

# User's Guide

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by EPSON®

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## Apex by Epson User's Guide for the Apex Plus and Apex Plus 20

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User's Guide  
for the  
Apex Plus and Apex Plus 20

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- 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 further 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 computer 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<sup>™</sup> by Epson<sup>®</sup> personal computer comes in two versions: the Apex Plus with two 360 KB (kilobyte) diskette drives, and the Apex Plus 20 with one 360 KB diskette drive and one 20 MB (megabyte) hard disk drive.

Both versions have 512 KB of internal memory, called random access memory or RAM. RAM determines the size of software programs you can run and the data files you can create. With 512 KB of RAM, you can run most large programs and create large data files.

Most software programs expect a computer to have two diskette drives, one for the program diskette and one for a data diskette. The Apex Plus provides two diskette drives so you do not have to spend time switching diskettes. The Apex Plus 20 hard disk drive and diskette drive provide the same convenience and let you take advantage of the hard disk's large storage capacity and faster performance.

Depending on your needs, you can use either a TTL monochrome monitor or an RGB (red-green-blue) color graphics monitor with your computer. The Apex monochrome monitor is a good choice if you are using word processing and spreadsheet programs. The Apex color monitor is an excellent choice if you use software designed for color graphics.

Your Apex comes with a multi-graphics adapter (MGA) card so you can display color or monochrome graphics on your monitor. The card is already installed in one of the five *option slots* in the computer. The MGA card also includes a game port so you can easily connect a joystick to your computer. You can replace the MGA card to use another type of monitor, such as an enhanced graphics adapter (EGA) monitor or a video graphics array (VGA) monitor.

Your Apex includes built-in parallel and *serial* interfaces that let you connect almost any peripheral device to the computer. A peripheral device is one that you attach to your computer, such as a printer, mouse, or modem. You can use the parallel interface to connect an Epson printer or plotter or any other parallel printer. You can use the serial interface to connect a serial printer or a mouse.

Your computer comes with version 3.2 of the MS-DOS<sup>®</sup> disk operating system and the GW-BASIC<sup>®</sup> programming language.

An operating system controls how programs run on the computer and supervises all input and output. MS-DOS is one of the most commonly used operating systems. It supports most popular software programs available, including those designed for the IBM<sup>®</sup> personal computer.

GW-BASIC is simple to learn and provides advanced features for the experienced programmer.

If you have used MS-DOS or GW-BASIC before, you'll find these programs work the same way on the Apex. Check your Apex MS-DOS or GW-BASIC reference manuals for descriptions of special features added by Epson.

You can add more devices by installing an **option** card in one of the computer's five option slots. An option card is an installable circuit board containing a device, such as a modem, or providing an additional interface to connect other devices. You can use most of the option cards designed for the IBM PC on your Apex.

You can also install an optional 8087 math coprocessor to speed up the computer's ability to perform calculations. You may want to add a coprocessor if you frequently use your computer for spreadsheet or other calculation-intensive applications.

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## How to Use This Manual

This manual describes how to set up and care for your computer. It also introduces the basics of using MS-DOS and shows you how to install option cards so you can connect optional devices. You may not need to read everything in this manual; some sections may describe a particular option or accessory you don't have.

The information in this manual applies to both the Apex Plus and the Apex Plus 20 computers unless indicated otherwise.

- ❑ Chapter 1 provides instructions on setting up and using your Apex computer.
- ❑ Chapter 2 describes general operating procedures for using the computer.
- ❑ Chapter 3 explains how to use MS-DOS with your Apex. It also introduces the XTREE<sup>®</sup> utility provided by Epson and describes how you can use XTREE to perform many file operations.
- ❑ Chapter 4 provides the steps for installing option cards.
- ❑ Chapter 5 contains troubleshooting information and a question and answer section about expanding your system.
- ❑ Appendix A shows how to change the DIP switch settings in your computer. You can use DIP switches to set or change the configuration of your system. You do not need to change the DIP switches unless you add or remove hardware from your system.

