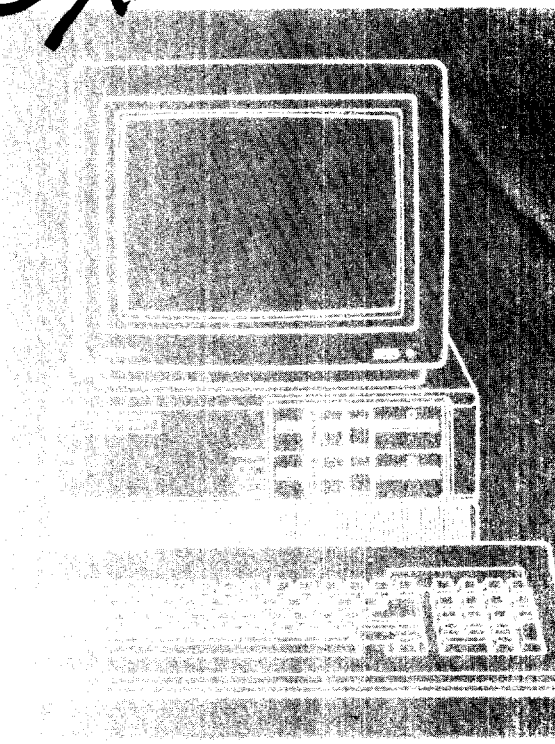
Apex™ by EPSON®



USER'S GUIDE

Apex™ by EPSON®

User's Guide

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IBM is a registered trademark of International Business Machines Corp.

MS-DOS, GW-BASIC, and Microsoft are registered trademarks of Microsoft Corp.

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Q50187005

FCC COMPLIANCE STATEMENT FOR AMERICAN USERS

This equipment generates and uses radio frequency energy and if not installed and used properly, that is, in strict accordance with the manufacturer's instructions, may cause interference to radio and television reception. It has been type tested and found to comply with the limits for a Class B computing device in accordance with the specifications in 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 television reception, which can be determined by turning the equipment off and on, you are 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 the computer and receiver are on different branch circuits.

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

"Television Interference Handbook"

This booklet is available from the U.S. Government Printing Office, Washington DC 20402. Stock No. 004-000-00450-7.

Note: If the interference stops, it was probably caused by the computer or its peripheral devices. To kther isolate the problem:

Disconnect the peripheral devices and their input/output cables one at a time. If the interference stops, it is caused by either the peripheral device or its I/O cable. These devices usually require shielded I/O cables. For Epson peripheral devices, you can obtain the proper shielded cable from your dealer. For non-Epson peripheral devices contact the manufacturer or dealer for assistance.

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. Operation with non-certified peripherals is likely to result in interference to radio and TV reception.**

The connection of a non-shielded equipment interface cable to this equipment will invalidate the FCC Certification of this device and may cause interference levels that exceed the limits established by the FCC **for this equipment.**

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Introduction

Your Apex™ by Epson® personal computer comes with 512KB (kilobytes) of internal memory and two floppy disk drives, and is compatible with all popular IBM® PC software.

The amount of internal memory (called random access memory or RAM) in your computer determines the type of software programs you can run and the size of your data files. With 512KB of RAM, you can run any of the larger programs without having to add any memory and you can create large data files. (One kilobyte equals approximately 1000 bytes, and one byte is the equivalent of one character.)

Most software programs expect a computer to have two floppy disk drives, one for the program diskette and one for a data diskette. Having two floppies on your Apex means that you do not have to spend time and effort switching diskettes.

You can choose the type of monitor you want to use with your Apex. You can select either a monochrome or color monitor. The Apex monochrome monitor is the most inexpensive choice. However, if you select the Apex color monitor, which has good resolution, you will be able to use software designed for color graphics.

Your Apex comes with a built-in parallel interface that lets you connect an Epson printer or plotter, or any other parallel printer. (Parallel refers to the way data is transmitted; a parallel interface is a high-speed interface used primarily for printers.)

Besides a printer, you can add other accessories to further expand the capabilities of your Apex. You have three option slots that let you connect almost any perifherul device you choose. A peripheral device is any device that you connect to the computer, and which then depends on the computer for its operation. Monitors, printers, and internal modems (which are used for on-line communications) are all peripheral devices.

Your Apex comes standard with a color/graphics adapter (CGA) card installed in one of the option slots. This allows you to connect any composite monitor, monochrome or color, or any RGB color/graphics monitor to your Apex. Or, you can change this card if you want to use any other type of monitor.

Here are some of the devices you can use with your standard Apex system:

- Composite monochrome monitor (composite refe to the type of signal your monitor receives)
- Composite color monitor
- RGB (red green blue) color monitor
- Any printer with a parallel interface.

Here are some of the devices you can use with your Apex by adding an option card:

- Enhanced graphics monitor
- TTL monochrome monitor
- Any serial device, such as a game port or joy stick.

You can also add additional memory to increase the amount of RAM to 640KB, and you can add an 8087 math coprocessor. Besides the accessories made especially for the Apex, you can use most of the option cards designed for the IBM personal computer on your Apex.

Your Apex comes with the MS-DOS® operating system. An operating system determines how programs run on the computer and supervises all input and output. MS-DOS is one of the most commonly used operating systems, and the majority of software programs are designed to work with MS-DOS.

Your Apex also comes with the GW-BASIC® programming language, which is simple to learn but also includes advanced features for the experienced programmer.

If you have used MS-DOS or GW-BASIC before on another computer, you'll find that it works the same on the Apex. Be sure to refer to your Apex MS-DOS or GW-BASIC manual, however, where you'll find descriptions of special features added by Epson.

If you already have software products designed for the IBM PC, you'll be able to use them with your Apex.

After you set up your Apex, see the manuals for your application programs for information on using the software.

How to Use This Manual

By reading this manual, you'll learn how to set up and care for your Apex by Epson. You'll also learn how you can start using the MS-DOS operating system and how to connect optional equipment. You may not need to read everything in this manual; some sections may describe a particular option or accessory that you don't have.

If you are using a computer for the first time, read each chapter carefully

- Chapter 1 provides complete instructions on how to set up and begin using your Apex by Epson.
- Chapter 2 covers some general operating procedures you'll want to know about before you start work.
- Chapter 3 describes how diskettes and disk drives work and shows how to use them.
- Chapter 4 tells you how to use MS-DOS with your Apex and describes some of the basic MS-DOS commands.
- Chapter 5 shows you how to install option cards.
- Chapter 6 contains troubleshooting information.

You can refer to the appendixes to find out how to set DIP switches and for hardware specifications. DIP switches give the computer information about itself. You should not need to change the DIP switches on your Apex; they are already set when you purchase the computer. However, it's a good idea to become familiar with the switch settings in case you upgrade your Apex or have a system problem.

A glossary of computer terms used in this manual is also included at the end of this manual. You can refer to this glossary whenever you need to look up an unfamiliar term.

For easy referral, the steps for setting up your Apex are illustrated on the inside back cover of this manual.

Chapter 1

Setting Up Your System

Setting up your Apex by Epson personal computer is easy. Just follow the nine steps in this chapter and you'll be on your way. You can also refer to the "Quick Guide To Setting Up" on the inside back cover.

1 Unpacking

Now you can remove the components from their cartons, but be sure to inspect each piece as you do. If anything is missing or damaged, notify your Epson Customer Care Center immediately. The number to call is 1-800-421-5426. Be sure to have the serial number from your Apex and a description of the problem.

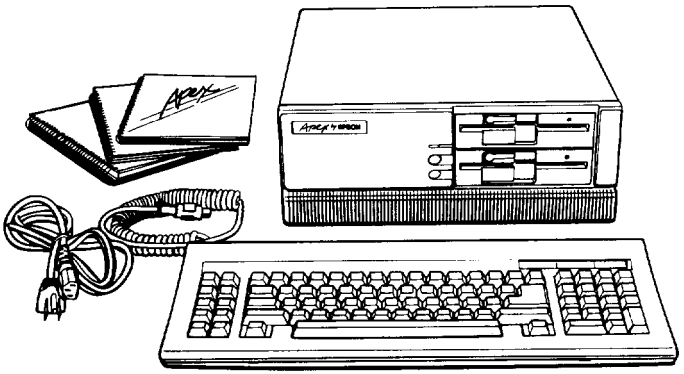
Don't discard anything. Keep your packing materials and use them to protect your computer if you need to move or ship it later.

When you unpack your Apex, you will find the following items along with this manual:

- The main unit and power cord
- The keyboard with an attached cable

9 An MS-DOS operating system diskette (version 3.2) with an MS-DOS manual

■ A GW-BASIC programming language diskette (version 3.2) with a GW-BASIC manual.



You'll find one registration card with your Apex; fill it out now and mail it to Epson. With your registration card on file, Epson can send you any update information.

2 Choosing a Location

Before you set up your Apex, it's important that you decide on the right place to locate the computer. Whether you use your Apex at home or in the office, you'll need a comfortable, convenient place to use it.

When considering a location, make sure that it provides the following

- A large area and sturdy surface, such as a desk or table, that can easily support the weight of your Apex, including all its components.

- A flat, hard surface. Don't set the Apex on a soft surface like a bed or a carpeted floor. These surfaces attract static electricity, which erases data on your diskettes and can damage the computer's circuitry. Sofi surfaces also prevent the proper ventilation your Apex needs.

- Good air circulation. Your Apex needs air to circulate freely under it as well as behind it. Leave several inches of space around the computer for proper ventilation.

- Moderate environmental conditions. Protect your computer. Avoid extremes in temperature and humidity; also avoid direct sunlight or any other type of heat. High humidity also hinders operation, so it's best to select a cool, dry area. Don't risk losing data stored on a diskette by exposing your computer to dust and smoke, which can cause damage to diskettes and disk drives.

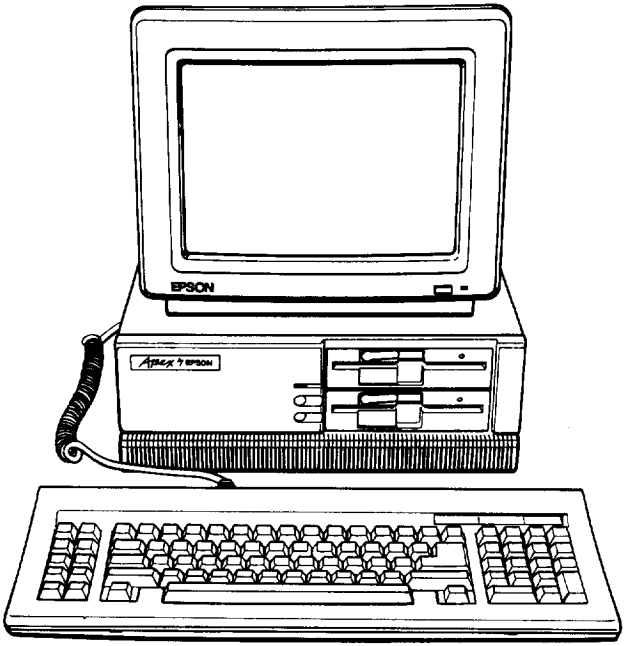
- Appropriate power sources. Static charges can be damaging. Connect all your equipment to three-prong, 120-volt, grounded outlets. You can plug the monitor into the auxiliary power outlet on the back panel of the Apex, but you still need one outlet for the main unit and one outlet for your printer.

- No electromagnetic interference. Choose a spot for your Apex away from any electrical device that generates an electromagnetic field. Surprisingly even your telephone can cause problems, especially if you keep diskettes right next to it.

When you find the ideal location for your Apex, you can start to set up your system.

3 Arranging the Components

First things first. Decide how you want to arrange your system components. The most common setup is with the monitor on top of the main unit and the keyboard directly in front (leaving enough space for you to insert diskettes into the disk drives):

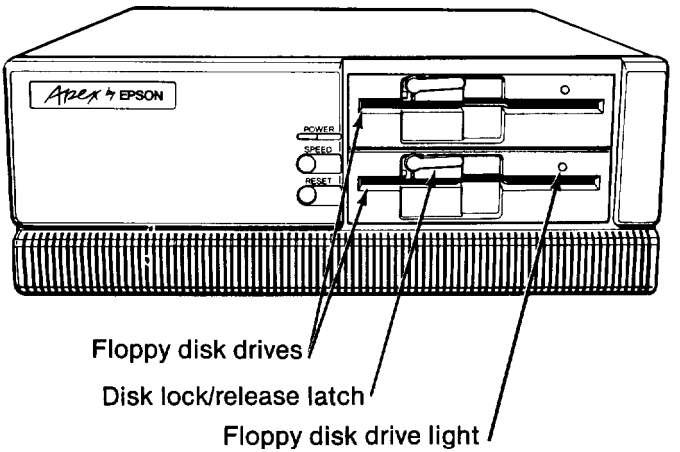


Of course, if you have special computer furniture, you can arrange your Apex components to suit your own particular needs.

