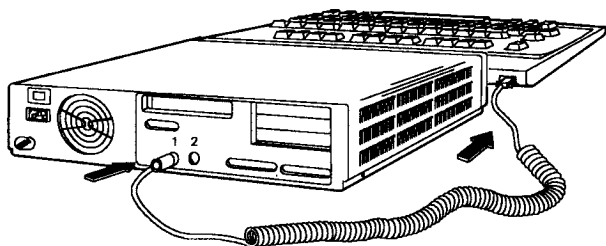
1. Unpack the system unit, the keyboard, and the display.

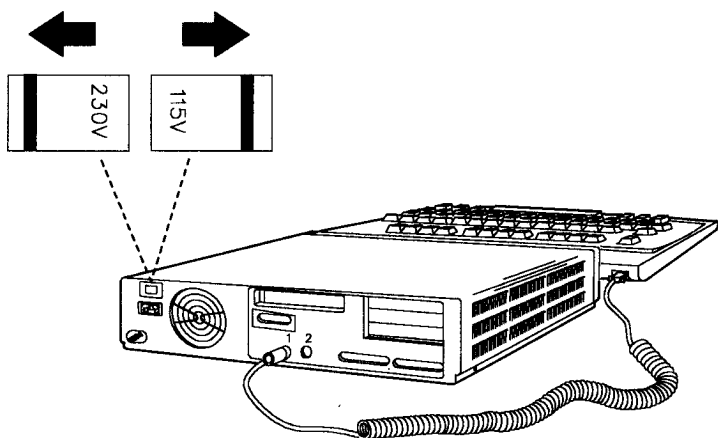2. Be sure the system unit is turned off.
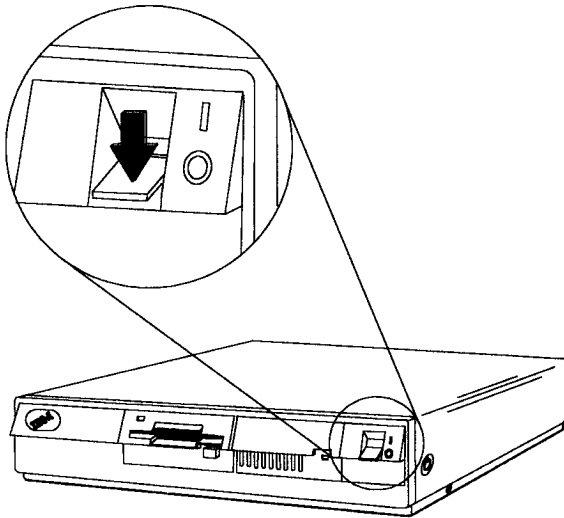
3. Push the diskette eject button and remove the shipping insert, if present. If your system unit has two diskette drives, remove both shipping inserts.
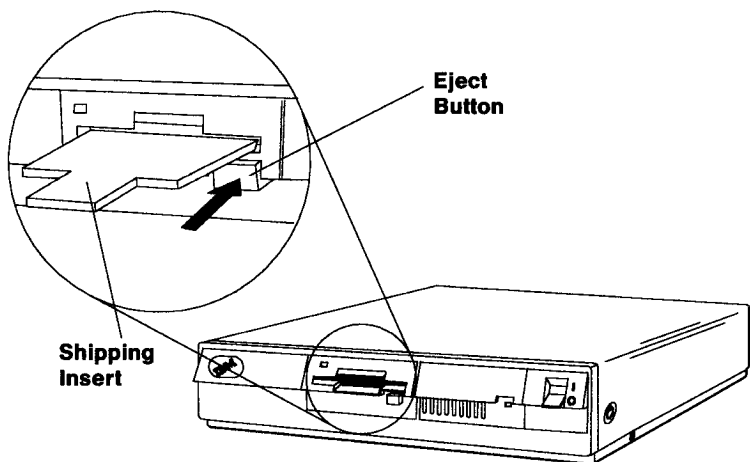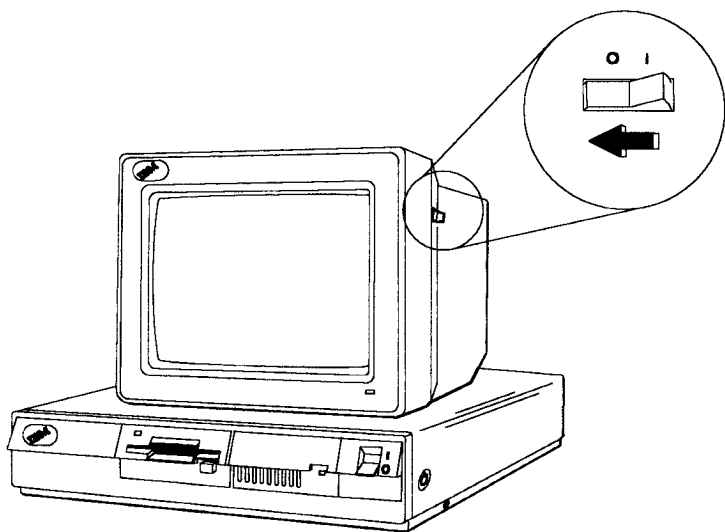

4. Connect the keyboard cable to the system unit keyboard connector (1) and to the keyboard.

5. Set the voltage selector switch, if present, to the proper setting. If the voltage range in your country is 90-137 volts, slide the switch to the right (115 volts). U.S. and Canada (100-125 volts) use the 115 volts setting. If the voltage range in your country is 180-265 volts, slide the switch to the left (230 volts).
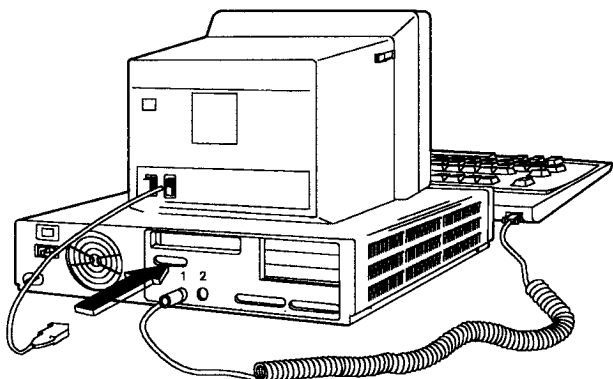

6. Put the display on top of the system unit. Be sure the display is turned off.

7. Connect the display signal cable to the system unit and tighten the thumbscrews.

   If a display adapter is installed in your system unit, refer to the instructions supplied with the adapter for information about connecting the display.

8. Connect the power cord for the display. If your display has a detachable power cord, connect it to the display first. Then plug the power cord into an electrical outlet.

CAUTION:
Plug the power cord into a properly grounded 3-wire electrical outlet.
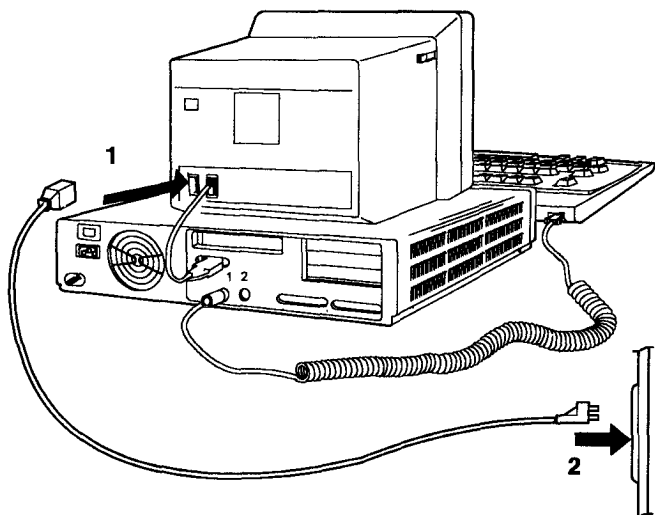
9. Connect the power cord to the system unit. Then plug the power cord into an electrical outlet.

CAUTION:
Plug the power cord into a properly grounded 3-wire electrical outlet.
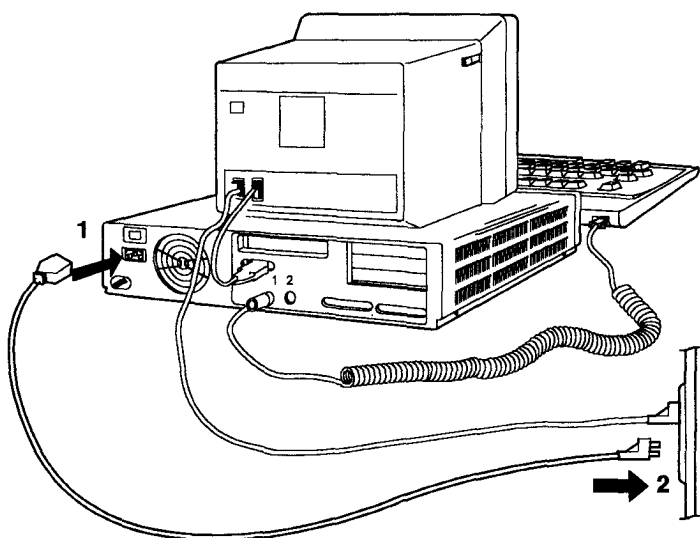
Your system is ready to use. Record the serial numbers for the system unit and the cover-lock key, if present, on page iv in this guide. (A cover lock is provided only on a system that has a fixed disk drive installed.) Then continue with "Using the Starter Diskette" on page 1-7.

Using the Starter Diskette

The Starter Diskette contains the following programs:

- **Learn about the system** provides information about hardware features and software programs and about operating, testing, and getting service for your system.