- ❑ Appendix B describes how to prepare an unformatted hard disk for use.
- ❑ Appendix C lists the hardware specifications, operating requirements, and options of your computer.
- ❑ The glossary defines the computer terms used in this manual.

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## Where to Get Help

For warranty repairs and technical assistance for your Apex computer, call toll-free 1-800-922-8911 (24 hours a day, seven days a week) for the location of your nearest Epson Customer Care Center.

To purchase accessories such as printer ribbons and option cards, check with the store where you purchased your computer or call toll-free 1-800-922-891 1 for the location of your nearest Epson Customer Care Center.

## Chapter 1

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# Setting Up Your System

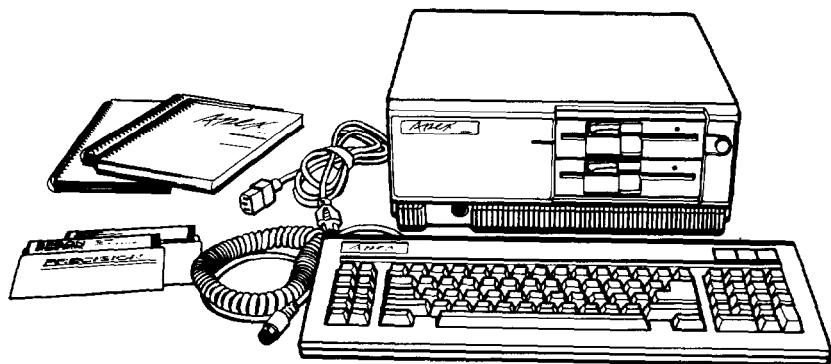
Setting up your Apex personal computer is easy - just follow the steps in this chapter and you'll be on your way. You can also check the "Read This First" sheet included with your computer.

## **1** Unpacking

Inspect each component as you remove it from its carton. If you discover any missing or damaged items, contact the place of purchase to obtain the missing items or an exchange. If you are unable to obtain an exchange, please call 1-800-922-891 1 for the location of your nearest Authorized Epson Customer Care Center. When you call, please have the serial number of your computer available.

Be sure to keep your packing materials. They provide the best possible protection for your computer if you need to move or ship it later. When you unpack your Apex, you'll find the following:

- ☐ The main unit and power cord
- ☐ The keyboard with an attached cable
- ☐ An MS-DOS operating system diskette (version 3.2)
- ☐ A diskette containing supplemental MS-DOS utilities, the GW-BASIC programming language (version 3.2), and the XTREE utility
- ☐ An MS-DOS reference manual and a GW-BASIC reference manual.

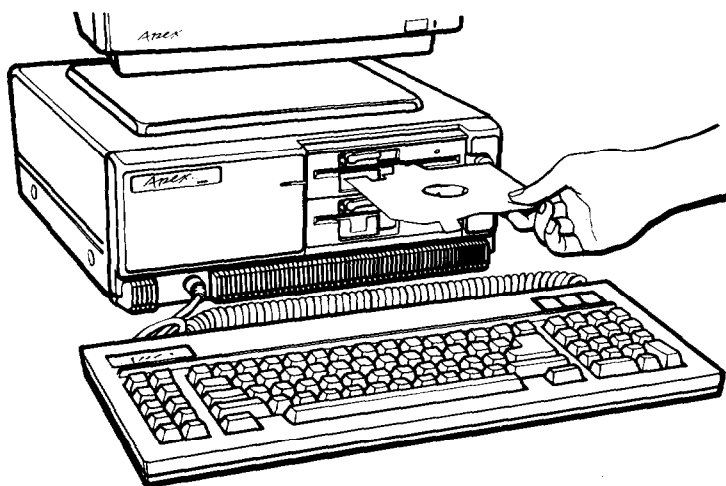


You'll also find a registration card with your Apex; fill out this card now and mail it to Epson. With this registration card on file, Epson can send you update information.