Before you begin to connect the cables, take a look at the front and back panels of the main unit.

The front panel

On the front panel you'll see two floppy disk drives, the power light, and two buttons you press to control the operation of your Apex.

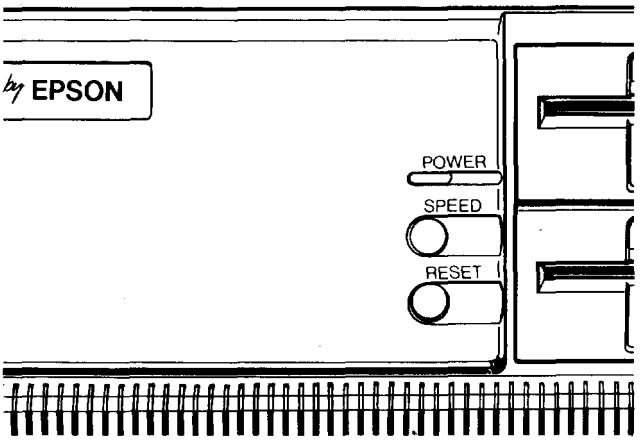


Here's how the front panel components work:

- Floppy disk drives. Both the top and bottom floppy disk drives use 5 1/4-inch, 360KB diskettes.

- Disk lock/release latch. After you insert a diskette, turn this latch down until it is vertical. To remove a diskette, turn it up until it is horizontal.

- Floppy disk drive light. When you see this red light, it means that the drive is being used. To avoid losing data, never remove a diskette or turn off the computer's power when this light is on.



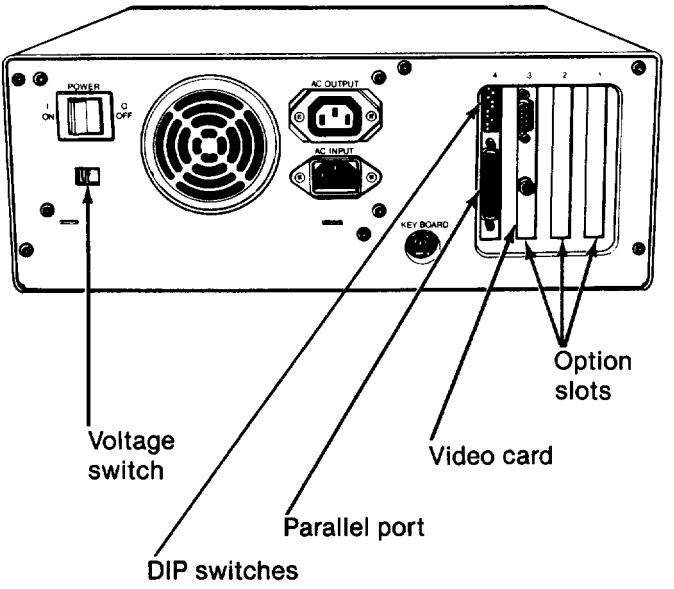
- POWER light. When this light is red, it means that the power is on and the system is running at 4.77MHz (megahertz). When this light is green, the system is on and running at 8MHz. (Your Apex operates at two different speeds. The difference between these speeds is explained in Chapter 2.)

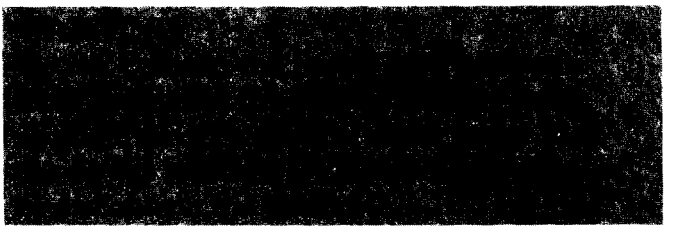
- SPEED button. You can press this button to change the computer's running speed from 4.77MHz to 8MHz. When the button is pressed in, your Apex runs at 8MHz; when the button is released, it runs at 4.77MHz.

- RESET button. You can press this button to reset the computer. For example, when your MS-DOS dkkette is in the top drive, you can press the RESET button to reload the operating system. Be careful not to press this button while your program is running; you could lose data.

The back panel

Take a look at the back panel and find the Apex power switch, input/output ports, and keyboard cable socket. This is where you turn on the Apex and connect the peripheral devices, such as the monitor and printer.





Here is some background information on each component:

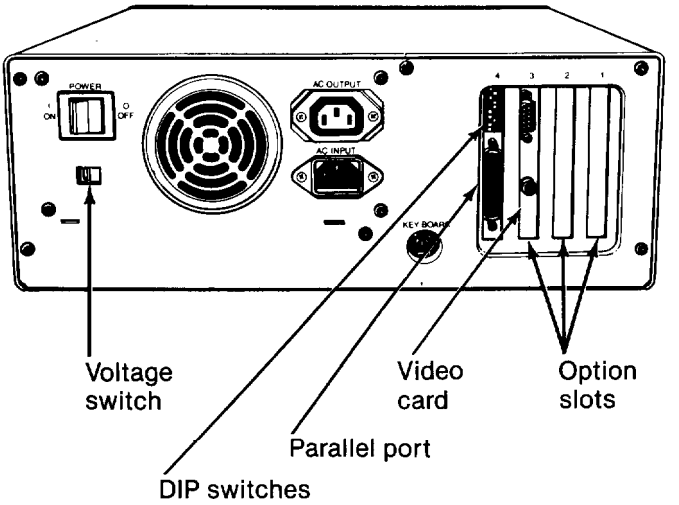
- POWER switch. You turn the main unit ON and OFF with this switch.

- AC OUTPUT This is the auxiliary power outlet. You can plug your monitor (or another device) into the main unit here, instead of into a wall outlet. The main unit's power switch controls the power to this outlet. Be careful not to plug any device into this outlet that uses more than 80 watts.

- AC INPUT. This supplies electrical power to your computer when you plug the power cord into this power inlet. It's important to always turn the power switch OFF before you plug the power cord into an inlet or outlet.

- Voltage switch. Leave this switch at 115V for USA and Canadian use. Slide the switch to the right to select 230V for use in other countries (as necessary).

- KEYBOARD. The keyboard cable socket is where you plug the keyboard into the main unit.



- DIP switches. These switches give the computer information about its keyboard, coprocessor status, memory size, video card type, floppy disk drives, and parallel interface. The switches are preset to match your system configuration. (Refer to Appendix A to see how to set these switches if you change your system configuration.)

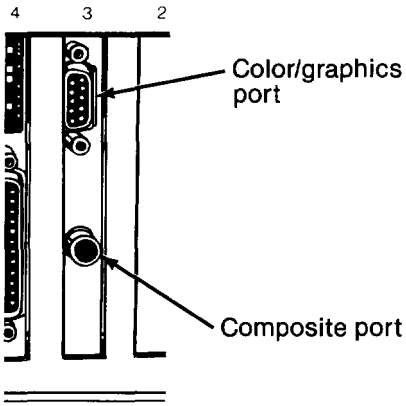
- Parallel port. You can connect any printer with a parallel interface into this connector.

- Option card access slots. For expansion purposes, the Apex has space for three option cards (which control the optional devices you add). One of these slots is already occupied by your video card, which allows you to use either a monochrome or color monitor. Some time in the future, you may want to use the other two slots to add special devices, such as a modem or hard disk controller, to your Apex system.

4 Connecting the Monitor

Now you can connect your monitor by placing it on top of or near the Apex main unit. It is easiest to connect the monitor cable if the backs of the monitor and the main unit are facing you.

Your Apex has a color/graphics adapter (CGA) video card installed. This means that you can connect a composite monochrome monitor or a composite or RGB color/graphics monitor to this port right now:

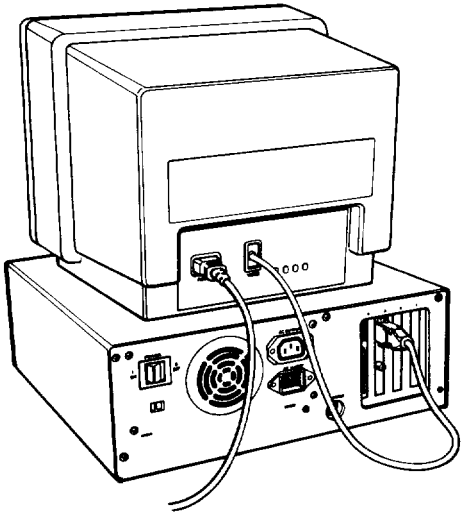


You connect a color/graphics monitor in the top port or a composite monitor in the bottom port.

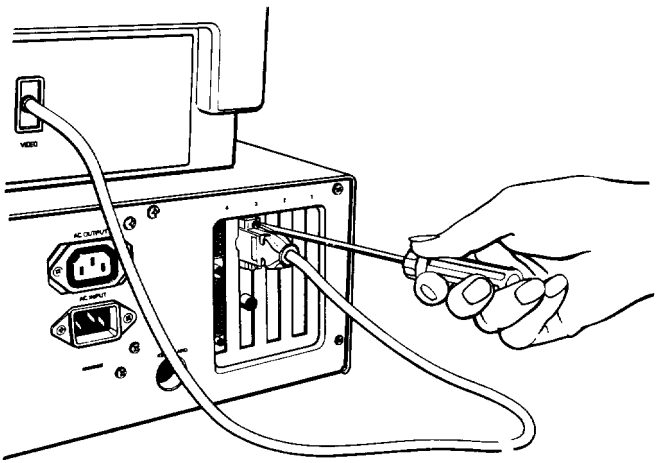
The way you connect your monitor depends on the type you have, so refer to your monitor manual or follow these guidelines to proceed:

1. First, if necessary, connect the monitor cable to your monitor. Some cables are permanently attached to the monitor at one end.

2. Next, connect the monitor cable to the connector at the back of the main unit:



3. Then, tighten the screws (if any) on the plug with a screwdriver.

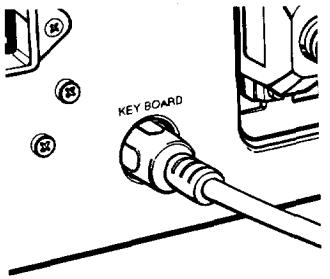


4. Finally plug the monitor's power cable into the AC OUTPUT outlet on the back panel of the Apex or into an electrical outlet.

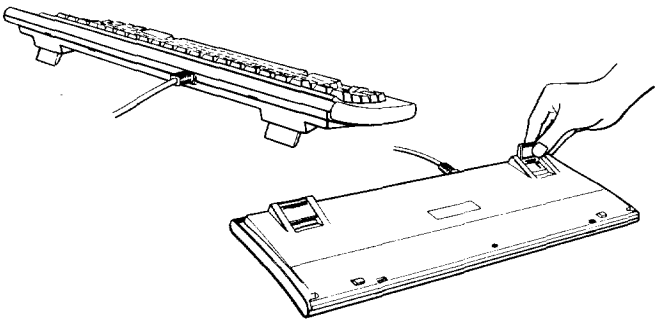
If you are using anything other than the color/graphics adapter, you need to check the DIP switch settings (defined in Appendix A) to be sure they are set correctly for the type of video card you have. (Although these switches are set by the manufacturer, it's a good idea to become familiar with them so you can check the settings when it's appropriate.)

5 Connecting the Keyboard

It's easy to connect the keyboard. Just insert the keyboard connector into the KEYBOARD socket on the back panel of your Apex. Be careful not to force the connector, but make sure you insert it all the way by pushing on it gently. Then check to see that the cable is secure.



Now that your Apex is all hooked up, you can decide if you'd like to adjust the angle of the keyboard by lifting the legs on the bottom. Turn the keyboard over and lift each leg upward until it locks into place. If this feels better to you, fine; if not, just leave the legs flat.