- **Backup the Starter Diskette** copies the original Starter Diskette onto another diskette.

- **Set configuration** lets you run automatic configuration and view, change, backup, or restore the system configuration.

    Run automatic configuration automatically configures the system. During automatic configuration, the system makes a list of devices that are installed and assigns those devices to operate a certain way. The configuration information is stored in the system unit and is retained even when the system unit is turned off. Use this program the first time you install the system and when you install additional memory or a math coprocessor.

    View configuration shows the present configuration stored in the system unit.

    Change configuration allows you to make changes to the configuration stored in the system unit. Use this program to customize the system operation, for example, to change your printer port. You can change only those items enclosed in brackets.

    Backup configuration copies the configuration stored in the system unit onto the backup copy of the Starter Diskette. Use this program if you make changes to the configuration.

    Restore configuration retrieves the configuration stored on the backup copy of the Starter Diskette and restores it in the system unit. Use this program to restore the configuration (if you backed it up).

- **Set features** lets you set the date, time, and passwords and change the keyboard speed.

   Set date and time stores the current date and time in the system unit. The system uses this information to automatically record the date and time of your system activities.

   Set passwords allows you to set passwords to restrict the use of the system by unauthorized persons. Three passwords are available on your system: a power-on password, network server mode, and a keyboard password. Instructions for setting passwords are included in Section 3, "Operating Your System."

   Set keyboard speed changes the speed at which the keyboard responds when you hold down a key.

- **Move the system** prepares a fixed disk drive to be moved. Instructions for moving your system are included in Section 3, "Operating Your System."

- **Test the system** tests the system hardware. Instructions for testing your system are included in Section 4, "Testing Your System."

Use the instructions on the following pages and on the Starter Diskette to view the learning program, set the system date and time, make a backup copy of the Starter Diskette, and set the system configuration.

To load and use the Starter Diskette:

1. Be sure the system unit is turned off.

2. Insert the Starter Diskette, metal-shutter end first and the label facing up, into drive A. When the diskette is fully inserted, it clicks into place.
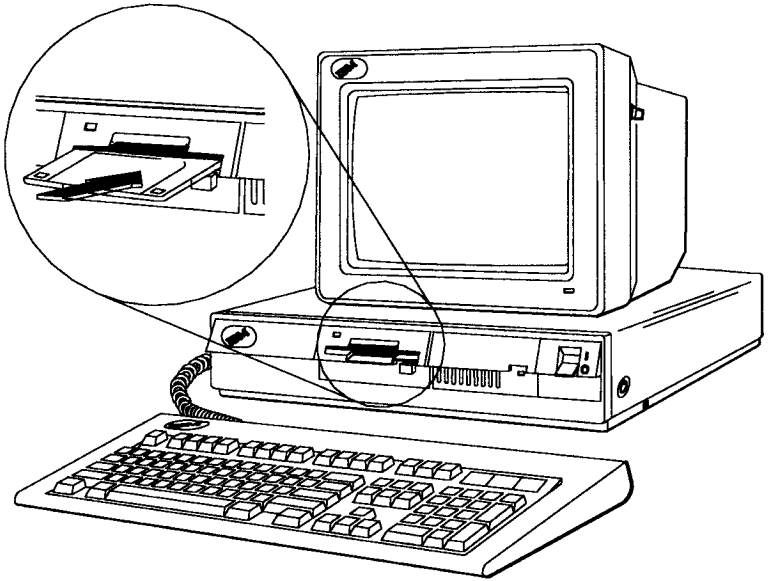
3. Set the contrast and brightness controls on the display to their middle positions.

Contrast Control

Brightness Control
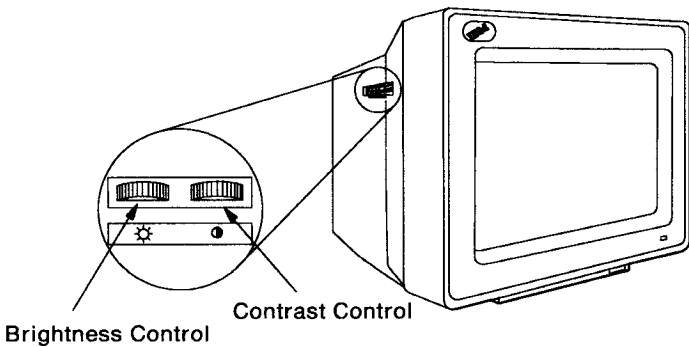
4. Turn on the display and the system unit.

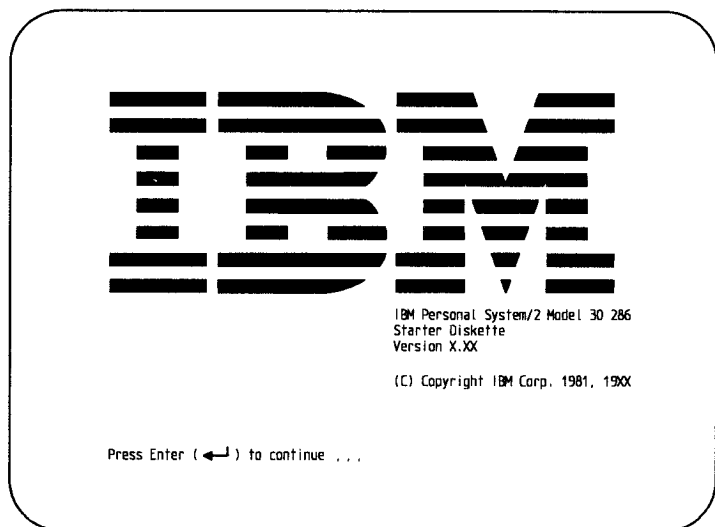   When you turn on the system unit, it performs a power-on self-test. The self-test takes up to 90 seconds to complete, depending on the amount of memory installed. The system beeps once when the self-test is completed, and the following screen is displayed:


   ```
   IBM Personal System/2 Model 30 286
   Starter Diskette
   Version X.XX

   (C) Copyright IBM Corp. 1981, 19XX

   Press Enter ( ⏎ ) to continue . . .
   ```

   If you see this screen, continue with the next step. If you do not see this screen:

   a. Be sure that the diskette you inserted is the Starter Diskette and that you inserted it properly. (See step 2 on page 1-9.) If the Starter Diskette was not inserted properly, start over at step 1 on page 1-9.

   b. If the problem continues, turn to Section 4, "Testing Your System" to find the problem. After it is corrected, start over at step 1 on page 1-9.

5. Adjust the brightness and contrast controls on the display for more comfortable viewing.

6. Press Enter.

   If you are installing the system for the first time or if you have changed the system configuration, the screen displays a message. Follow any instructions on the screen and continue to the main menu.

```
Main Menu
  1. Learn about the system
  2. Backup the Starter Diskette
  3. Set configuration
  4. Set features
  5. Move the system
  6. Test the system
Use ↑ or ↓ to select. Press Enter.
Esc=Quit   F1=Help
```
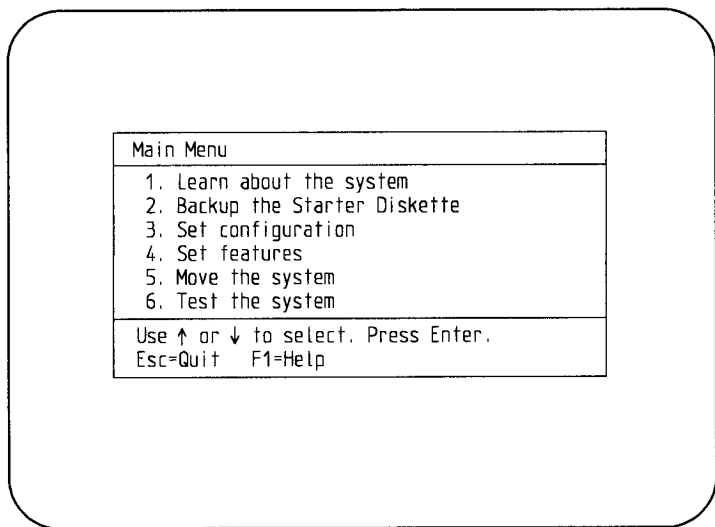
7. Select **Learn about the system** and follow the instructions on the screen to view the learning program.

8. Select **Set features** from the main menu. Then select **Set date and time** and follow the instructions on the screen to set the system date and time.

9. Select **Backup the Starter Diskette** and follow the instructions on the screen to make a backup copy of the Starter Diskette.

   If your system unit has only one diskette drive, you will be instructed to remove the source diskette (the Starter Diskette) and insert the target diskette (the blank diskette) several times to complete this task.

   After you make the backup copy, put the original Starter Diskette in a safe place and use the copy. If the copy becomes damaged, use the original Starter Diskette to make another copy.

10. Insert the backup copy of the Starter Diskette into drive A.

11. Select **Set configuration** from the main menu. Then select **Run automatic configuration** and follow the instructions on the screen to set the system configuration.

After you have completed the tasks in this section, you can install your hardware options and begin using your software programs.

To install your hardware options, see Section 2, "Installing Your Options."

To use your software programs, refer to the publications that came with the programs.

Note: If your system unit has a fixed disk drive, follow the instructions in your operating system manual to prepare the fixed disk before installing software.

Section 2. Installing Your Options

You can expand the capabilities of your system by installing accessory pieces of hardware called *options*. Options installed inside the system unit are called *internal options*. Options connected by a cable to the rear of the system unit are called *external options*. Install internal options first; then install external options.