### **Removing the disk drive protector cards**

A protector card occupies each diskette drive in your computer. This card is inserted at the factory to protect the disk drive heads that read from and write to diskettes,

Be sure to remove the card from each diskette drive before you turn on the computer. Turn the latch that covers the disk slot until it is horizontal and carefully pull out the card.



Save these cards to use whenever you move the computer. Also, if you don't intend to use your computer for a week or more, insert the cards to help prevent dust from entering the drives.

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## 2 Choosing a Location

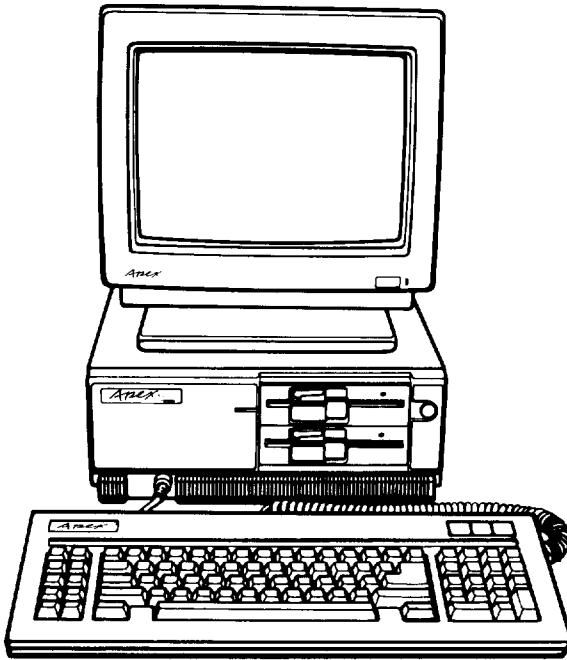
Before you set up your Apex, it's important to choose the right location. Make sure it provides the following:

- ❑ A large, sturdy area and surface, such as a desk or table, that can easily support the weight of your Apex and all its components.
- ❑ A flat, hard surface. Don't set the Apex on a soft surface like a bed or a carpeted floor. Soft surfaces attract static electricity, which may erase data on your diskettes and damage the computer's circuitry. Soft surfaces can also prevent proper ventilation.
- ❑ 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. Avoid extremes in temperature and humidity; also avoid direct sunlight or other heat sources. High humidity also hinders operation, so it's best to select a cool, dry area for operation. Dust and smoke, which can cause damage to diskettes and disk drives, could cause you to lose valuable data.
- ❑ Appropriate power sources. Static charges can be damaging. Connect all equipment to three-prong, 120-volt, grounded outlets. You need at least three outlets, one for the main unit, one for the monitor, and one for your printer. If you need more outlets, you may want to buy a power strip. Available at any electronics store, a power strip provides four to eight additional outlets. A power strip with surge suppression is recommended.

- ❑ No electromagnetic interference. Choose a spot for your computer away from any device that generates an electromagnetic field (like a telephone).

## Arranging the components

Decide how you want to arrange your system components. The illustration below shows a typical setup. The monitor is on top of the main unit and the keyboard is directly in front. This leaves enough space for you to insert diskettes into the disk drives.