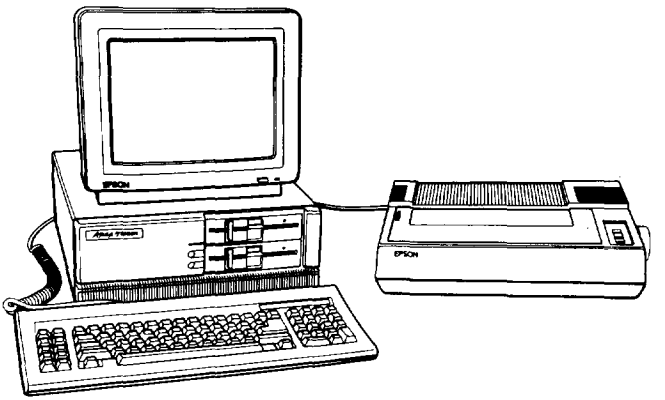


6 Connecting a Printer

Your Apex has a *parallel interface* to which you can easily connect a printer or plotter. Epson offers a fill range of printer products for you to choose from.

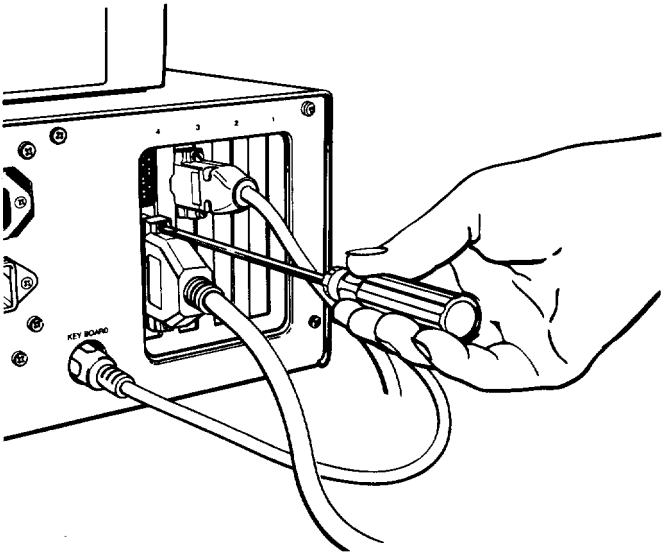
If you have a printer you'd like to connect to your Apex, make sure you have an IBM PC-compatible printer cable. Once you have a printer cable, just follow these next few steps to connect your printer to the parallel interface on the main unit:

1. Place the printer in a convenient location next to your system.

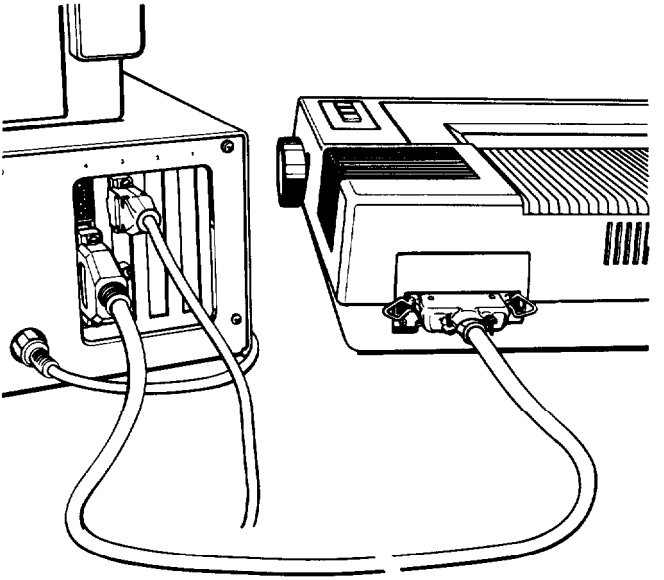


2. Before you connect the printer, make sure the power switches on the main unit, the monitor, and the printer are off.

3. Connect the printer cable to the parallel port on the back panel of the main unit. If the plug has retaining screws, tighten them with a small screwdriver.



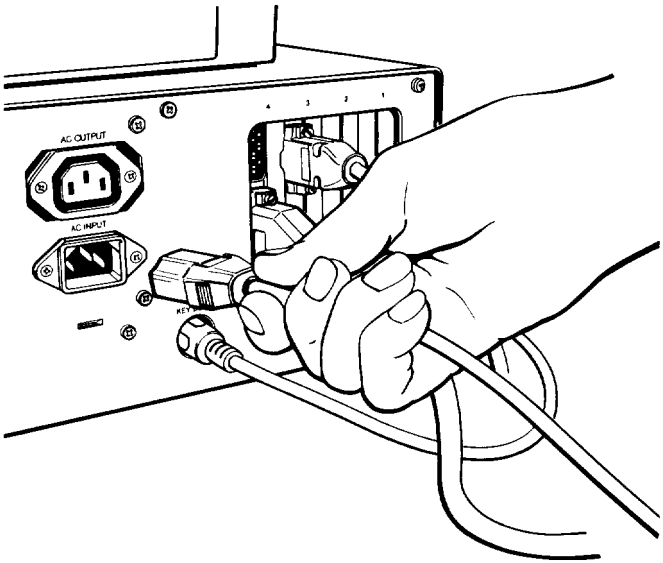
4. Connect the other end of the cable to the printer. Secure the cable by pressing together the squeeze locks at each side of the printer port and pushing them into the connectors on each side of the cable.



5. Plug the printer's power cable into an electrical outlet. Now your printer is connected to your Apex.

7 Connecting the Power Cord

The last step before turning on your computer is to insert the power cord into the AC INPUT connector on the back panel. To avoid an electric shock, be sure to plug this end into the main unit first and then plug the other end into the wall socket.



Now you can plug the power cord into an electrical outlet.

8 Turning On the Computer

At this point, you have successfully set up your system, and you're almost ready to turn on the power and start using your Apex. But before you do this, please take a minute to read the following safety rules and the section on removing the disk drive protector sheets.

Safety rules

If you follow these rules, you can help to avoid accidentally damaging your computer or injuring yourself:

- Never turn the computer on with a disk drive protector sheet in the disk drive. (Please see "Removing the disk drive protector sheets" below.)
- Do not attempt to dismantle any part of the computer. If there is a hardware problem you cannot solve after reading Chapter 6 on troubleshooting, call your Epson Customer Care Center. (Refer to Chapter 6 for information.)
- Do not unplug cables from the computer while the power switch is on.
- Never turn off or reset the computer when the red diskette drive light is on. This can destroy data stored on a disk or make an entire diskette unusable.

- Always wait at least five seconds after you switch the power off before switching it on again. Turning the power off and on rapidly can damage the computer's circuitry.

- Never leave a beverage on top of, or next to, your Apex or any of its components. Spilled liquid damages the circuitry of your components.

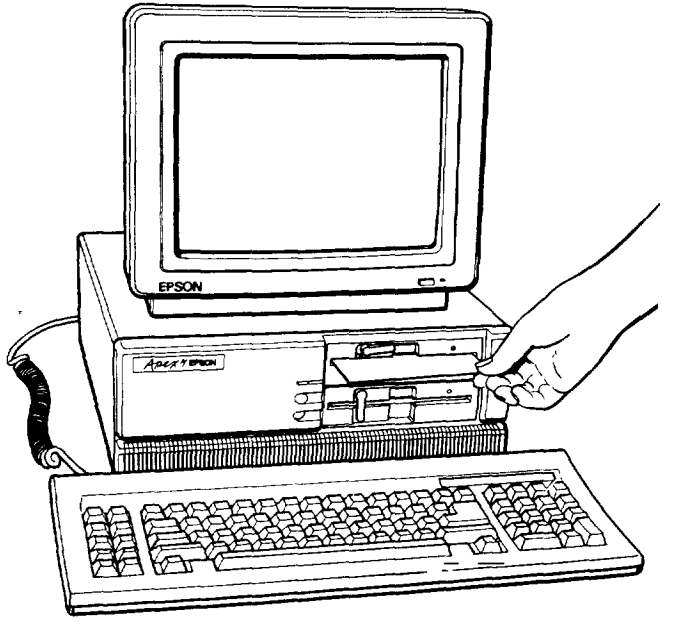
- To install or remove an option card, always turn off the power, disconnect the main power cord, and wait for a few minutes before removing the cover from the computer. (Installing option cards is described in Chapter 5.)

The last thing you need to do before you start the computer is to be sure to remove the disk drive protector sheets.

Removing the disk drive protector sheets

Now look at your floppy disk drives, and note that there is a cardboard sheet in each drive. These sheets are inserted at the factory to protect the disk drive heads that read from and write to diskettes.

Be sure to remove both protector sheets before you turn the computer on. Turn the latch that covers the disk slot until it is horizontal and carefully pull out the sheet.



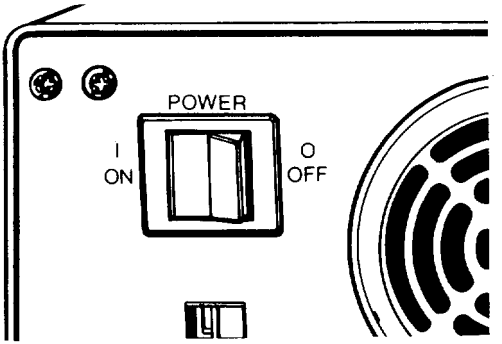
Save these protector sheets and put them back whenever you move the computer, even if you are just moving it to another part of the room. If you are not going to use your computer for a week or more, put the protector sheets back in and they will help keep dust from entering the disk drives.

System startup

Now you're ready to turn on your Apex; however, it's a good idea to turn on the monitor and printer before you turn on the computer.

Make one last check to be sure that the power cord is plugged into the power inlet (AC INPUT) on the back panel of the main unit and into a 3-prong, 120-volt, grounded electrical outlet. Next, turn on the monitor so you can see the messages that appear as your computer starts up. Finally, if you have a printer, turn it on.

Normally you can turn on your computer with or without a system diskette in the top disk drive, but for now, leave the drive empty. If you're ready to turn on the computer, go ahead and press the POWER switch on the back panel of the main unit to the ON position.



You'll notice that the power indicator on the front panel lights up and you'll hear the cooling fan inside the main unit start. After a few seconds, the computer begins to perform an internal test.

Initial screen display

After the Apex completes its self test, you see a message telling you how much internal memory is available:

512KB OK

Then the following messages are displayed:

```
Non-system disk or disk error
Insert system diskette in dirve A
and strike any key when ready
```

These messages tell you that the computer is ready to load the MS-DOS operating system from a diskette in the topdrive. The Apex comes with version 3.2 of MS-DOS.

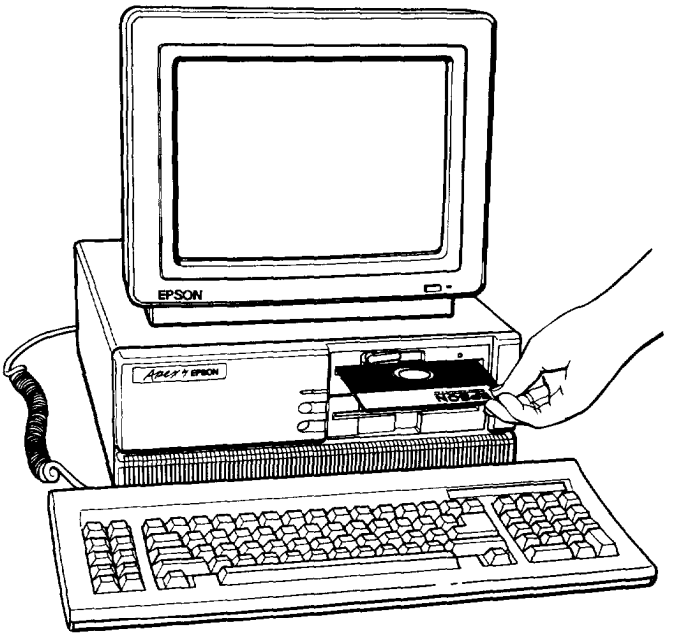
If you can't see the screen display clearly make sure the power light is on. Then use the controls on your monitor to adjust the brightness and contrast until characters on the screen are clear and bright.