Installing Internal Options

Use the instructions in this section to install the following:

- IBM Personal System/2 512KB Memory Expansion Kit

- IBM Personal System/2 2MB Memory Expansion Kit

- IBM Personal System/2 80287 Math Coprocessor

- Adapters.

To begin installation, you need a medium-sized, flat-blade screwdriver and instructions for installing the option in the Model 30 286. If installation instructions are included in this section, use those instructions. If installation instructions are *not* included in this section, use the instructions included with the option.

Notes:

1. If you are installing additional memory, make a note of the memory size currently installed before you remove the system unit cover. (See "Memory Expansion Kit Installation" on page 2-3 for more information.)

2. You may receive a 16X error the first time you turn on the system unit after installing your options. If so, insert the Starter Diskette into drive A and restart the system. Follow any instructions on the screen to correct the error.

Cover Removal

To remove the system unit cover:

1. Turn off the system unit.

2. Turn off all external options (display, printer, and others).

3. Unplug the system unit power cord from the electrical outlet.

4. Unplug the power cords of any external options from the electrical outlets.

5. Remove all cables from the rear of the system unit.

6. If your system unit has a cover lock, unlock it and remove the key.

7. Loosen the two cover screws and remove the system unit cover.
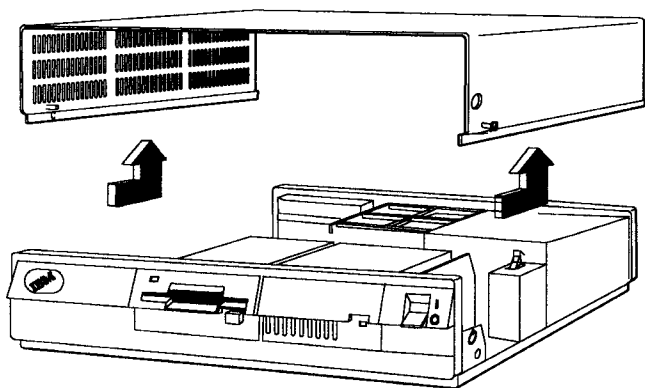
Memory Expansion Kit Installation

Warning: As you install the memory expansion kit, be aware of the following:

- Static electricity can damage the memory packs. Reduce static electricity by touching the metal frame of the system unit before handling the memory packs.

- All memory packs installed in the system unit must be the same memory size (either all 256KB memory packs or all 1MB memory packs).

- Memory size is not marked on the memory packs. If you are instructed to remove memory packs from the system unit, be careful not to mix the memory packs you are removing with the new memory packs you are installing.

- 4MB is the maximum amount of memory that can be installed on the system board.

Before installing additional memory, be sure you know the memory size currently installed. The installed memory size is displayed on the screen as part of the system unit power-on self-test.

To run the power-on self-test, turn on the system unit and the display. As the memory is tested, the memory size is displayed in the upper left corner of the screen. The final number displayed is the installed memory size. Record the number.
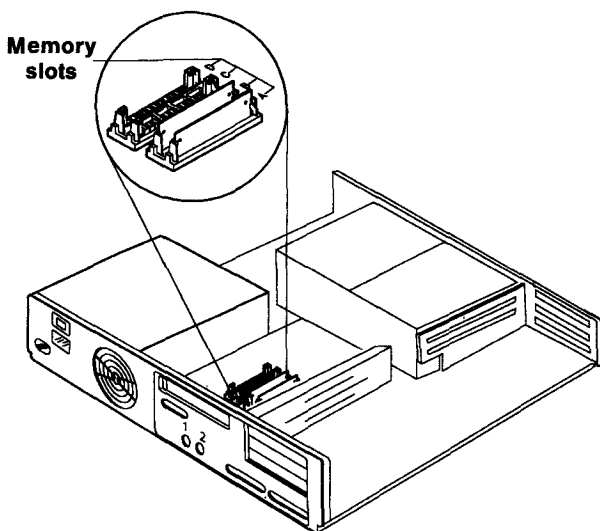
To install the memory expansion kit:

1. Remove the system unit cover using the information in "Cover Removal" on page 2-2.

2. Turn the system unit so that the front of the system unit is on your right.

3. Tilt the support bracket toward the power supply and remove the bracket.
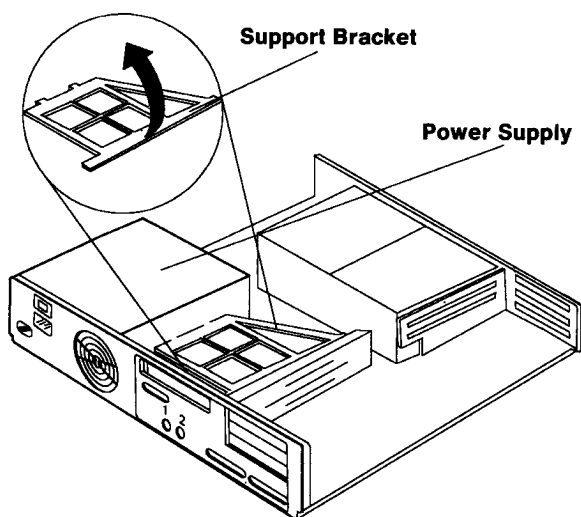
4. Locate the four memory slots on the system board. The slots are labeled A, B, C, and D.

For ease of installation, you may want to disconnect any cables that block access to the memory slots. If so, note the locations of the cables before disconnecting them. (The cables are designed to fit tightly.)


5. In the following table, locate the line that contains the memory size currently installed and your expansion kit memory size. Go to the step indicated.

Memory Size Currently Installed	Expansion Kit Size	Go to Step
512KB	512KB	8
512KB	2MB	6
512KB	4MB (two 2MB kits)	6
1024KB (1MB)	2MB	6
1024KB (1MB)	4MB (two 2MB kits)	6
2048KB (2MB)	2MB	8

6. Remove the memory pack from slot A. To remove the memory pack, use your thumbs or the eraser end of a pencil to push out on the locking tabs. While pushing out on the tabs, tilt the memory pack toward you. Once the memory pack is tilted, remove it from the slot.

   Repeat this step and remove the memory pack installed in slot B, and if present, in slots C and D.
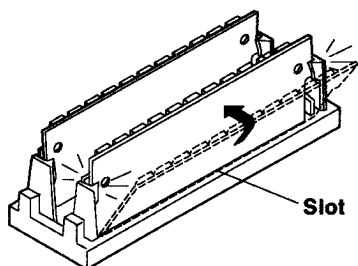
   Note: The memory packs you remove will not be reinstalled.
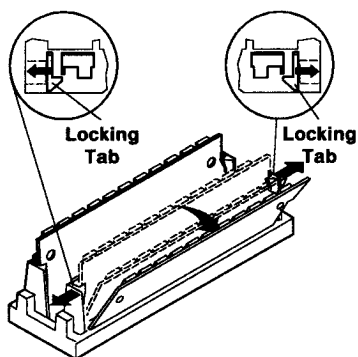
7. Align an expansion kit memory pack with slot B. Make sure the modules on the memory pack face away from you and the gold contact edge is on the bottom.

Insert the memory pack into the slot at an angle; then push the memory pack to an upright position to lock it in place.

Repeat this step and install a memory pack in slot A.

If you are installing one 2MB Memory Expansion Kit, go to step 9.

If you are installing two 2MB Memory Expansion Kits, continue with step 8.

8. Align an expansion kit memory pack with slot D. Make sure the modules on the memory pack face away from you and the gold contact edge is on the bottom.

Insert the memory pack into the slot at an angle; then push the memory pack to an upright position to lock it in place.

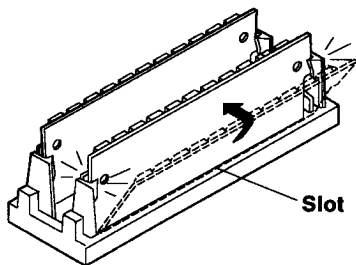Repeat this step and install a memory pack in slot C.

9. Replace any cables you disconnected in step 4.

10. Replace the support bracket. Place the bracket hooks into the small slots on the side of the power supply. Then tilt the bracket down and press it firmly in place.

11. If you have other internal options to install, do so now. If not, replace the system unit cover using the information in "Cover Installation" on page 2-15.

12. After installing the cover, use the Starter Diskette to set the system configuration. (See "Set configuration" on page 1-7 for more information.)

Math Coprocessor Installation

Warning: As you install the math coprocessor, be aware of the following:

* Static electricity can damage the coprocessor. Reduce static electricity by touching the metal frame of the system unit before handling the coprocessor.

* Incorrect placement of the coprocessor can damage the system board or the coprocessor.

To install the coprocessor:

1. Remove the system unit cover using the information in "Cover Removal" on page 2-2.

2. Installed adapters prevent access to the coprocessor socket. Temporarily remove any installed adapters. (See "Adapter Installation" on page 2-11 for more information.)

Adapter
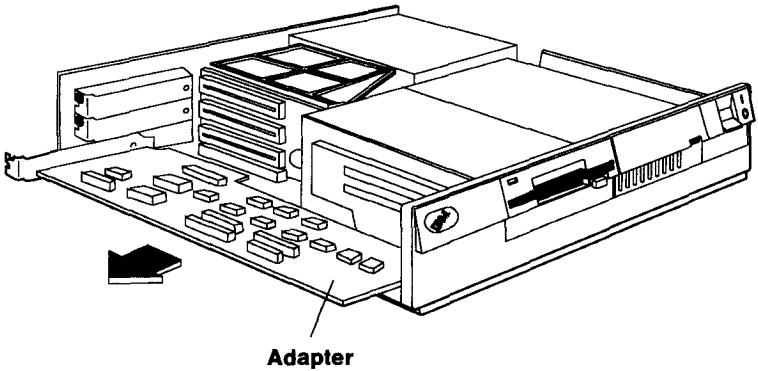
3. Locate the coprocessor socket (ZM1) on the system board. Align the coprocessor with the socket, making sure the notch on the coprocessor faces the rear of the system unit.