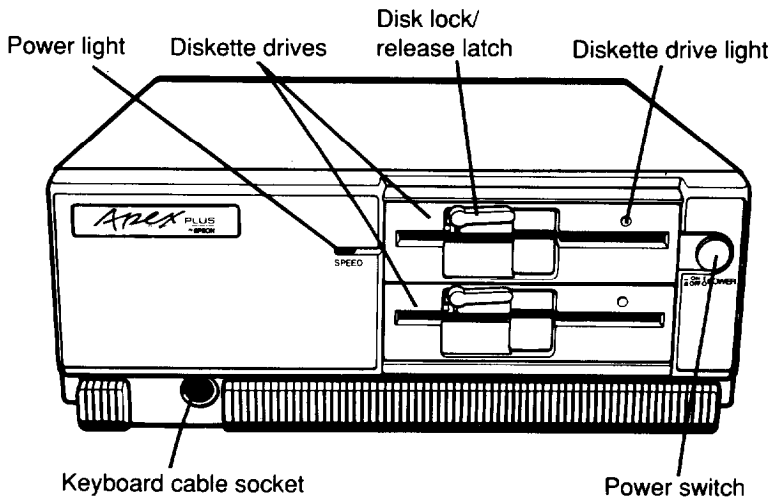


If you have special computer furniture, you can arrange your Apex components to suit your own particular needs.

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

## The front panel

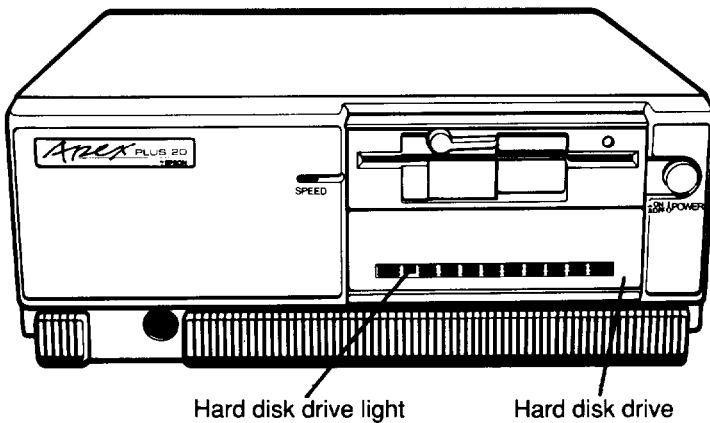
On the front panel you see the power light, the power switch, and the keyboard cable socket. If you are using an Apex Plus, your computer has two diskette drives. If you are using an Apex Plus 20, your computer has one diskette drive and one hard disk drive.



Here's how the front panel components work:

- ☐ **Power switch.** Press this switch to turn the main unit on and off.
- ☐ **Power light.** This light is on when the power is on. Your Apex computer can operate at two different speeds. The light is orange when the system is running at 4.77MHz (megahertz). The light is green when the system is running at 9.54MHz. Do not change the operating speed while you are running a program. See Chapter 2 for more information.
- ☐ **Keyboard cable socket.** Use this socket to plug the keyboard into the computer.

- ❑ Diskette drives. In the Apex Plus, both the top and bottom diskette drives use 5 1/4-inch, 360 KB diskettes. In the Apex Plus 20, the diskette drive also uses 5 1/4-inch, 360 KB 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.
- ❑ Diskette drive light. This green light is on when the drive is in use. To avoid losing data, never remove a diskette or turn off the computer's power when this light is on.
- ❑ Hard disk drive. In the Apex Plus 20 (shown below), the hard disk drive is the bottom drive. The green light on the hard disk drive panel is on whenever the computer is writing to or reading from the drive.



## The back panel

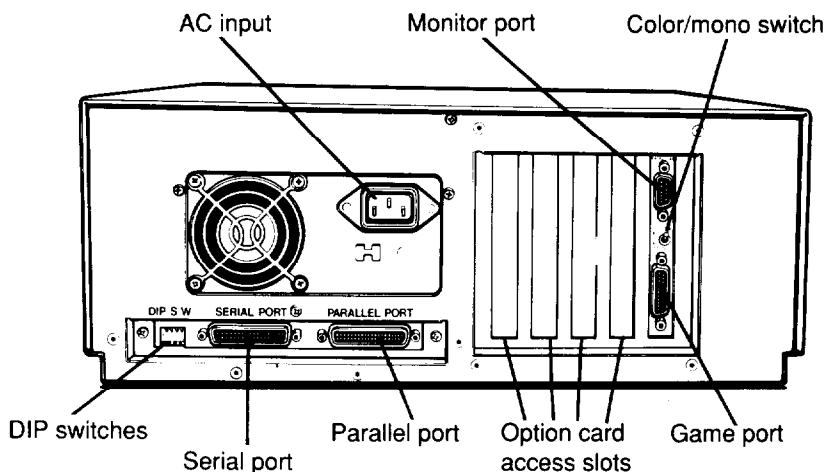
Take a look at the back panel and note the power inlet, the universal power supply, the **DIP switches**, the built-in input/output ports, and the option card access slots.