9 Loading MS-DOS

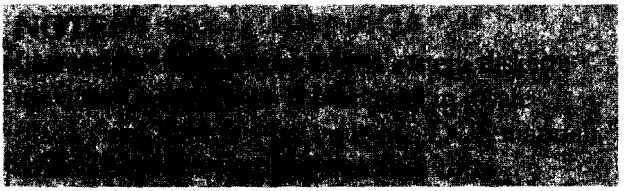
Before you can run a software program designed to run on the MS-DOS operating system, MS-DOS itself must be running in the Apex's memory. Loading MS-DOS into memory is called booting the system. Once MS-DOS is loaded, you can give instructions to the computer and begin to use various software programs.

Loading MS-DOS is simple:

1. Insert your MS-DOS system diskette in the top drive. Hold it with the label faceup and the notch to the left. Be careful not to touch the diskette surface. Slide the diskette into the disk drive:



2. When you can feel that the diskette is all the way in, turn the latch down until it locks in the vertical position. For a complete description of inserting diskettes, see Chapter 3, Using Diskettes and Disk Drives.



Next, your computer begins loading MS-DOS into memory A message on the screen notifies you that MS-DOS is loading.

3. If you didn't insert your system diskette, or you inserted another diskette by mistake, you see these messages after 15 seconds:

```
Non-System disk or disk error
Insert system diskette in drive A:
and strike any key when ready
```

Insert your MS-DOS diskette, and press any key to proceed.

4. After MS-DOS is loaded, you see the operating system tide and version display on the screen.

5. The next item to appear on your screen is the date prompt, which appears every time you boot the system:

   Current date is *mm/dd/yy*
   Enter new date:

   At this point, you can either enter the correct date or leave it unchanged by pressing **Enter.** For now, press **Enter** to leave the date unchanged.

6. After accepting the date, MS-DOS displays the time prompt:

   Current time is *hh: mm: ss*
   Enter new time:

   The time you see is the amount of time that has lapsed since you turned on the computer. You can enter the correct time or bypass the prompt by pressing **Enter.** For now, press **Enter** to bypass the prompt.

This brings you to the MS-DOS command prompt, A), which is your starting point for putting MS-DOS to work. The command prompt identifies the current operating drive. On your Apex system, the top drive is drive A and the bottom drive is drive B.

Now that you've made it to the MS-DOS command prompt, you should immediately make a working copy of the MS-DOS system diskette, and then store the original safely away. In fact, make two copies—one that you'll work with, and one to store in a different location (away from your original MS-DOS diskette). (You'll find out how to make copies of your diskettes in Chapter 4.)

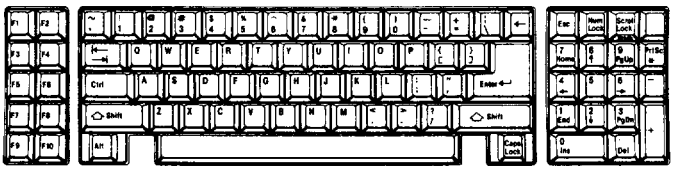
Chapter 2

Using Your Apex

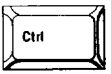
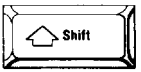
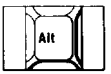
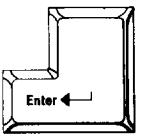
Once you have set up your Apex, you're ready to take advantage of its versatility. In this chapter you'll learn about the special keys on the keyboard, how to change your computer's operating speed, and how to reset and turn off your computer.

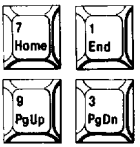
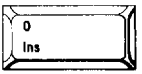
Special Keys on the Apex Keyboard

Some of the keys on your keyboard serve special functions when your computer is running software programs. You should become familiar with some of the more important keys, which are shown here on the keyboard:

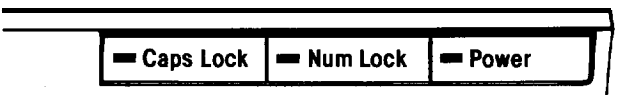


Take a look at the special keys and their functions:

Key *Name*	Purpose
 Function keys 1-10	Perform special functions within application programs.
 Tab	Moves the cursor to the right in normal mode (and to the left in shift mode in some application programs).
 Control	Works with other keys to perform special (control) functions, such as editing operations in MS-DOS and GW-BASIC.
 Shift	Produces uppercase characters or symbols when used with the main character keys. Produces lowercase characters when **Caps Lock** is on.
 Alternate	Works with other keys to enter alternate character codes not otherwise available on a standard keyboard.
 Backspace	Moves the cursor back one space, deleting the character to the left.
 Enter	Ends a line of keyboard input or executes a command. (This key may be called the **Ret urn** key in some of your software documentation.)
 Caps Lock	Changes the letter keys from lower- to uppercase; changes back to lowercase when pressed again.
 Escape	Cancels the current command line or operation.

Key Name	*Purpose*
 Numeric Lock	Changes the function of the numeric/cursor keys from numeric to cursor positioning; changes when pressed again.
 Scroll Lock	Controls scrolling in some applications.
 Print Screen	Prints the screen display on a line printer.
 Home, End, Page Down,	Within application programs, control cursor location.
 Insert	Turns insert function on and off.
 Delete	Deletes characters to the right.

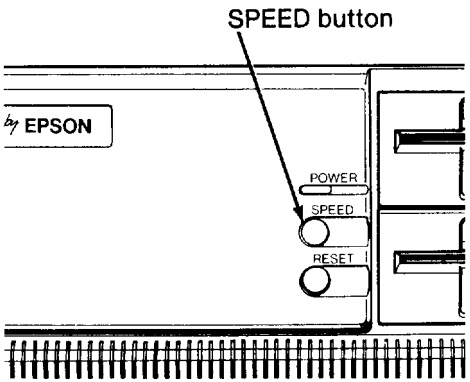
The **Caps Lock, Num Lock,** and **Scroll Lock** keys work as toggles-that is, on-off switches—when you press them. When you press the **Caps Lock** or the **Num Lock** key the corresponding light in the upper-right corner of the keyboard goes on. When you press these keys a second time, the light goes off. Try pressing one of these keys a few times and watch the indicator light go on and off.



Selecting Execution Speed

With the Apex you have the flexibility of operating at two execution speeds: 4.77MHz or 8 MHz. At 8MHz, the Apex simply performs all tasks faster. You will normally want to run at the faster speed and take advantage of this feature, but you can select the slower speed to run application programs that have specific timing requirements. Refer to your application program manual to determine the best operating speed for your program.

To change the execution speed, press the button on the front panel:



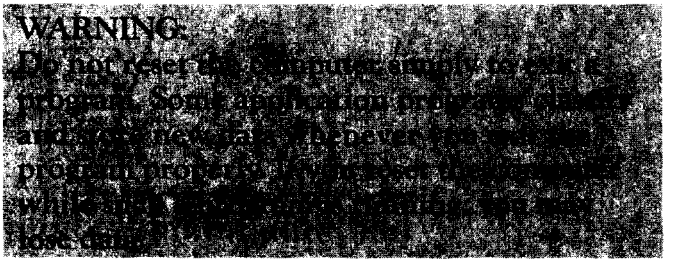
If you want to run the computer at 8MHz, press the button in. When you want to change the Apex's operating speed to 4.77MHz, press the button again to release it. You can do this at any time without rebooting the operating system.

When the power light on the front panel is red, the computer is running at 4.77MHz. When the light green, it is running at 8MHz.

Resetting the Computer

There are a number of ways that you can reset your Apex. You may want to do this if an error occurs and the computer does not respond to your keyboard commands. In this case, you can reset the computer and try the same operation again. However, it's important to remember that resetting erases all data in the computer's internal memory (RAM); so if you have a problem, reset your computer only as a last resort.

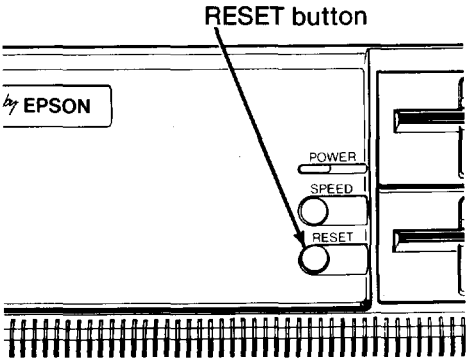
When using MS-DOS, you can hold down **Ctrl** and press C to stop a program's operation and return to the MS-DOS command prompt. If an error occurs while you using an application program, try this method before you reset the computer.



Should you need to reset your computer, there are three different ways to reset the Apex. Because each one is more powerful than the last, try them in the order listed here:

1. If you are using MS-DOS, hold down the **Ctrl** and **Alt** keys and press the **Del** key, which you can find on the numeric keypad at the right of the keyboard. You see the screen go blank for a moment and then MS-DOS is loaded. (MS-DOS must be on the system diskette in the top drive.) If this does not correct the problem you're having, try the second method.

2. Press the RESET button on the front panel.



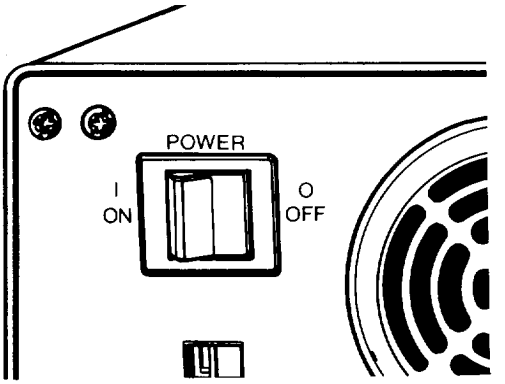
This method works even when the keyboard does not respond to your commands. However, if this does not correct the problem, try the third method.

3. Remove any diskettes from the disk drives. Turn off the monitor and any peripherals, and then turn off the Apex. Wait for five seconds, and then switch the power back on.

Turning Off the Computer

Normally when you are through working with an application program, you will save your data and exit the program. Then, before you turn off your computer, remove all diskettes from the disk drives.

Turn off the monitor and peripherals first; then turn off the main unit using the switch on the back panel.



Chapter **3**

Using Diskettes and Disk Drives

The disk drives in your computer serve a very important function; they let you store your work and programs on removable diskettes for use at any time in the future. All Apex systems have two 360KB floppy disk drives installed.

In this chapter, you'll learn how diskettes work and how to:

- Choose diskettes
- Care for your diskettes and disk drives
- Insert and remove diskettes
- Protect your data
- Make backup copies of your diskettes.

How Diskettes Work

The diskettes you insert in your computer's floppy disk drives are round pieces of flexible plastic coated with magnetic material and enclosed in protective jackets. Like a record, a diskette has circular tracks on both sides. Your computer stores the data you enter as magnetic patterns on these circular tracks.

A small read/write head in the computer's disk drive interprets the magnetic patterns. When you put a diskette in a drive, the read/write head is right over the large oval hole in the diskette jacket. This hole allows the read/write head to access the diskette as you store, retrieve, and delete data.

Because the data is stored magnetically you can retrieve it, record over it, and erase it—just as you would when you play, record, and erase music on cassette tapes.

Choosing Diskettes for the Apex

With the floppy disk drives on the Apex, you must use 514-inch, double-sided, double-density 48 TPI (tracks per inch) diskettes. These diskettes are compatible with those used for the IBM PC. This means you can use diskettes on the Apex that were prepared and used on another IBM-compatible computer.

For the best results, use only high-quality diskettes with reinforced hub rings—the added reliability is well worth the extra cost. Be sure to select diskettes that are double-sided, double-density. Each diskette of this kind can hold 360KB of data, the equivalent of about 150 pages of text.

Whatever your diskette requirements are, you need to format new diskettes before you can use them with MS-DOS. The process of formatting erases all data on a diskette and prepares it to receive new data, so be sure to format only new blank diskettes or diskettes that contain data you want to erase. Refer to Chapter 4 (or your MS-DOS manual) for instructions on how to format diskettes.

Caring for Your Diskettes and Disk Drives

To avoid damaging diskettes, you need to care for them properly. Following these basic precautions will help you avoid losing data:

- Keep your diskettes away from dust and dirt. Small particles of dust or dirt scratch the magnetic surface (destroying data). Dust can also ruin the read / write head in the disk drive.

- Keep your diskettes away from magnetic fields. (Remember that diskettes store their information magnetically.) Beware of the many sources of magnetism in and around your home or office, such as electrical appliances, telephones, and loudspeakers.

- Do not place diskettes on top of your monitor.