The pins on the coprocessor bend easily. To prevent bending, place one row of pins into the holes on one side of the socket. With the edge of a rigid item such as a credit card, push in on the other row of pins until they go into the holes on the other side of the socket. Press the coprocessor down.
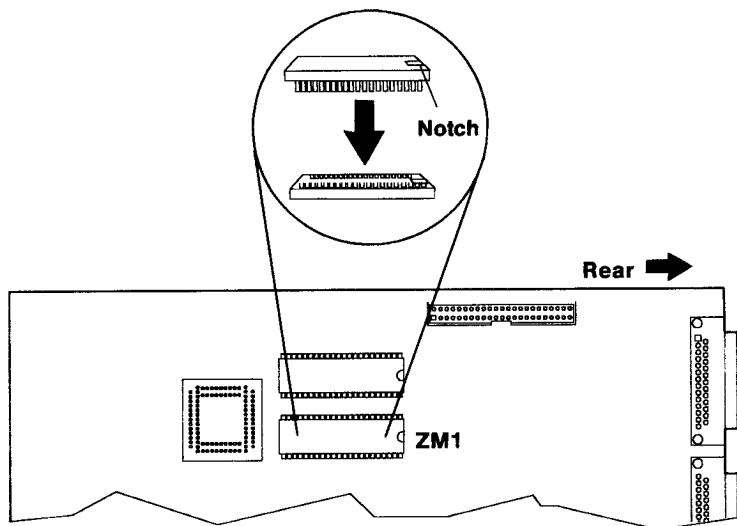
4. Reinstall any adapters you removed in step 2.

5. If you have other internal options to install, do so now. If not, replace the system unit cover using the information in "Cover Installation" on page 2-15.

6. After installing the cover. use the Starter Diskette to set the system configuration. (See "Set configuration" on page 1-7 for more information.)

Adapter Installation

You can install three adapters in the system unit expansion slots.
Use the following guidelines when installing adapters:

- Adapters can be no longer than 343 mm (13.5 inches).

- For ease of installation, begin installing adapters in the bottom
  expansion slot.

- Install the shortest adapter in the top expansion slot.

- Installed adapters prevent access to the math coprocessor
  socket. Install adapters last.

To install an adapter:

1. Remove the system unit cover using the information in "Cover
   Removal" on page 2-2.

2. Remove the screw and expansion slot cover. Save the screw for
   installing the adapter.

Expansion
Slot
Cover
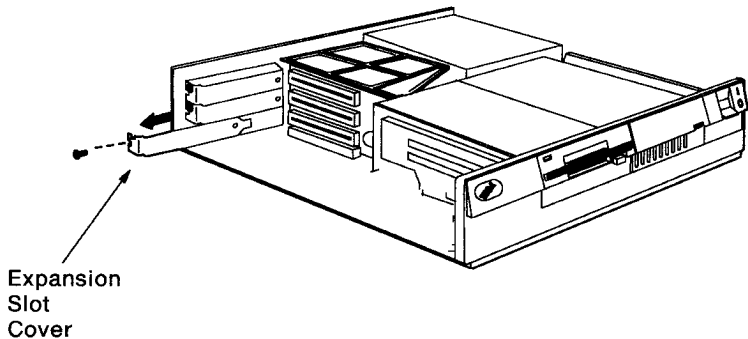
3. Remove the plastic insert that covers the expansion slot by inserting and turning a screwdriver, as shown.

Support Brackets
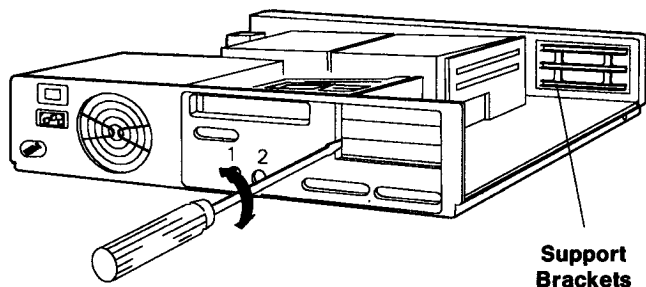
4. If the adapter has switches or jumpers to set, locate and use the switch and jumper information from the Personal Computer, Personal Computer XT™, or Personal Computer AT® instructions that are supplied with the adapter. (The switch and jumper information is the same in all packages.)

Note: Jumper information is not included with the IBM Serial/Parallel Adapter. If you are installing this adapter in your system, see "Serial/Parallel Adapter" on page 2-14.

Save any switch or jumper information with this guide for future reference.

Personal Computer XT is a trademark of the International Business Machines Corporation.

Personal Computer AT is a registered trademark of the International Business Machines Corporation.

5. Hold the adapter by the edges with the components facing upward. Align the adapter with the support brackets, and then slide it into the expansion slot.
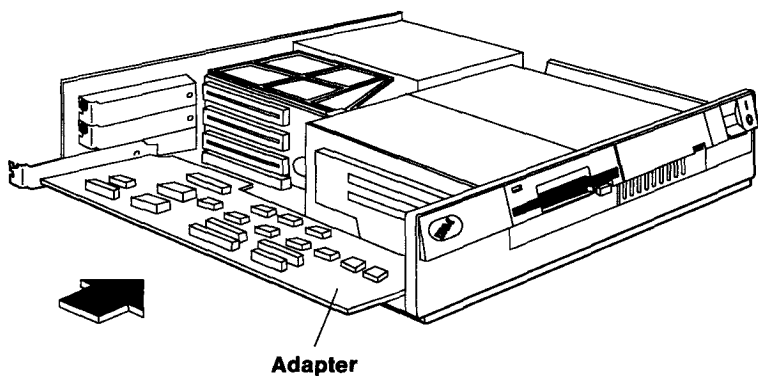
Adapter

6. To secure the adapter, replace the screw you removed in step 2.

7. If you have other internal options to install, do so now. If not, replace the system unit cover using the information in "Cover Installation" on page 2-15.

Serial/Parallel Adapter

When you set the system configuration using **Run automatic configuration**, the serial and parallel connectors on the system board are assigned the primary settings. Because the system board and the serial/parallel adapter cannot use the same settings, be sure to install the jumpers in the alternate position on the adapter.

If you decide to change the parallel connector on the system board to alternate using **Change configuration**, leave the parallel jumper in the primary position on the adapter. The serial connector on the system board cannot be changed, so you must set the serial jumper to the alternate position on the adapter.

Remove the jumpers on the adapter to install them in the alternate position. To remove a jumper, insert a flat-blade screwdriver under the jumper and lift up. After setting the jumpers, continue with step 5 on page 2-13.
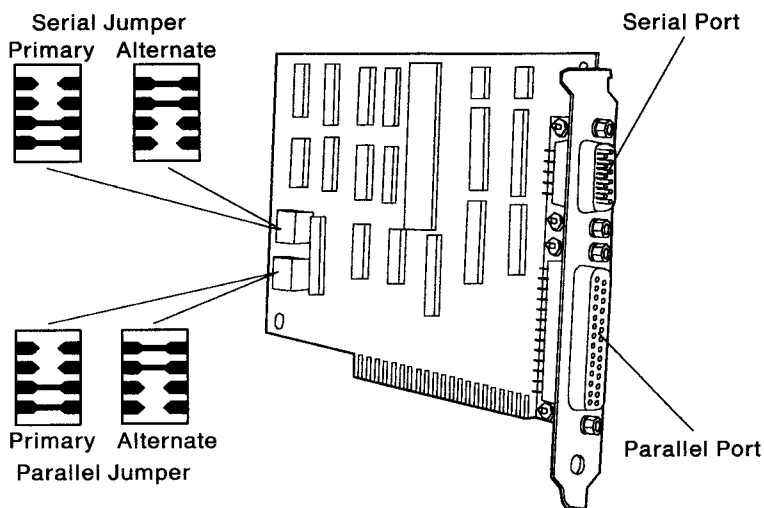
Cover Installation

To install the system unit cover:

1. Replace the system unit cover and tighten the two cover screws.
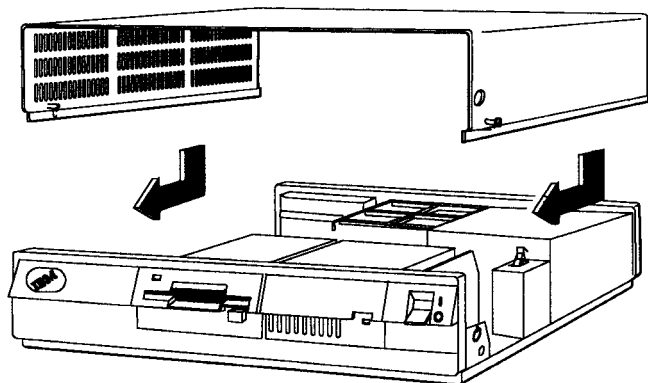
2. Reconnect all cables to the rear of the system unit.

3. Plug the power cords of external options into electrical outlets.

4. Plug the system unit power cord into a properly grounded electrical outlet.

5. If your system unit has a cover lock, lock it and store the key in a safe place.

6. If you installed memory or a math coprocessor, use the Starter Diskette to set the system configuration. (See "Set configuration" on page 1-7 for more information.)