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### WARNING

Do not connect the power cord until you have connected the printer and any other optional devices. Always check to see that the power switch is off before you connect or disconnect the printer.

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The back panel components are:

- ☐ **AC input.** This inlet supplies electrical power to your computer when you plug in the power cord. Always turn the power switch off before you plug the power cord from this inlet into an electrical outlet.
- ☐ **DIP switches.** These switches give the computer information about its video card type, and parallel and serial interfaces. The switches are preset to match your system

configuration. Do not change them unless you are adding option cards that require different settings. Appendix A describes how to set these switches if you change your system configuration.

- ❑ Parallel port. Lets you connect any printer or plotter with a parallel interface.
- ❑ Serial port. Lets you connect any serial device, such as a serial printer or a mouse.
- ❑ Option card access slots. The Apex has space for five option cards to control any peripheral devices you add. The multi-graphics adapter (MGA) card, which allows you to use either a monochrome or color monitor, occupies one of these slots. If you have an Apex Plus 20, the hard disk controller card occupies another slot. You can use the other slots to add special devices, such as an internal modem, to your Apex system.
- ❑ Monitor port. Lets you connect an RGB color graphics monitor or a TTL monochrome monitor.
- ❑ Color/mono switch. Set this switch to color or mono, depending on the type of monitor you are using.
- ❑ Game port. Lets you connect a joystick, track ball, or other pointing device.

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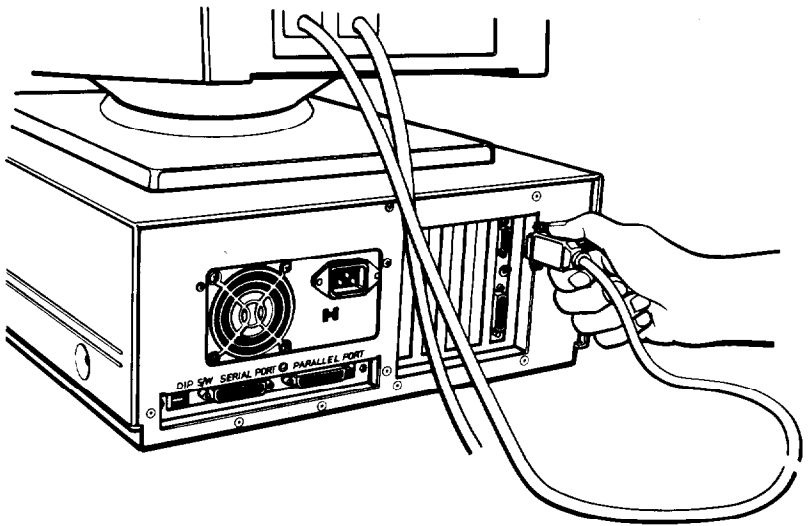
## 3 Connecting the Monitor

It is easiest to connect the monitor cable if the backs of the monitor and the main unit are facing you.