- Keep your diskettes in a moderate environment. They work best at normal room temperature and low humidity conditions. Don't leave your diskettes sitting in the sun, or in extreme cold or heat. Remember, the temperature inside a car in the middle of summer or winter can be extreme and can cause severe damage to a diskette.

- Never touch your diskette's magnetic surface. Even the oils on your fingertips can damage it. Always hold a diskette by its protective jacket.

- Store your diskettes properly. When you are not using them, keep your diskettes in their protective envelopes and store them in a diskette container.

- Do not place anything on top of your diskettes, and do not bend them. A diskette will not rotate properly in the drive if it has been damaged.

- Never wipe, brush, or try to clean diskettes in any way.

- Be careful when you label your diskettes. Attach your labels firmly but gently, and only along the top of the diskette (next to the manufacturer's label). Do not stack labels on top of one another too many labels can prevent the diskette from spinning freely in the disk drive.

- It is best to write on the label before you attach it to a diskette. If you must write on a label that is already on a diskette, use only a soft-tip pen, not a ballpoint pen or a pencil.

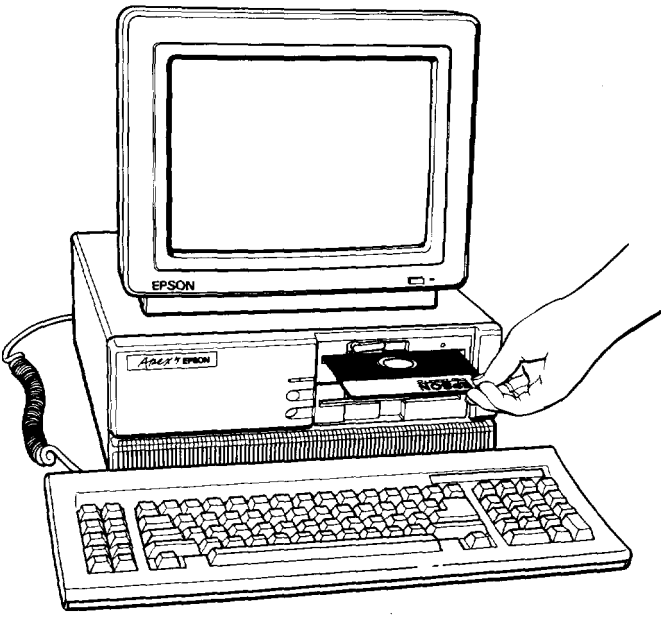
- Do not remove a diskette from the disk drive or turn off the computer while the drive light is on. The light you see indicates that the computer is copying data to or from a diskette, If you interrupt this process, you can destroy data.

- Remove all diskettes from the disk drives before you turn off the computer.

Inserting and Removing Diskettes

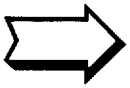
When you insert a diskette into a disk drive, hold it with the label face up and the write-protect notch to the left (so that the read/write slot is away from you).

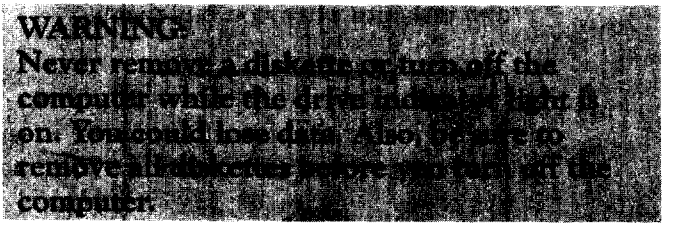
Then gently slide the diskette into the disk drive, being careful not to force it into the slot.



When you feel that the diskette is all the way in, turn the latch down until it locks into the vertical position. This keeps the diskette in place and enables the read/write heads in the disk drive to access the diskette.

When you want to remove the diskette, turn the latch up until it is horizontal. Carefully pull out the diskette, place it in its protective envelope, and store it properly. For protection, it's a good idea to keep your diskettes in a special diskette container.





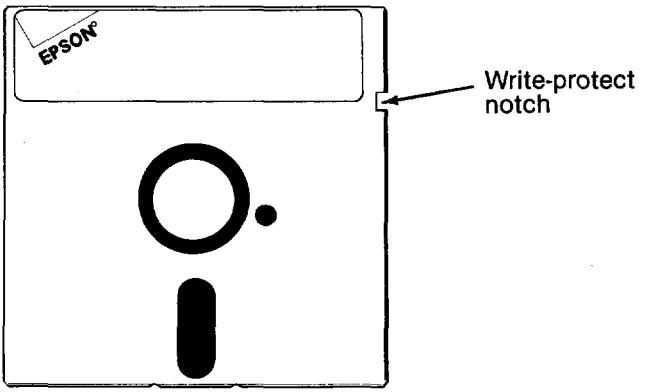
Protecting Your Data

Once you have stored information on your diskettes, you'll want to make sure your data is protected. There are two ways to avoid losing the valuable information that you have stored. You can write-protect your diskettes and make backup copies.

Write-protecting diskettes

It's easy to write-protect a diskette to prevent its data from being altered. When a diskette is write-protected, you can read data from it, but you cannot store new data on the diskette or delete any files it contains. If you try to change data stored on a write-protected diskette, you get an error message.

To write-protect a diskette, just cover the small, rectangular notch with an adhesive write-protect tab. These write-protect tabs usually come in the box with new diskettes when you buy them.



If you change your mind and want to write to a diskette, remove the write-protect tab.

Making backup copies

Many disasters can be avoided by making backup copies of all your data and system diskettes. Copy all diskettes that contain programs, such as the master system diskettes that come with your Apex, and use only the copies. Store your original system diskettes in a safe place away from your working diskettes.

Also, be sure to copy your data diskettes regularly (preferably every day or every few hours if your're inputting a lot of data) to keep your backup data current, and then store the backup copies away from your originals.

Chapter 4 will tell you how to make backup copies of your diskettes, You can also refer to your MS-DOS manual.

Chapter **4**

Using MS-DOS with Your Apex

In this chapter, you'll learn how to use the MS-DOS operating system with your Apex by Epson. The MS-DOS operating system's job is to manage the routine work of your system, such as keeping the computer's memory organized, controlling monitor displays, accepting keyboard input, and directing external communication.

Introducing MS-DOS

Your Apex personal computer comes with version 3.2 of MS-DOS, Microsoft's disk operating system. The MS-DOS operating system contains the instructions that enable your application program to work automatically with the hardware.

Your software cannot communicate with your Apex hardware without instructions from the operating system. The operating system controls system input and output and the operation of all disk drives. Think of a traffic controller managing traffic at the busiest of intersections, and you'll have an idea of the role of your operating system.

Before you can use an MS-DOS application program, MS-DOS must be running in your computer's memory. This means that you must first load MS-DOS

so that the operating system can accept your instructions and make the right connections. You already learned how to load MS-DOS in Chapter 1.

To communicate with the operating system, you need to enter MS-DOS commands. How much you need to know about the MS-DOS commands depends on how you plan to use your Apex. If you plan to use it only for running application programs, you'll use very few MS-DOS commands. If you plan to use advanced features or create your own programs, you'll want to know as much as possible about MS-DOS.

If you plan to use your Apex primarily for running application programs, you'll find that this chapter introduces you to the MS-DOS features you'll use the most. For more in-depth information about MS-DOS, you can refer to your MS-DOS manual.

The basic procedures you must know include:

- How to start and exit MS-DOS
- How to enter an MS-DOS command
- How to store data
- How to prepare a diskette for storing data
- How to copy an entire diskette or selected files
- How to list the contents of a diskette

- How to change the default drive
- How to start an application program.

Starting and Exiting MS-DOS

Remember, before you can run an MS-DOS application program, MS-DOS itself must be running in memory. Follow these steps to load MS-DOS:

1. Turn on your monitor and any peripherals, such as the printer.

2. Turn on your Apex. Refer to Chapter 1 for complete instructions on turning on your system.

3. Insert your MS-DOS system diskette into the top drive. Refer to Chapter 3 for a complete description of inserting diskettes.

4. Respond to the Date and Time prompts, or press **Enter** to skip through these prompts.

Now you see the MS-DOS prompt, which tells you that MS-DOS is loaded and indicates the current drive followed by a greater-than symbol:

```
A>
```

This prompt informs you that you can now enter commands to instruct MS-DOS to perform tasks and run application programs.

Before you end a session with MS-DOS, make sure you are at the A) prompt. Then it is safe to remove your diskettes, turn off all peripherals, and finally turn off the computer.

When you're in the middle of a program, you can stop a program's operation and return to the MS-DOS command prompt by pressing **Ctrl** and C. However, any data not stored on diskette at the time is lost. Many application programs establish their own *abort* keys (instead of **Ctrl C),** which you must know when using those programs.

Entering MS-DOS Commands

You can enter an MS-DOS command whenever you see the A) prompt. This means that you type the command name and any necessary *parameters*, and then press **Enter** to execute the command. Parameters include items that identify the data to be processed and switches that alter the effects of a command.

You can enter command names and parameters in either uppercase or lowercase letters. However, you must separate command names and parameters with *delimiters;* most commands require spaces or commas as delimiters.

If you make a mistake when typing a command and you notice it before pressing **Enter,** you can do one of two things:

- Use the backspace key to back up and correct the error,
- Press **Esc** to cancel the command line.

If you press **Enter** and a command line has an error in it, you see this message:

Bad command or file name

Then MS-DOS displays the command prompt so you can try again. Now type the correct command line and press **Enter.**

Storing Data

All your work and programs are stored in files on your diskettes. Each file must have a unique filename, so that you can retrieve it whenever you need to. The filename consists of two parts: the file name and the file extension.

You can choose a filename up to eight characters long indicating what the file contains. The file extension, which can be up to three characters long, describes what type of file it is, such as a text file or program file. When you use an extension, you separate it from the file name with a period. For example, an MS-DOS filename might look like this:

DATA1Ø1 . TXT

Sometimes you have to further identify your files by telling MS-DOS which drive contains the diskette holding the file. To do this, you type the letter, A or B, of the disk drive where the diskette containing your file is located, followed by a colon, and then the filename. For example:

B : DATAlØl . TXT

You can type your filenames and drive identifiers in upper- or lowercase letters. MS-DOS does not differentiate between the two, but converts everything to uppercase letters.

Your files are stored in *directories.* You can create several directories, and even *subdirectories* within a directory. This is especially useful when working with hard disks, which have a very large storage capacity. With floppy disks, you will normally have only one directory on each diskette.

The directory of your diskette contains specific information about each file, such as its name, size, location, and the date and time you last updated the file.

The *root directory* is the main directory on a disk and is identified by a backslash (\).

The directory you are working in is called your current *directory.* When you start work, the root directory is the current directory. If you do not create any other directories on your diskette, you will always be working in the root directory. This is often the case when working on a diskette.

Preparing Diskettes for Data

You may have just purchased a brand new box of diskettes, but before you can store data on a diskette, the diskette must be *formatted.* Formatting prepares the diskette to accept data written by MS-DOS.

You can also reformat previously-used diskettes. However, once you reformat a diskette, all data on that diskette is erased. Always make sure that you do not want to save any of the data on a diskette before you format it.

When you decide you're ready to format a diskette, follow these steps:

1. Make sure your working copy of the MS-DOS system diskette is in the top drive (drive A).

2, When you see the A) prompt, type:

   FORMAT B:

   and press **Enter.** You see this prompt:

   Insert diskette for drive B:
   and strike ENTER when ready

3. After you insert the diskette you want formatted into drive B, press **Enter** to start formatting. As MS-DOS formats the diskette, it displays the head and cylinder numbers as it formats each cylinder of the diskette:

   Head: *n* Cylinder: *nn*

4. When the diskette incompletely formatted, you see these messages:

   Format complete
   XXXXXX bytes total disk space
   XXXXXX bytes available on disk
   Format another (Y/N)?

   At this point, you can either format another diskette by pressing Y, or return to the MS-DOS system prompt by pressing N.

Copying Data

You'll want to copy your data and program files for many reasons. For one, it's very important to have backup copies of all your diskettes.

You have several choices: you can back up an entire diskette using the DISKCOPY command, or you can back up selective files using the COPY command. Epson also provides a disk utility called DU that you can use to copy diskettes; this utility is described in your MS-DOS manual.