Installing External Options

External options connect by cables to the rear of the system unit. Some examples of external options are:

- Display

- Printer

- Plotter

- Pointing device

- Communication (serial or parallel) devices.

Use the instructions that are supplied with the external option to install that option. The illustrations in "Appendix. Hardware Reference" show the locations of external option connectors on your system unit.

Warning: Before connecting an external option to the system unit, make sure the system unit and the option are turned off.

Section 3. Operating Your System

This section contains information and instructions for tasks such as
starting your system, setting passwords, and working with diskettes.

Starting Your System

Each time you turn on the system unit, it performs a power-on
self-test. The self-test takes up to 90 seconds to complete,
depending on the amount of memory installed in the system unit.
During the self-test, the following events occur:

1. The system unit and memory are tested. As the memory is
   tested, the memory size is displayed in the upper left corner of
   the screen. The final number displayed is the installed memory
   size.

2. The system beeps once when it has successfully completed the
   self-test.

3. One of the following screens is displayed:

   • F1 and Diskette Prompts
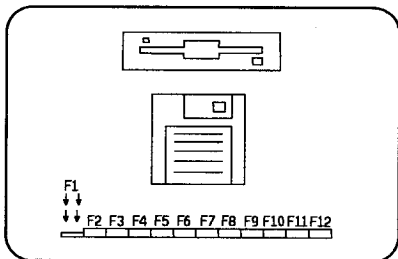
   To continue, insert a diskette into drive A and press the F1
   key.

- Password prompt
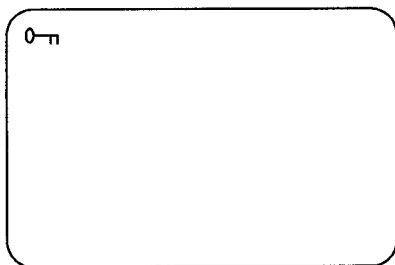
To continue, type the correct password and press Enter. (See "Setting Passwords" on page 3-3 for more information.)

- Beginning of your program.
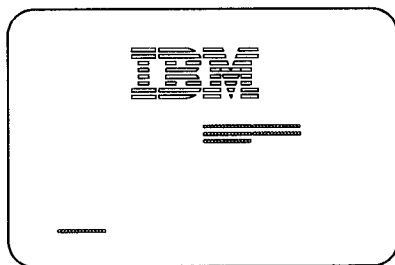
To continue, follow the instructions on the screen.

If none of these screens are displayed, turn to Section 4, "Testing Your System," to find the problem.

You can restart your system by using either of the following procedures:

- If the system unit is on, press and hold the Ctrl and Alt keys; then press the Delete key. Release all three keys.

OR

- Turn off the system unit, wait 5 seconds, and then turn on the system unit.

Setting Passwords

You can set three different passwords on your system: a power-on password, network server mode, and a keyboard password. You do not have to set passwords to use your system, but using passwords helps protect the information you store in your system.

Power-on Password

Setting a power-on password helps prevent unauthorized persons from using your system. You can use any combination of characters (A to Z and 0 to 9) for the power-on password, but the password can contain no more than seven characters. Once the power-on password is set, the password prompt is displayed each time you turn on the system unit. (See the illustration on page 3-2.) To use the system, you must type the correct password and press Enter. The password is not displayed when you type it. If you type the password correctly, an **OK** is displayed. If you type the password incorrectly, the password prompt with an **X** over it is displayed. If you have not typed the password correctly after three tries, you must turn off the system unit, wait 5 seconds, and then turn it on and try again.

If you forget your power-on password, you can reset it by moving a jumper inside the system unit. See "Power-on Password Reset" on page 3-4 for instructions.

To set a power-on password:

1. Insert the Starter Diskette into drive A and turn on the system unit.
2. Select **Set features** from the main menu.
3. Select **Set passwords**.
4. Select **Set power-on password** and follow the instructions on the screen.

To change a power-on password:

1. Turn on the system unit.
2. When the password prompt is displayed, type your current password; then press the key located above the right Alt key. (On the U.S. keyboard, the character on the key is a slash (/).)
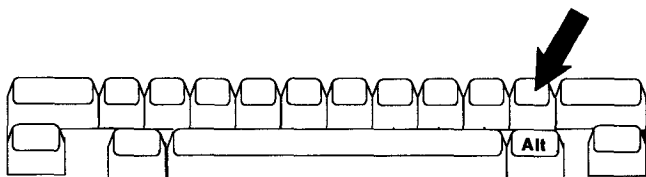
3. Type your new password (no more than seven characters); then press Enter.

To remove a power-on password:

1. Turn on the system unit.
2. When the password prompt is displayed, type your current password; then press the key located above the right Alt key.
3. Press Enter.

Power-on Password Reset

If you forget your power-on password, use the following procedure to reset the password.

1. Remove the system unit cover using the information in "Cover Removal" on page 2-2.

2. If an adapter is installed in the bottom expansion slot, you may want to temporarily remove the adapter for easier access to the password reset jumper. (See "Adapter Installation" on page 2-11 for more information.)

3. Locate the jumper (J13) on the system board.

← Rear
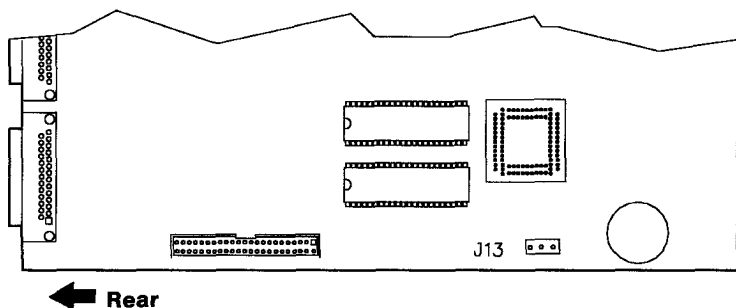
4. Note the position of the jumper. If the jumper covers the first and second pins, move it so that it covers the second and third pins. If the jumper covers the second and third pins, move it so that it covers the first and second pins. To move the jumper, lift it straight up.

   Once you have moved the jumper to the new position, leave it in that position until the next time you need to reset the password.

5. If you removed an adapter, reinstall it.

6. Replace the system unit cover using the instructions in "Cover Installation" on page 2-15.

7. Follow the instructions on page 3-3 to set a new power-on password.

Network Server Mode

If your system is a server on a network, you can set network server mode. Network server mode allows other systems to access your fixed disk drive if your system is on. For security, your keyboard is locked while in network server mode.

You must set a power-on password before setting network server mode. If you change or remove your power-on password, network server mode is removed.

To set network server mode:

1. Select **Set features** from the main menu of the Starter Diskette.
2. Select **Set passwords**.
3. Select **Set network server mode** and follow the instructions on the screen.

To remove network server mode:

1. Select **Set features** from the main menu of the Starter Diskette.
2. Select **Set passwords**.
3. Select **Set network server mode**. When you are asked "Set network server mode?," type **N**.

Keyboard Password

Setting a keyboard password lets you lock the keyboard without turning off the system unit. If you have set a power-on password, that password also acts as your keyboard password. If you want to set a keyboard password that is different from your power-on password, follow the instructions to change the keyboard password.

Before you can use the keyboard password program, you must first install the program from the Starter Diskette onto your fixed disk drive.

To install the keyboard password program:

1. Select **Set features** from the main menu of the Starter Diskette.
2. Select **Set passwords**.
3. Select **Set keyboard password**. When you are asked "Set keyboard password?," type **Y**.

To set and use a keyboard password, remove the Starter Diskette from drive A and restart the system. At the DOS prompt (usually **C>**), do one of the following:

- To lock the keyboard, type **KP** and press Enter. When you hear a beep, the keyboard is locked.

- To unlock the keyboard, type the keyboard password (normally your power-on password) and press Enter. When you hear a beep, the keyboard is unlocked.

- To change the keyboard password, type **KP /c** and press Enter. Follow the instructions on the screen. Use this procedure to set a keyboard password that is different from your power-on password.

- To deactivate the keyboard password, turn off the system unit.

Working with Diskettes

Your system unit contains a 1.44MB diskette drive (**1.44** is printed on
the eject button). This drive uses only 3.5-inch diskettes. The
diskettes may be 2.0MB capacity (HD) or 1.0MB capacity (2HC)
diskettes. Other IBM systems may contain 720KB diskette drives (no
printing on the eject button). The 720KB drives use only 1.0MB
capacity (2HC) diskettes.

When using 2.0MB and 1.0MB diskettes, remember:

- A 2.0MB diskette must be formatted to 1.44MB using a 1.44MB
  diskette drive. Do not format a 2.0MB diskette to 720KB. If you
  accidentally format a 2.0MB diskette to 720KB, discard the
  diskette. It will not be reliable even if reformatted to 1.44MB.

- A 1.0MB diskette must be formatted to 720KB. IBM DOS defaults
  to a 1.44MB format when a 1.44MB drive is used. To format a
  1.0MB diskette in a 1.44MB drive, refer to your operating system
  manual for the correct format command.

- If you are transferring diskettes between systems that have
  different sized drives, use only 1.0MB diskettes formatted to
  720KB. A 2.0MB diskette must not be used in a 720KB drive.

- When creating diskettes by using commands that format as they
  write, be sure the target diskette has the appropriate diskette
  capacity.

You must format new diskettes before using them. To format
diskettes for general use, follow the formatting instructions in your
operating system manual. The formatting program on the Starter
Diskette is intended only to prepare diskettes for testing the system.
If you want to reuse the testing diskettes, reformat them using the
instructions in your operating system manual.