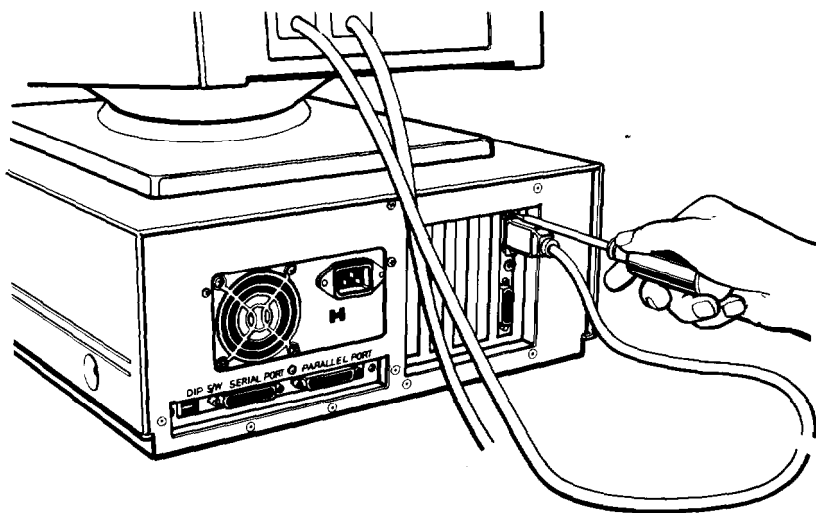
Your Apex comes with an installed multi-graphics adapter (MGA) card. You can connect an RGB color graphics monitor or a TTL monochrome monitor to the port on this card.

The way you connect your monitor depends on the type you have, so check your monitor manual for instructions, or follow these guidelines:

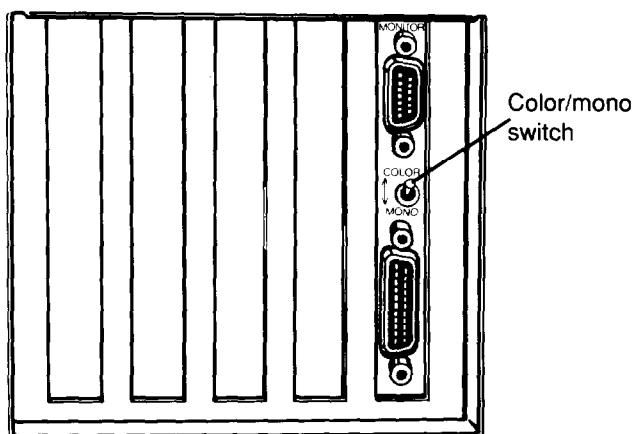
1. If necessary, connect the monitor cable to your monitor. Some monitors have permanently attached cables.
2. Connect the monitor cable to the connector at the back of the main unit.



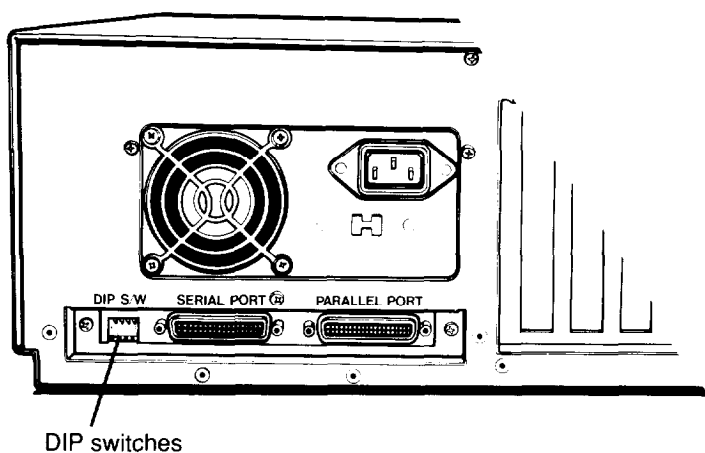
3. Tighten the screws (if any) on the plug with a screwdriver.



4. Plug the monitor's power cable into an electrical outlet.
5. Set the color/mono switch on the back panel for the type of monitor you are using.



6. Make sure the DIP switch settings are correct for the type of monitor you are using. The Apex computer is set at the factory to 80x25 color, for a color graphics monitor. If you are connecting a monochrome monitor, you need to change the DIP switch settings. See Appendix A for more information.