Using the DISKCOPY command

To copy the entire contents of a diskette in drive A to a blank diskette in drive B, follow these steps:

1. First make sure your orignal diskette is write-protected.

2. Make sure your working copy of the MS-DOS system diskette is in the top drive (drive A).

3. At the A) prompt, type:

   DISKCOPY A: B :

   and press **Enter.**

4. MS-DOS prompts you to insert your diskettes. You see these messages:

   Insert SOURCE diskette in drive A:
   Insert TARGET diskette in drive B:
   Press any key when ready

5. Insert your diskettes and press any key.

6. DISKCOPY checks to see if the destination diskette is formatted. If it is not, DISKCOPY formats the diskette. You see the message:

```
Formatting while copying
```

7. The copy operation begins when the format is complete. You see this message:

```
Copying 40 tracks
9 sectors/track, 2 side(s)
```

8. When the copy is complete, you see the messages:

```
Copy complete
Copy another (Y/N) ?
```

Your diskette has now been copied and you can either make another copy or leave the DISKCOPY command. Press Y to perform another copy or N to end the DISKCOPY command.

When you use the DISKCOPY command, you don't need to enter the disk drive descriptors (A: and B:). If you omit them, MS-DOS copies the diskette in drive A to a second diskette that you insert in drive A. You must swap diskettes in the A drive during the copy process. MS-DOS displays prompts to advise you when you need to change diskettes.

Using the COPY command

You can use the COPY command to copy files in several ways. You can:

- Copy individual files from one diskette to another or to the same diskette
- Copy a group of files using wildcard characters
- Copy one or more files and give them new names
- Combine or merge files into one file.

A few simple rules apply when copying files:

- You must tell MS-DOS where to find the source file and where to write the target file.
- You cannot create a new file with the same name as an existing file.
- If a file on the target diskette has the same name as a file on the source diskette, the file on the target diskette is overwritten.
- The target diskette must be formatted.

All you need to do is type the COPY command and the necessary filenames at the A) prompt, and then press **Enter.** In the following examples, you substitute your own filenames for the items in italics.

Let's say you want to copy a particular file from the diskette in drive A to the diskette in drive B using the same name. Type:

COPY A: *file1. ext* B:

If you want to copy a file from the diskette in drive A to the diskette in drive B using a new name, type:

COPY A: *file1.ext* B: *file2.ext*

To copy a file onto the same diskette with a new name, type:

COPY *file1 file2*

In this case, you can omit the drive identifier as long as the file exists on the current drive.

An easy way to copy a group of files is by using wildcard characters in the filenames. To copy all the files on the diskette in drive A to the diskette in drive B, type:

COPY *.* B:

In this case, drive A is the current drive, and the diskette in drive B is a new, formatted diskette.

Another task you can perform with the COPY command is to combine a number of files into one file. Use this format:

COPY *file1.ext + file2 + file3.ext new file*

When you use the COPY command this way it copies filel, then file2, and then file3 into the new file. All these files are located on the current drive.

Listing the Contents of a Diskette

You will often want to see what files are stored on your diskettes. For example, before you format a used diskette and erase its contents, always list the contents of the diskette to be sure you will not erase any valuable files.

You can use the DIR command to list the names of all files on a diskette. At the A) prompt, type:

DIR

and press **Enter.** MS-DOS lists the directory of files on the diskette in drive A.

To see the files on the diskette in drive B, type:

DIR B :

and press **Enter.**

The DIR command lists the names of the files, and also lists any subdirectories, the sizes of the files in bytes, and the date and time each file was last modified. At the end of the directory listing, you see the number of files and available bytes on your diskette.

Changing the Default Drive

When you see the A) prompt, you know that MS-DOS is operating from drive A and you can now enter a command.

However, if you want to run a program or find a file on a different drive, you must specify that drive. YOU can do this by including the drive descriptor with the filename or by logging onto that drive. To log onto drive B, follow these steps:

1. At the A) prompt, type:

   B:

   Be sure to type the colon.

2. Press **Enter.**

Your screen now displays the B) prompt. This means that MS-DOS is now using drive B. The system continues to read from drive B, which is now the default drive, until you log back onto drive A.

Starting Your Application Program

Now that you have MS-DOS loaded, you can start using your application program. Remove your MS-DOS diskette from drive A and insert your application program diskette. From this point on, the documentation that comes with your application program will give you instructions on how to use it.

Once you start using your application program, the MS-DOS command prompt disappears. Instead, you see the prompts and screens that are unique to the application program.

Chapter 5

Installing Option Cards

You can use your Apex in many additional ways by adding to its present configuration with option cards. Option cards are accessories that provide extra capabilities to your Apex. For example, you may want to install a serial port or an auto-dial modem.

You can install up to three option cards in the Apex at one time, but keep in mind that one position is always occupied by the video card that operates your monitor.

Option cards are available from Epson as well as other vendors. In addition, multifunction boards (available from various vendors) allow you to add other features without using additional slots.

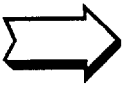
Before you install an option card in your main unit, you need to remove the cover from your computer. Remember that static electricity can damage the computer's circuitry. Therefore, be careful when you remove the cover and install the option card.

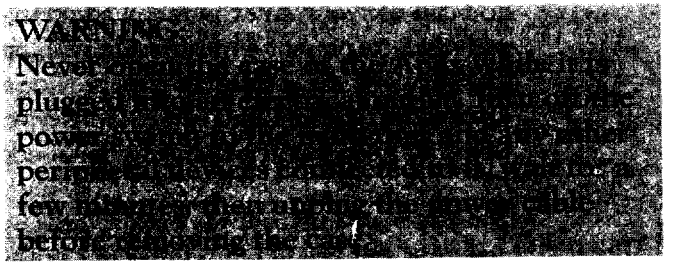
This chapter describes how to:

- Remove and replace the main unit's cover
- Install and remove an option card.

Removing the Cover

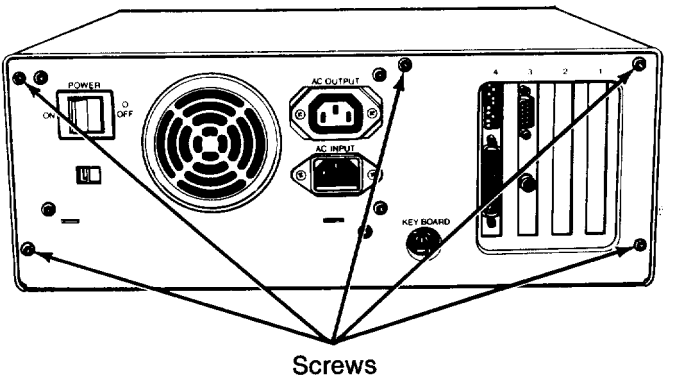
To remove the cover, you'll need a phillips-head screw driver. Follow these steps:



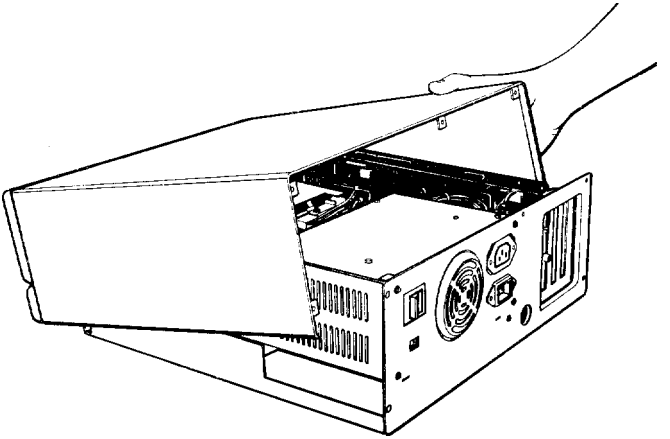


1. If your monitor is on top of the computer, disconnect it and move it to one side. Disconnect the keyboard and your printer and set them out of the way too. Turn the main unit around so that the back panel faces you.

2. You'll see that the cover is secured with five screws. Remove the screws and put them safely to one side.



3. Now tilt the cover up slightly from the back and push it away from you and the main unit.

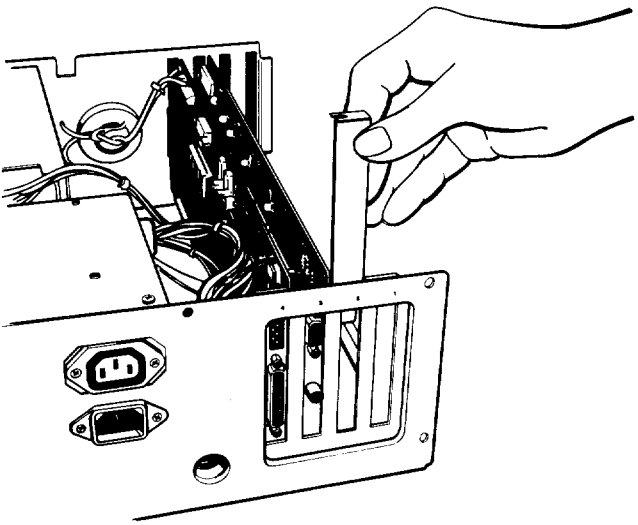


4. Set the cover aside for now.

Inserting the Option Card

Now that the cover is off, you can place the option card in either of the two remaining option slots. Even though option cards are designed to fit only one way, it is a good idea to examine the card first and follow the instructions closely.

1. Decide which option slot you want to use, then remove the retaining screw from the metal cover plate at the back of the slot. Lift out the metal cover and keep it in a safe place to use later if you remove the option card. Keep the screw close by; you'll need it to secure the option card to the computer.



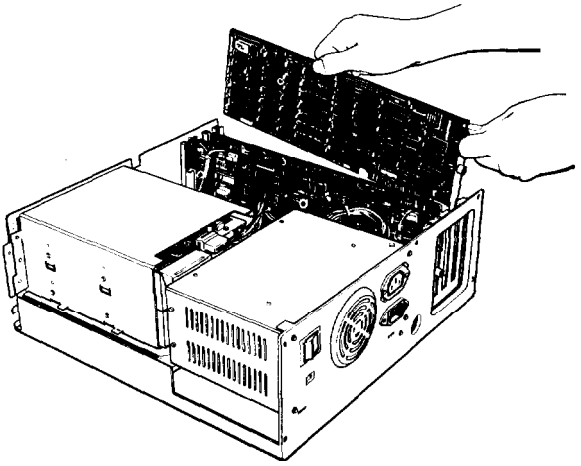
2. Next, unpack the option card and read all instructions that come with it. Then, on the option card, adjust any switches or jumper connections that are necessary.

NOTE:

When you handle the card, be careful not to touch any of the contacts on the circuit board, especially along the gold edge connections. If you need to put it down before installing it, place it with the component side facing down on top of the original packing.

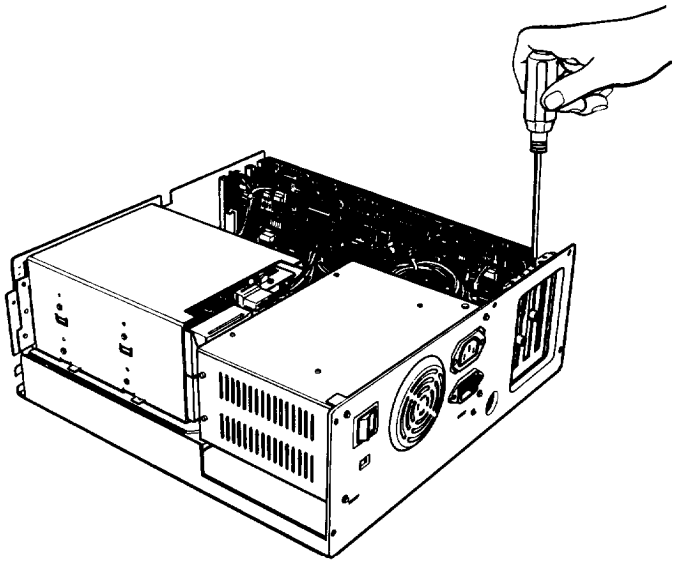
3. Grip the card firmly by the top corners. Keep the contact pins pointing down and the components facing toward the inside of the main unit.

4. Now, insert the card straight down into the slot. Place the tab at the bottom of the retaining bracket into the corresponding notch at the back of the computer.



5. Once you have the connector pins sitting in the connector slot, push down firmly (but carefully) to fully insert the card. If you feel that the connector isn't going in smoothly do not force it; pull it all the way out and try again. Be sure to keep it straight.