Most diskettes have a write-protect tab that helps protect the information on the diskette. When a diskette is write-protected, you cannot write information on it or erase information from it.
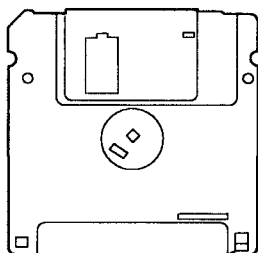
- To prevent writing on or erasing from a diskette, slide the write-protect tab down.

- To allow writing on or erasing from a diskette, slide the write-protect tab up.

Top View
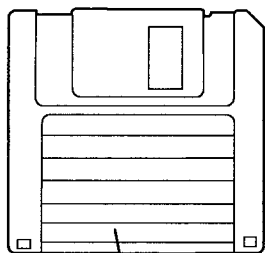
Bottom View

Label

Write-Protect
Tab

Not Write-Protected

Write-Protected

Using IBM Personal Computer BASIC

Your system unit comes with an installed program language called IBM Personal Computer BASIC.

Note: If your system unit has a fixed disk drive with an operating system installed, you cannot access BASIC using the following procedure. If you want to use this program, see the *IBM Personal Computer BASIC Reference*.

To use BASIC:

1. Remove any diskettes from the diskette drives.

2. Turn on the system unit. If the system unit is already on, press and hold the Ctrl and Alt keys; then press the Delete key. Release all three keys.

3. After the self-test (up to 90 seconds), press the F1 key to continue.

4. When the following screen is displayed, BASIC is loaded and ready to use. (See the *IBM Personal Computer BASIC Reference* for more information.)

```
The IBM Personal Computer Basic
Version CX.XX Copyright IBM Corp. XXXX
XXXXX Bytes free
Ok





1LIST 2RUN 3LOAD" 4SAVE" 5CONT 6"LPT1 7TRON 8TROFF 9KEY 0SCREEN
```
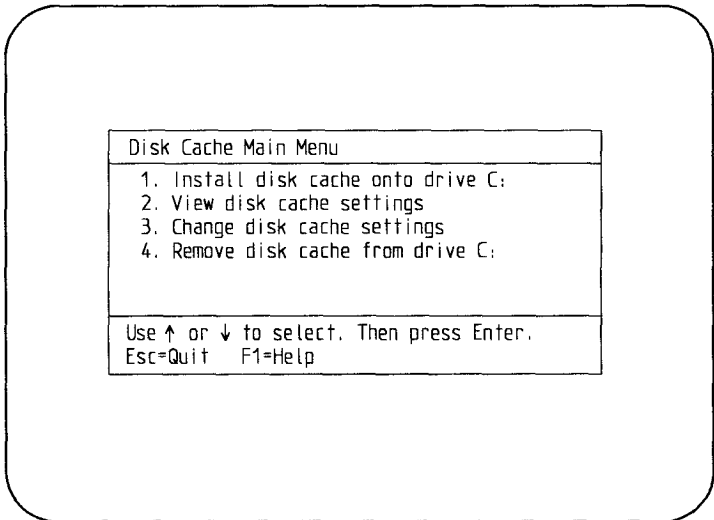
Installing IBM Disk Cache

Your Starter Diskette contains IBM Disk Cache, a program you can install on your fixed disk to increase the speed of application programs. Cache improves the speed of programs by creating a storage space in memory for frequently-accessed information. Retrieving information from memory is faster than retrieving information from a fixed disk.

To use Cache, you must have IBM Disk Operating System (DOS) installed on your fixed disk. The DOS *User's Guide* contains instructions for installing DOS on your fixed disk.

To install Cache on your fixed disk:

1. Remove any diskette from drive A.

2. Turn on the system unit. If the system unit is already on, press and hold the Ctrl and Alt keys; then press the Delete key. Release all three keys.

3. When the DOS prompt (usually **C>**) is displayed, insert the Starter Diskette into drive A.

4. Type **A:IBMCACHE** and press Enter. The Cache main menu is displayed. Follow the instructions on the screen to install Cache.

```
 Disk Cache Main Menu
   1. Install disk cache onto drive C:
   2. View disk cache settings
   3. Change disk cache settings
   4. Remove disk cache from drive C:


 Use ↑ or ↓ to select. Then press Enter.
 Esc=Quit   F1=Help
```

Cache is installed with recommended (default) settings which specify the location of Cache (low memory), the size of the storage space (64KB), and the page size in sectors (4). These default settings work well with most programs.

You can change the default settings. However, different settings may actually reduce rather than improve the performance of some programs. If you want to change the default settings, you should understand device drivers, buffers, VDISK, and extended memory applications. Refer to the DOS *Reference* for information on these topics.

Cache and VDISK are compatible in extended memory, but Cache may conflict with other extended memory applications. In addition, high-speed communications (above 9600 baud) may create data errors if Cache is in extended memory.

Moving Your System

If your system unit has a fixed disk drive, you should backup the files before moving your system. See your operating system manual for instructions to backup the fixed disk drive. You cannot use the backup program on the Starter Diskette to backup the fixed disk drive.

1. If you do not have a fixed disk drive, go to step 6.

2. After the files on the fixed disk drive are backed up, insert the Starter Diskette into drive A.

3. Turn on the system unit. If the system is already on, press and hold the Ctrl and Alt keys; then press the Delete key. Release all three keys.

4. Select **Move the system** from the main menu and follow the instructions on the screen.

5. Remove the Starter Diskette.

6. Turn off the system unit.

7. Turn off all external options (display, printer, and others).

8. Put a blank diskette into each diskette drive.

9. Unplug the system unit power cord from the electrical outlet.

10. Unplug the power cords of any external options from the electrical outlets.

11. Remove and secure all cables and cords.

12. If you saved the original shipping cartons and packing materials, use them to pack the units. If you are using different cartons, cushion the units to avoid any damage.

Securing Your System

You can secure your system unit by using one of the following features:

* The bolt-down feature allows you to attach the system unit to a table or desk.

Bolt-Down
Hole
Location
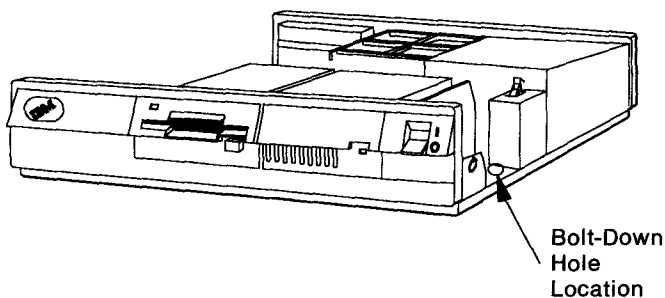
* The cabling feature allows you to attach a U-bolt to the rear of the system unit so that it can be cabled to a table or desk. To install a U-bolt, use a screwdriver to remove the plastic inserts from the rear panel.
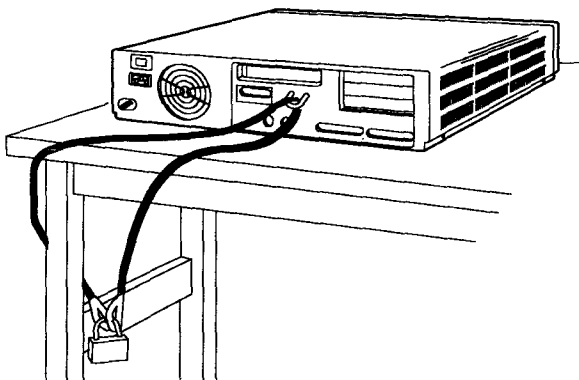
Typing Additional Characters Using the Numeric Keypad

You can type additional characters that may not appear on your keyboard by using the numeric keypad and the following procedure.

PC Enhanced Keyboard

To type an additional character:

1. Press and hold the Alt key.

2. On the numeric keypad, type the number for the character as indicated in the following table.

3. Release the Alt key.

Character Table

Some numbers in the table are followed by two characters. The first character represents the standard U.S. code page (437). The second character represents the standard multilingual code page (850). If a number has only one character, that character represents both code pages. The character you get when you type a number depends on the code page installed by your software.

Num	437	850	Num	437	850	Num	437	850	Num	437	850	Num	437	850	Num	437	850
96	'		149	ò		171	½		193	┴		215	╫	Î	237	∅	Ý
128	Ç		150	û		172	¼		194	┬		216	╪	Ï	238	∈	¯
129	ü		151	ù		173	¡		195	├		217	┘		239	∩	´
130	é		152	ÿ		174	«		196	─		218	┌		240	≡	-
131	â		153	Ö		175	»		197	┼		219	█		241	±	
132	ä		154	Ü		176	░		198	╞	ã	220	▄		242	≥	=
133	à		155	¢	ø	177	▒		199	╟	Ã	221	▐	¦	243	≤	¾
134	å		156	£		178	▓		200	╚		222	▌	Ì	244	⌠	¶
135	ç		157	¥	Ø	179	│		201	╔		223	▀		245	⌡	§
136	ê		158	Pt	×	180	┤		202	╩		224	α	Ó	246	÷	
137	ë		159	ƒ		181	╡	Á	203	╦		225	β		247	≈	¸
138	è		160	á		182	╢	Â	204	╠		226	Γ	Ô	248	°	
139	ï		161	í		183	╖	À	205	═		227	π	Ò	249	•	¨
140	î		162	ó		184	╕	©	206	╬	¤	228	Σ	õ	250	·	
141	ì		163	ú		185	╣	¢	207	╧		229	σ	Õ	251	√	¹
142	Ä		164	ñ		186	║		208	╨	ð	230	µ		252	ⁿ	³
143	Å		165	Ñ		187	╗		209	╤	Ð	231	τ	þ	253	²	
144	É		166	ª		188	╝		210	╥	Ê	232	Φ	Þ	254	■	
145	æ		167	º		189	╜	¢	211	╙	Ë	233	Θ	Ú			
146	Æ		168	¿		190	╛	¥	212	╘	È	234	Ω	Û			
147	ô		169	⌐	®	191	┐		213	╒	ı	235	δ	Ù			
148	ö		170	¬		192	└		214	╓	Í	236	∞	ý			

Section 4. Testing Your System

Problems with your system can be caused by software, hardware, or both. Use the testing programs on the Starter Diskette and the troubleshooting charts in this section to determine the cause of a problem and the action to take.