6. With the card properly inserted, secure the retaining bracket to the frame of the computer with the small screw.

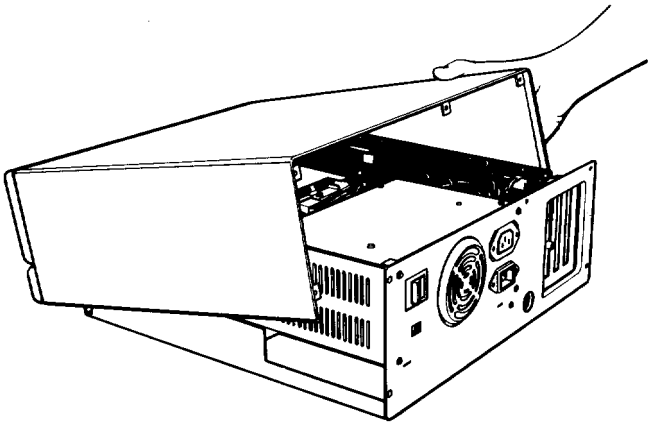


Replacing the Cover

With the installation of your option card completed, you have only to replace the cover of the main unit:

1. With the back of the main unit still facing you, position the cover over the computer with the front edge pointing slightly downward.

2. Lower the cover onto the main unit making sure that the edges fit around the back panel.



3. Secure the cover by replacing the screws on the back of the main unit.

4. You can return the computer to its original position now and reconnect it to the monitor, the keyboard, and any other peripherals you have.

5. Check to make sure the power switch is off before you reconnect the power cable to the back of the main unit and then to an electrical outlet.

Post-installation Setup

With the option card in place, your Apex may need a few adjustments to accommodate it's new configuration. If you have already replaced the main unit's cover and reconnected the power cord, you may now need to change your DIP switches settings to reflect the new configuration. For example, if you add an external floppy disk drive, you need to change switches 7 and 8 so the computer recognizes the additional drive.

You may also need to add some commands in the configuration files on your system diskette as well. Your MS-DOS manual will provide you with instructions.

When you finish installing option cards and reconfiguring the system, you should test the option if possible. Some option cards come with their own diagnostic test programs.

Removing Option Cards

If you find that you need to remove an option card, first turn off the computer and unplug the power cord, then detach any cable connected to the card. Disconnect the monitor and keyboard, and remove the main unit cover. Then refer to the option card installation instructions and follow them in reverse.

Be sure to follow all the same safety instructions you did while installing the card, and make sure you pull the card straight up and out of the connector to avoid damaging it. When the card is removed, rewrap it (preferably with the original packing materials) and place it inside the packing box for safe storage. Next, replace the metal access slot cover, and finally replace the computer's cover.

When you have reassembled the unit, remember that you may need to reset DIP switches to properly configure your system.

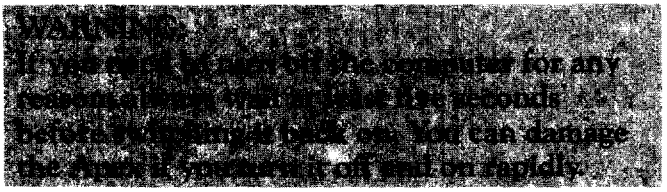
Chapter 6

Troubleshooting

You should not encounter any serious difficulties as you set up and use your Apex. But if anything out of the ordinary happens, refer to this chapter. Usually correcting a problem situation requires nothing more than adjusting a cable connection, repeating a software procedure, or resetting the computer.

You can use the suggestions in this chapter to help you solve most of the problems that you may encounter. If you still have a problem after trying the recommended solution, consult the Epson Customer Care Center (1-800-421-5426) about servicing the computer.

Before you call Epson, please be ready to provide the serial number of your Apex, the configuration (such as number of drives, type of monitor, option cards), and the software you were using, This information will lessen the time it takes to diagnose the problem.



The Computer Fails to Start Up

If your computer does not start up when you turn on the power switch, follow these steps to find a solution:

1. First, check to see if the POWER light on the front panel of the main unit is lit. If it is not, remove any diskettes you have in the drives and turn off the power. Wait five seconds, then turn the power back on.

2. If the light still does not come on, turn off the power switch again. This time check to see that the power cable is securely connected to both the AC INPUT inlet on the back panel and the electrical outlet. After securing anything that feels loose, try turning the power switch on again.

3. If the computer still does not start up, check the electrical outlet. To do this, plug a portable lamp into the outlet you are using for your computer, and turn it on to see if the outlet supplies power.

The Video Display Does Not Appear

If your computer starts up (the power indiator on the main unit is on) but you don't see any images on the screen, follow these steps to try to find a solution:

1. First, check to see that the monitor's power switch is on and the power indicator on the monitor is lit. If the power is on but you don't see the indicator light, turn off the monitor's power switch, wait five seconds, then turn the power back on. Wait a few seconds to see if the display screen appears.

2. You can also use the controls on the monitor to adjust the brightness and contrast of the display.

3. Check DIP switches 5 and 6 on the back panel of the main unit to make sure they are set correctly for your video card. If you need to adjust a DIP switch, turn off your computer, make the adjustment, and then turn on the power.

4. Remove any diskettes you have in your disk drives, then turn off the computer. Check to see that the monitor's power cable is securely connected to the AC OUTPUT outlet on the back panel of the main unit, and that the monitor cable is properly connected to both the monitor and the correct option slot on the back panel. Then turn both power switches back on.

5. Finally you can check the AC OUTPUT outlet for power. Turn off your computer. Then plug a portable lamp into the outlet, and turn it on to see if it supplies power.

The Computer Locks Up

If you're working on your computer and it locks up and does not respond to the keyboard, try the following:

1. Wait a few seconds. Remember that some operations take longer to perform than others, and your computer may still be performing some internal fuction. For example, a spreadsheet program takes quite a bit longer to recalculate an entire spreadsheet than to record one figure. Also, BASIC programs that have a lot of calculations to perform can take several minutes, or even hours to complete a task. Be aware of the task the computer is performing and judge the time accordingly.

2. If the computer remains locked up after you've allowed a reasonable amount of time, follow the steps in Chapter 2 under "Resetting the Computer."

Floppy Disk Problems

If you have trouble with one of your diskettes, answer the following questions to see if they apply to the problem:

1. Is the diskette damaged? To find out, copy the diskette and repeat the operation that caused the problem using the copy you just made. (If you have trouble copying the entire diskette, some of the sectors may be bad. Try to copy one file at a time with the Copy command.) If the operation works using the copy diskette, the original diskette is probably damaged. Make another copy to use as a backup.

2. Have you inserted the right type of diskette? Your Apex uses 5 Winch, double-sided, double-density 48 TPI, soft-sectored diskettes.

3. Is the diskette write-protected? There may be a write-protect tab over the notch on the side of the diskette, which means that you can't write data to this diskette. Before you remove the tab, check the diskette directory to determine what files it contains. If it contains information you do not want to change or lose, leave it write-protected. Although you should normally write-protect all program diskettes, some programs store temporary files on the diskette and will not work if you write-protect the diskette.

Software Problems

If you are having trouble with a software program, check the following possible problems and solutions:

1. The software program does not start. Check to be sure that you are following the correct procedure for an MS-DOS application. Make sure you inserted the application diskette in the top drive.

2. An application routine does not work. Refer to the software manual and try the routine again according to the instructions. If this does not work, go ahead and reset the computer, reload the program, and try the routine again.

Remember, to operate properly some programs require the computer to run at 4.77 MHz or 8MHz. Try changing the CPU operating speed by pressing the SPEED button on the front panel. See “Selecting Execution Speed” in Chapter 2.

Printer Problems

Your printer manual describes methods to solve most of your printer problems. However, if your printer does not work correctly right after you install it, you can quickly make sure the printer has power and is properly connected to the computer. If you need aciditional help, the printer manual gives detailed instructions on how to connect your printer.

If you have printing problems, check the printer manual for the printer's correct DIP switch settings. The DIP switches on a printer help it communicate properly with the computer and you may need an adjustment for your configuration.

Be sure your software is setup for your printer.

Option Card Problems

If you install an option card and get unexpected results, check the following:

1. Is the option card installed correctly? Recheck the setup and operation procedures in the option card instructions.

2. Did you set the necessary DIP switches or jumpers on the option card? See your option card instructions for these settings.

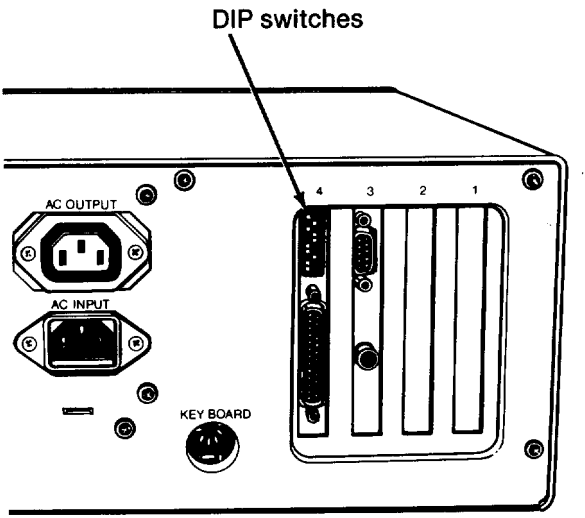
3. Did you set the necessary DIP switches on the main unit (as required by your option card)? See "Setting the DIP Switches" in Appendix A.

4. If you added an external device to your Apex, did you use the proper cable to connect the peripheral to the port or option card connector on the back panel?

5. Did you perform any necessary post-installation setup procedures for the operating system? If you did, check your MS-DOS manual to see that you properly followed the instructions.

Setting the DIP Switches

The DIP switches on the Apex are set to provide your computer with information about its configuration. Each time you turn on your Apex, it checks these switch settings to determine the type of keyboard, coprocessor status, memory size, type of monitor, number of floppy disk drives, and the type of interfaces being used. The DIP switches are located on the rear panel of your main unit:



These switches have been preset for you by the manufacturer. However, read this appendix so you will be familiar with the DIP switch settings and able to check that the settings match your system's setup. If you add optional devices to your system, you may need to alter the DIP switch settings.

The Apex has ten DIP switches. When a switch is left, it is on. When a switch is right, it is off. To change a setting, use a hard, thin object, such as a small screwdriver.

The functions controlled by each DIP switch are listed in Table A-1 and described below.

Switch 1 (Keyboard type)-tells your computer that the standard keyboard is attached to your system. The factory setting is ON.

Switch 2 (Coprocessor)-tells your computer whether or not an optional math coprocessor is installed. The factory setting is ON to tell the system that this option has not been installed.

Table A-1. DIP *switches*

Switch	Options	1	2	3	4	5	6	7	8	9	10
Keyboard type	Standard*	ON									
Coprocessor 8087	Not installed*		ON								
	Installed		OFF								
Memory size	256KB			ON	ON						
	512KB*			OFF	ON						
	640KB			OFF	OFF						
'Monitor and adapter type	Color(40x25)					OFF	ON				
	Color(80x25)*					ON	OFF				
	Monochrome					OFF	OFF				
	Reserved					ON	ON				
Number of floppy disk drives	1							ON	ON		
	2*							OFF	ON		
	3							ON	OFF		
	4							OFF	OFF		
Parallel port	Disabled									ON	ON
	Inhibit									ON	OFF
	Secondary									OFF	OFF
	Primary*									OFF	ON

**Factory setting*

Switches 3 *and* 4 (Memory size)–indicate how much built-in memory is available. You only change these switches if you install a memory card and you want to use part of the optional memory instead of the built-in main memory. The factory setting is switch 3 OFF; switch 4 ON.

Because the system checks the amount of available memory each time it is reset, problems may occur if the switch settings do not agree with the amount of main memory in use.

Switches 5 and 6 *(Monitor and adapter* type)–define the type of video card and monitor you are using and help the system address the adapter memory correctly. Set these switches using the following information:

- If you are using a composite (monochrome or color) or an RGB monitor with the color/graphics adapter, set switch 5 ON and switch 6 OFE (This is the factory setting.)

- If you are using a composite video monitor, and its resolution is poor, you may want to set switch 5 OFF and switch 6 ON. This selects 40-column text mode for your screen and improves the resolution.

- If you install a non-composite monochrome monitor and video card, set both switches off.

Switches 7 *and* 8 (FloPpy *disk* drives)-indicate how many floppy disk drives are installed in your Apex. These switches are very important and should be set as follows:

- For the standard Apex system, which has two floppy disk drives, set switch 7 OFF and switch 8 ON. (This is the factory setting.)

- If you add external floppy disk drives, for a total of four drives, you need to set switches 7 and 8 as indicated in Table A-1.

Switches 9 and 10 (Parallel port)–tell the computer how to access the built-in parallel port, as follows:

- The built-in parallel port functions as either the primary or secondary parallel port. If you decide to install an option card that has its own parallel port, you must set these two DIP switches so that there is no conflict between the built-in parallel port and the added card. Table A-1 shows you how to set these DIP switches.

- If you install an option card that has only a parallel port, you must set the DIP switches to designate this as the secondary port and leave the built-in port as the primary port.

- If you install a video card with a parallel port (such as an IBM monochrome display and printer adapter), then you must designate it as the primary parallel port. In this case, the built-in port becomes the secondary parallel port.

- If you install two option cards with parallel ports, you must designate one as the primary port and the other as the secondary port. In this case, you need to set switches 9 and 10 ON in order to disable the built-in port.

- The number of parallel ports you have is information that MS-DOS uses also. If MS-DOS searches the system for a parallel port and finds only one, it names it LPT1:. If it finds two parallel ports, it names the primary port LPT1: and the secondary port LPT2:.

Specifications

Main Unit

16-bit CPU	*8088* microprocessor; 4.77MHz or 8MHz clockrate; push-button selectable
Main memory	512KB; expandable to 640KB
Coprocessor	8087 microprocessor (optional)–for use only at 4.77MHZ 8087-2 microprocessor (optional)–for use only at 8MHZ
Read Only Memory (ROM)	16KB, selectable by jumper
Interrupt (8259)	Programmable interrupt controller, 8 interrupt levels
Timer/counter (8253-5)	Three programmable timer/counters
Parallel interface	Standard 8-bit parallel, DB-25 female connector; programmable; on system board

Speaker interface	Internal, controlled by timer/counter
Option slots	Three IBM PC-compatible, 8-bit, input-output expansion slots (one used by video card)

Keyboard

	Detachable, two positions, 83 sculpted keys
Layout	56-key QWERTY main keyboard, 17-key numeric pad, 10 function keys (user-definable); LEDs for lock keys
Function keys	Three levels (normal/shift/alternate); userdefinable

Mass Storage

	Four drives maximum—two internal
Standard	Two 5¼-inch, half-height floppy disk drives; double-sided, double-density 360KB storage capacity

Power Supply

Switching type, fan-cooled

Output voltage:
-5 VDC, +5 VDC,
-12 VDC, + 12VDC
Auxiliary AC (80 watt)

Power Requirements:
115/230 VAC

Power Rating:
80W average, 100W peak

Environmental Requirements

Temperature

Operating range:
60° to 90°F (15° to 35°C)

Non-operating range:
0° to 149°F
(-40° to 60"C)

Humidity

Operating range:
20% to *80%*,
non-condensing

Non-operating range:
10% to 90%,
non-condensing

Physical Characteristics (CPU Only)

Width, 14.4" (367mm)

Depth, 15.2" (385mm)

Height, 5.3" (135mm)

Weight, 22 lbs. (9.99kg)

Video and Display Options

Color / graphics video card	Standard—Supports Epson- or IBM-compatible RGB color or composite video monitor; 40-character x 25-line display (low-resolution text); 80-character x 25-line display (high-resolution text); 640 x 200 (high-resolution graphics), 320 x 200 four colors, 160 x 200 eight colors; installed in option slot
Multiple graphics video card	Supports Epson- and IBM-compatible monochrome or color monitor; monochrome text, color graphics, and Hercules™ (monochrome) text / graphics (720 x 348), switch-selectable; installs in option slot

Glossary

ASCII
American Standard Code for Information Interchange. A standardized coding system for representing characters, such as numbers, letters, and graphic symbols. An ASCII character occupies one byte of storage. Files transmitted in ASCII code can be used by many different computers, printers, and programs.

Asynchronous
A method of data transmission in which one machine sends data one character at a time to another, without either machine preparing for the transmission.

Backup
An extra copy of a program, data file, or diskette, kept in case your working copy is damaged or lost.

Bit
A binary digit (0 or 1). The smallest unit of computer storage. The value of a bit represents the presence (1) or absence (0) of an electric charge.

Boot
To load a program or an operating system.

Byte
A sequence or group of eight bits that represents one character.

Character
Anything that can print in a single space on the page or the screen. Includes numbers, letters, punctuation marks, and graphic symbols.

CMOS
Complementary Metal-Oxide Semiconductor. A method for making silicon chips.

Code
A system of symbols for representing data or instructions. Also any software program or part of a program.

Command
An instruction you enter on the keyboard to direct your computer to perform a specific function.

Configuration
The particular setup of a group of components. For example, a typical system configuration consists of a CPU with two floppy disk drives, connected to a monochrome monitor, and a printer.

Control code
A command (generated when you hold down the Ctrl key and press another key on the keyboard) that instructs your computer to perform a specific function.

CPU
Central Processing Unit. The piece of hardware that interprets instructions, performs the tasks you indicate, keeps track of stored data, and controls all input and output operations.

Cursor
The highlighted marker that shows your position on the screen and moves as you enter and delete data.

Data
Information stored or processed by a computer.

Data diskette
A formatted diskette used to store files.

Diagnostics
The tests and procedures the computer performs to check its internal circuitry and set up its configuration.

DIP switches
Small switches on a piece of hardware such as a CPU, a printer, or an option card. DIP switch settings control various functions and provide a system with information about itself. DIP stands for Dual In-Line Package.

Directory
A list of the files stored on a disk or a part of a disk.

Disk
The collective term for both hard disks and floppy disks (diskettes).

Disk drive
The physical device that allows the computer to read from and write to a disk. A floppy disk drive has a disk slot on the front panel of the main unit into which you insert diskettes. A hard disk is permanently fixed inside the main unit, hidden behind the front panel.

Diskette
A flat piece of flexible plastic coated with magnetic material and used to store data permanently. Also called floppy disk.

DOS
The Disk Operating System that controls the computer's input and output functions. See Operating system.

Double-density
A type of diskette format that allows you to store twice as much data as the standard-density format. A double-density diskette for the Apex has a storage capacity of 360KB.

File
A group of related pieces of information called records, or entries, stored together on disk. Text files consist of words and sentences. Program files consist of code and are used by computers to interpret and carry out instructions.

Floppy disk
See Diskette.

Format
To prepare a new disk (or erase an old one) so it can receive information. Formatting a disk divides it into tracks and sectors; this creates addressable locations on it.

Graphics
Lines, angles, curves, and other nonalphanumeric data.

GW-BASIC
Microsoft's extended version of the Beginner's All-purpose Symbolic Instruction Code. A programming language designed to be easy to use and understand.

Hard disk
The enclosed unit used to store data permanently Unlike a floppy disk, it is fixed in place. It can process data more rapidly and store many more files than a floppy disk. You can install an optional hard disk to your Apex; this requires you to add a controller card to an option slot.

Hardware
Any physical component of a computer system, such as a monitor, printer, keyboard, or CPU.

Input/output port
See Port.

Interface
A physical or software connection used to transmit data between equipment or programs.

Jumper
A small electrical connector that alters some of the computer's functions.

Kilobyte (KB)
A unit used to measure storage space (in a computer's memory or on a disk). One kilobyte equals 1024 bytes.

LED
Light Emitting Diode. An electronic component that illuminates when electricity passes through it, like the indicator lights on the front panel of the Apex.

Main unit
The Apex computer.

Megabyte (MB)
A unit used to measure storage space (in a computer's memory or on a disk). One megabyte equals 1,048,576 bytes.

Memory
The area where your computer stores data. Memory contents can be permanent and inalterable (ROM) or temporary (RAM).

Microprocessor
A small version of a CPU contained on one semiconductor chip. Your Apex uses an 8088 microprocessor.

Modem
A device that allows a computer to transmit signals over telephone lines so it can send and receive data. Modem stands for MOdulator/DEModulator.

Monitor
The piece of hardware that contains the screen and displays information.

Monochrome monitor
A monitor that displays in only one color, such as green or amber, as opposed to a color monitor that can display in several colors.

MS-DOS
An operating system from Microsoft. See DOS, Operating system.

Operating system
A collection of programs that allow a computer to control its operations. The operating system determines how programs run on the computer and supervises all input and output—for example, MS-DOS.

Option card
A card installed inside the Apex main unit to provide additional capabilities, such as a serial port.

Parallel
The type of interface which transmits data in groups of bits. See also Interface and Serial.

Peripheral
A device (such as a printer or a modem) connected to a computer that depends on the computer for its operation.

Port
A physical input/output socket on a computer where you can connect a peripheral.

Program
A disk file that contains coded instructions and tells a computer what to do and how to do it.

Prompt
A message you see on your monitor that requests you to enter information.

RAM
Random Accesss Memory, The part of memory that a computer can both read and write to. The programs you use are temporarily stored in RAM. All data stored in RAM is erased when you turn off the power.

Read
To copy data from one area to another. For example, when you open a text file stored on disk, the computer reads the data from the disk and displays it on the screen.

Read/write head
The physical device inside a disk drive that reads and records data on the magnetic surface of a disk.

Reset
To reload a computer's operating system so you can retry a task. Resetting clears RAM.

RGB
Red Green Blue. An RGB monitor displays in high-resolution color.

ROM
Read Only Memory. A portion of memory that can only be read and cannot be used for temporary storage. ROM retains its contents even when you turn off the power.

RS-232C
A widely-used, standard type of serial interface. You can connect RS-232C compatible devices to the Apex only if an appropriate option card has been installed.

Sector
A contiguous section of a disk track that provides a space where the computer can store data.

Self test
The initial diagnostics procedures a system performs to check its hardware.

Serial
The type of interface that transmits data one bit at a time. See also Interface, Parallel, and RS-232C.

Software
The programs that enable your computer to perform the tasks and functions you indicate.

System diskette
A diskette that contains the operating system.

Tracks
Addressable, concentric circles on a diskette, resembling the grooves on a record, which help to divide the diskette into separate accessible areas. There are 40 tracks on each side of a double-sided, double-density diskette.

Write
To store data on a disk.

Write-protect
To prevent a diskette from being overwritten by placing a write-protect tab over the notch on the side of the diskette. When a diskette is write-protected, you cannot erase, change, or record over its contents.

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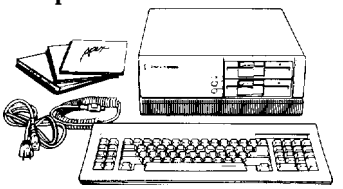
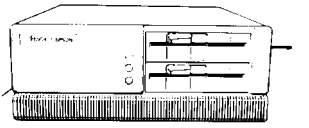
Quick Guide To Setting Up

Apex™ by EPSON®

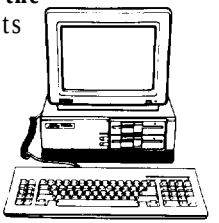
1 Unpacking Your Computer



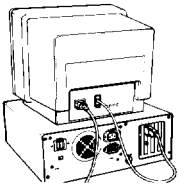
2 Choosing a Location



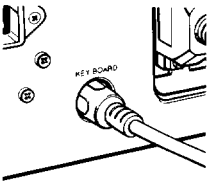
3 Arranging the Components



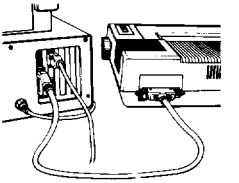
4 Connecting the Monitor



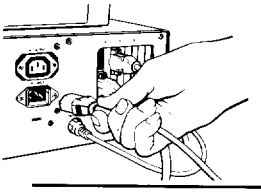
5 Connecting the Keyboard



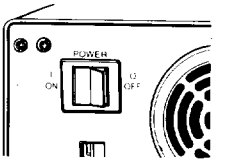
6 Connecting a Printer



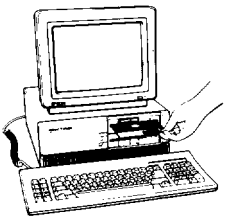
7 Connecting the Power Cord



8 Turning On the Computer



9 Loading MS-DOS



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USER'S GUIDE