Notes:

1. Use this section to test IBM products only. Non-IBM products may give invalid errors or responses.

2. Some devices that attach to your system have their own test instructions. Refer to those instructions when testing those devices.

3. Record any error message or symptom for future reference.

4. You may receive error messages when using software. Refer to the software manual for a description of those messages.

Starting the Tests

When testing your system, be sure the Starter Diskette contains a copy of the current system configuration. If a problem occurs during testing, an error message is displayed with the cause of the problem and the action to take.

To begin testing your system:

1. Turn off the system unit.

2. Insert the Starter Diskette into drive A, wait 5 seconds, and then turn on the system unit. When you turn on the system unit, it performs a power-on self-test.

3. Write down the number of times the system beeps during the self-test. You will need this information during testing.

4. After the self-test (up to 90 seconds), is the following screen displayed?
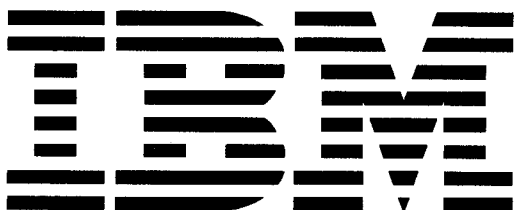
IBM Personal System/2 Model 30 286
Starter Diskette
Version X.XX

(C) Copyright IBM Corp. 1981, 19XX

Press Enter (◄┘) to continue . . .

NO Follow the instructions on your screen, or refer to "Troubleshooting Charts" on page 4-4 and take the action listed.

YES The self-test is complete. To continue testing, complete the following steps:

1. Select **Test the system** from the main menu of the Starter Diskette.

2. Select **Format diskette** and format one blank diskette for each diskette drive in your system unit.

   Note: Use this formatting program only to prepare diskettes to test the system. To format diskettes for general use or to format your fixed disk, use the formatting commands in your operating system manual.

3. Select **System checkout** and follow the instructions on the screen.

   If you receive an error message, refer to "Troubleshooting Charts" on page 4-4 and take the action listed.

Troubleshooting Charts

If your system displays any of the following error messages, take the action listed. If your system displays more than one error message, take the action listed for the *first* message. Error messages are displayed in the upper left part of the screen.

(**X** can be any number.)

Error Message	Action
161 - Nonvolatile Memory Error	Use the Starter Diskette to run automatic configuration. If the **161** error is displayed again after the system has been turned off for more than 30 minutes, have the system unit serviced.
162 - Configuration Error	If you have changed the system configuration (for example, removed or installed an option), use the Starter Diskette to run automatic configuration. If you have not changed the system configuration or the **162** error continues, have the system unit serviced.
163 - Set Date and Time	Use the Starter Diskette to set the date and time. If the **163** error continues after setting the date and time, have the system unit serviced.
164 - Memory Size Error	If you have installed or removed memory, use the Starter Diskette to run automatic configuration. If you have not installed or removed memory or the **164** error continues after running automatic configuration, have the system unit serviced.
199 - Installed Devices List Error	**Internal Devices (Except Option Adapters):** If a device is missing from the list, have the system unit serviced. **External Devices and Option Adapters:** If a device or option is missing from the list, refer to the instructions that came with the device for testing information. If there is no testing information, have the system unit and the device serviced.
1XX - System Board Error **2XX** - Memory Address Error	Have the system unit serviced.

Error Message	Action
301 - Keyboard or System Unit Error	Make sure that the keyboard is connected correctly and that a key is not being held down. If a key is not being held down, turn off the system unit, wait 5 seconds, and then turn on the system unit. If the **301** error continues, have the system unit, keyboard, and keyboard cable serviced.
3XX - Keyboard Error	Have the keyboard and cable serviced

6XX - Diskette Error
 	
- or -
 	
Starter Diskette program will not load
	Make sure you are using the Starter Diskette and that it is inserted correctly. Try to load the Starter Diskette again. (See page 1-9 for more information.) If the diskette program will not load, have the system unit serviced. **Note:** If you receive a **6XX** error and a 5.25-inch external diskette drive is attached to your system unit:
	
	1. Turn off the external diskette drive and the system unit.
	2. Insert the Starter Diskette into drive A.
	3. Turn on the system unit (do not turn on the external diskette drive).
	4. Repeat the system checkout.
	   • If you receive a **6XX** error, have the system unit serviced.
	   • If you did not receive a **6XX** error, have the external diskette drive serviced.

7XX - Math Coprocessor Error **9XX** - Parallel Port Error **10XX** - Alternate Parallel Error **11XX** - Serial Port Error **12XX** - Alternate Serial Error	Have the system unit serviced.
13XX - Joystick Error	Have the joystick and system unit serviced.
14XX - Printer Error	Have the printer serviced.
17XX - Fixed Disk Error	Have the system unit serviced.
24XX - Display Error	Have the system unit and display serviced.

If you did not receive any of the error messages listed, continue with the chart on the following page.

Error Message	Action
30XX - Network Failure (except **3015*** and **3042***) **31XX** - Network Failure (except **3115*** and **3142***)	Have the system unit serviced.
84XX - IBM Personal System/2 Speech Option Failure	Have the system unit and speech control assembly serviced.
86XX - IBM Personal System/2 Mouse Error	Have the system unit and mouse serviced.
ROM Error **Parity Check 1** **Parity Check 2**	Have the system unit serviced.

* If you received this error message, have the network serviced.

If you did not receive any of the error messages listed, continue with the chart on the following page.

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

Note: If you have just installed internal options, internal cables may
not be connected correctly.

Symptom	Action
Any of the following: • No beep during self-test • More than one beep during self-test • Continuous beep • Tests stop and you cannot continue.	Have the system unit serviced.
Any of the following: • Totally blank screen • No cursor displayed • Only the cursor is displayed • Screen is unreadable • Display problems.	Continue with "Testing a Display" on page 4-9.
F1 and diskette prompts are displayed.	Make sure you are using the Starter Diskette and that it is inserted correctly. Try to load the Starter Diskette again. If the diskette program will not load, have the system unit serviced.
Password prompt is displayed.	A power-on password is set. To use the system, you must type the correct password and press Enter. (See page 3-3 for more information.) If the power-on password is not working properly, have the system unit serviced.
No keys on the keyboard work.	Have the system unit, keyboard, and cable serviced.
Only some keys on the keyboard work.	Have the keyboard and cable serviced.
Any printer error or external option problem (other than display).	Continue with "Testing an External Option" on page 4-10.
Any other error message.	Have the system unit serviced.

If you have reached this point and have not resolved the problem, you may want to seek technical assistance. A person trained to help with technical problems may be available at your location or place of purchase. The name and number can be recorded here.

Name	Number

When calling for service, be prepared to provide the following information:

- Your system model and serial number (this information should be recorded on page iv in this guide)

- Any error codes or symptoms you observed during testing

- Your name or company name, address, and phone number.

Testing a Display

Some IBM displays have their own self-test. If you suspect a problem with your display:

1. Turn off the display and the system unit.

2. Disconnect the display signal cable from the system unit.

3. Turn on the display.

4. Adjust the brightness and contrast controls.

5. Does the screen have a white center with some shading near the edges, and does it have a black strip on either one side or both sides?
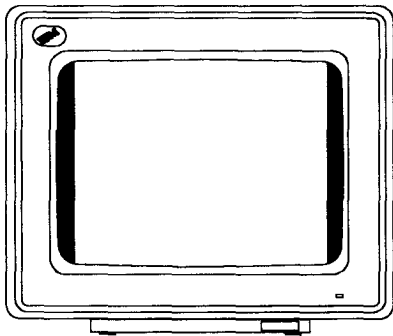
NO   Refer to the instructions that are supplied with your display for further testing information.

YES   The display has successfully passed its self-test. Have the system unit serviced.

Testing an External Option

Refer to the instructions that are supplied with the external option and check to see that it is:

- Cabled correctly
- Plugged into a properly grounded electrical outlet, if necessary
- Turned on
- Adjusted properly.

External options may have their own tests. Refer to the instructions that are supplied with the option and run the tests. If the tests do not work, have the external option serviced. If the tests work, have the system unit serviced.

Appendix. Hardware Reference

Use the information in this section to locate hardware features on your system and to learn more about IBM power cords.

Hardware Features

Display Cable

Display Power

Voltage Selector

Power

Display Cable

U-Bolt

Keyboard

Pointing Device

Parallel Serial

3 Expansion Slots

Brightness, Contrast Controls

1 2
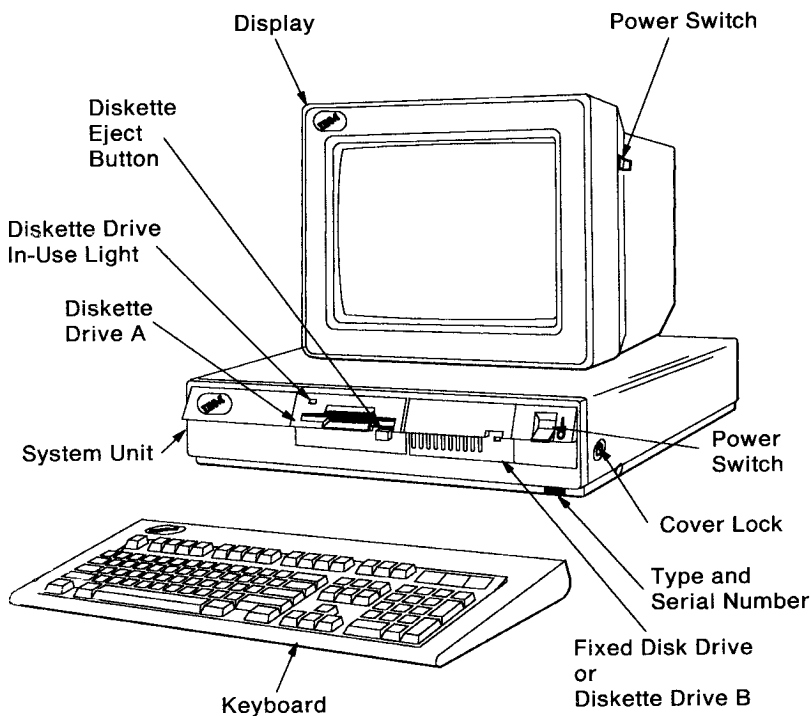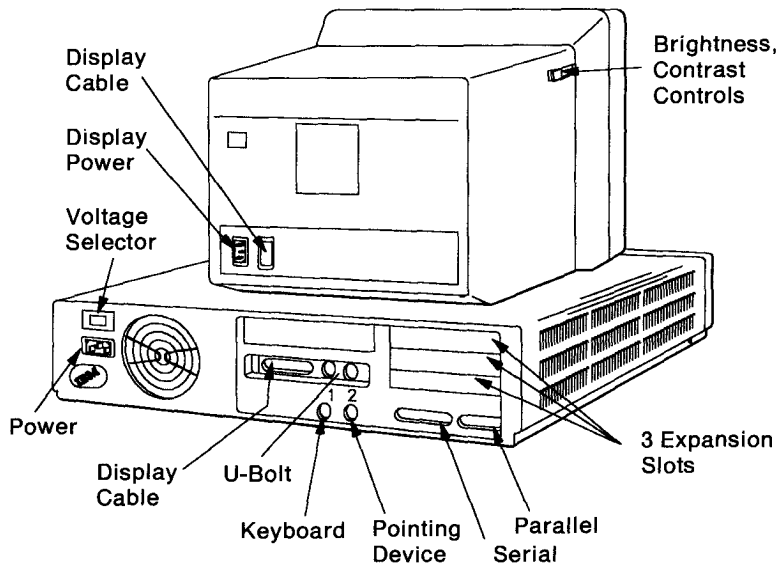
IBM Power Cords

To avoid electrical shock, IBM provides a power cord with a grounded attachment plug. Use only properly grounded electrical outlets.

IBM power cords used in the United States and Canada are listed by Underwriter's Laboratories (UL) and certified by the Canadian Standards Association (CSA). These power cords consist of:

- Electrical cables, type SVT or SJT

- Attachment plugs complying with National Electrical Manufacturers Association (NEMA) 5-15P

- Appliance couplers complying with International Electrotechnical Commission (IEC) Standard 320, Sheet C13.

IBM power cords used in all other countries consist of :

- Electrical cables, type HD21

- Attachment plugs approved by the appropriate testing organization for the specific countries where they are used

- Appliance couplers complying with International Electrotechnical Commission (IEC) Standard 320, Sheet C13.

IBM power cords for a specific country are usually available only in that country.

IBM Power Cord Part Number	Use in These Countries
5640664	Argentina, Uruguay
62X0663	Bahamas, Barbados, Bermuda, Bolivia, Canada, Cayman Islands, Colombia, Costa Rica, Dominican Republic, Ecuador, El Salvador, Guatemala, Guyana, Haiti, Honduras, Jamaica, Japan, Korea (South), Mexico, Netherlands Antilles, Nicaragua, Panama, Peru, Philippines, Saudi Arabia, Surinam, Taiwan, Thailand, Trinidad (West Indies), United States of America, Venezuela
6952291	Australia, New Guinea, New Zealand, Papua, Paraguay
6952301	Bolivia, Thailand
6952320	Austria, Belgium, Bulgaria, Czechoslovakia, Egypt, Finland, France, German Democratic Republic, Federal Republic of Germany, Greece, Hungary, Iceland, Indonesia, Netherlands, Norway, Poland, Portugal, Romania, Spain, Sweden, Turkey, Yugoslavia
6952329	Denmark
6952347	Bangladesh, Pakistan, South Africa, Sri Lanka
6952356	Abu Dhabi, Albania, Antigua, Bahrain, Brunei, Dubai, Fiji, Hong Kong, India, Ireland, Kenya, Kuwait, Macau, Malaysia, Nigeria, Oman, People's Republic of China, Qatar, Singapore, United Kingdom
6952365	Switzerland
6952374	Chile, Italy
6952383	Israel

Glossary

adapter. A circuit board that attaches to the system board and expands the capabilities of the system.

backup. To copy information from a fixed disk or diskette onto another diskette for safekeeping.

buffer. A part of memory used to temporarily store information.

cache. A high-speed buffer used to store frequently accessed instructions and data; it is used to reduce access time.

configuration. A list of the devices installed in the system unit and a description of how those devices operate.

computer system. A functional unit consisting of a system unit, all attached devices (keyboard, display, printer, and others), and software.

connector. A plug, usually on the back of the system unit, to which cables for other devices can be attached. See *port*.

device. A piece of equipment or a mechanism that serves a specific purpose or performs a special function.

device driver. A file that contains the code needed to attach and use a device.

diskette. A flexible, magnetic disk permanently enclosed in a protective container.

diskette drive. The device used to read and write data on diskettes.

expansion slot. A designated space in the system unit where an adapter can be installed.

fixed disk drive. A disk storage device that reads and writes data on rigid magnetic disks. A fixed disk drive is faster and has a larger storage capacity than a diskette.

format. To prepare a diskette so that data can be written on it in an organized fashion.

hardware. The equipment, as opposed to the programming, of a system.

KB. Kilobyte; 1024 bytes.

math coprocessor. An optional component that plugs into the system board of the computer, enabling it to perform complex mathematical operations in parallel with other operations.

MB. Megabyte; 1,048,576 bytes.

memory. The part of a computer where data and instructions are stored. Memory size is measured in Kilobytes (KB) or Megabytes (MB).

mouse. A hand-held device used to control the cursor on a display

screen. The mouse is operated by sliding it across a flat surface. As the mouse moves, the cursor moves in the same relative direction.

network server. A computer system that provides information or facilities to other computer systems.

nonvolatile memory. Memory that retains information after the electrical power to the system is turned off.

option. An accessory piece of hardware that can be attached to the system unit or installed inside the system unit to expand the capabilities of the computer.

operating system. Software that controls the execution of programs.

parity check. A check that tests whether the number of ones (or zeros) in an array of binary digits is odd or even.

password. In computer security, a string of characters known to the computer system and a user, who must specify it to gain access to the system and to the data stored within it.

port. A connector on a device to which cables for other devices such as displays and printers are attached.

program. A sequence of instructions that a computer can interpret and execute.

prompt. A displayed symbol or message that requests information from the user or gives information to the user; for example, on the display screen of an IBM Personal Computer, the DOS A> prompt. The user must respond to the prompt to proceed.

ROM. Read-only memory. Memory in which stored data cannot be modified by the user.

software. Programs, procedures, rules, and any associated documentation pertaining to the operation of a system.

system. See *computer system*.

system unit. The part of a computer that contains the processing unit and devices such as diskette and fixed disk drives.

VDISK. A device driver that acts as a disk drive by using a portion of memory as the storage medium.

write-protect. To prepare a diskette so that data cannot be recorded on the diskette and prerecorded data cannot be erased.

Index

A

adapter
  installation 2-11
  jumper settings 2-12, 2-14
  serial/parallel 2-14
additional characters, typing 3-15

B

BASIC 3-10
bolt-down feature 3-14

C

cabling feature 3-14
Cache, IBM Disk 3-11
character table 3-16
charts, troubleshooting 4-4
codes, error 4-4
configuration, setting 1-7
control
  brightness 1-9
  contrast 1-9
cover
  expansion slot 2-11
  installation 2-15
  removal 2-2

D

date and time, setting 1-8
device (see option)
diagnostic testing (see testing)
diskette drive
  eject button 1-2
  testing 4-1
diskettes
  formatting 3-8
  working with 3-8
  write-protecting 3-9

display

brightness control 1-9
contrast control 1-9
power cord 1-5
power switch 1-3
prompts 3-1
signal cable 1-4
testing 4-9

E

error messages 4-4
expansion slot cover 2-11
external option
  installation 2-16
  testing 4-1, 4-10

F

features, setting 1-8
fixed disk
  prepare for moving 3-13
  testing 4-1
formatting diskettes 3-8

H

hardware features A-1

I

installation
  adapter 2-11
  cover 2-15
  external option 2-16
  IBM Disk Cache 3-11
  internal option 2-1
  math coprocessor 2-9
  memory 2-1, 2-3
  option 2-1
  system 1-1