If you are using a monitor other than a color graphics or TTL monochrome unit, you'll need to install another video card in your computer. See Chapter 4, "Installing Option Cards," for instructions. You'll also 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 are installing.

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## 4 Connecting the Keyboard

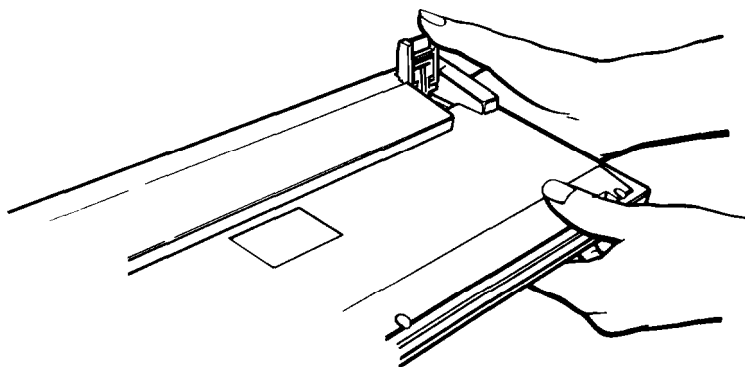
Follow these steps to connect the keyboard:

1. Insert the keyboard connector into the keyboard socket on the front panel of your Apex.

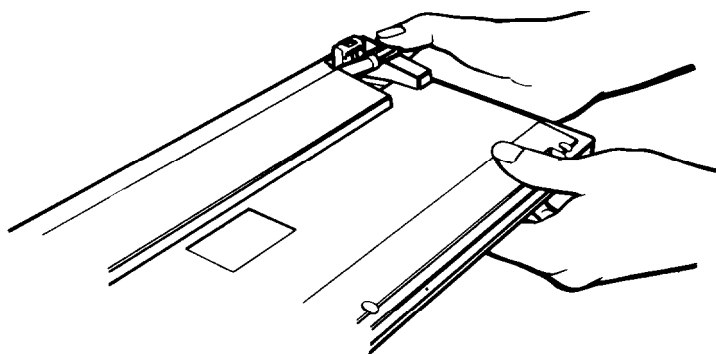
Do not force the connector, but make sure you completely insert it.



2. If you would like to adjust the angle of the keyboard, turn the keyboard over and lift each leg upward until it locks into place.



You can lock each leg in a 15 degree position or an 11 degree position. To lock a leg into the 11 degree position, lift up the entire leg and then push the portion marked 15" back until it snaps into the keyboard.



---

## 5 Connecting a Printer

Follow the steps in this section to connect your printer to either the parallel or serial interface.

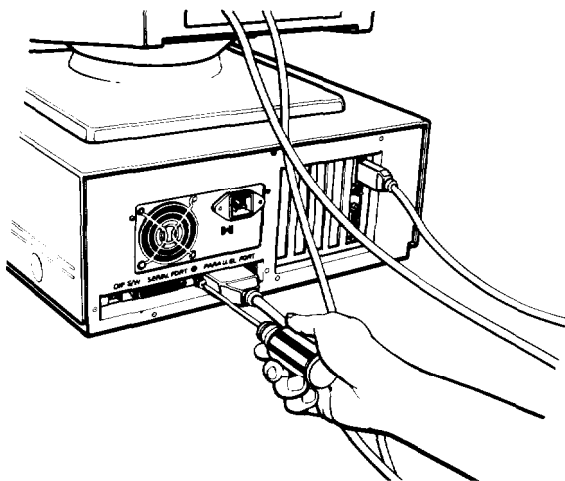
### **Parallel interface**

Your Apex computer has a parallel interface to which you can connect a printer. Of course, Epson offers a full range of printer products for you to choose from. Check with the store where you purchased your computer or call 1-800-922-891 1 for the location of your nearest Authorized Epson Dealer.

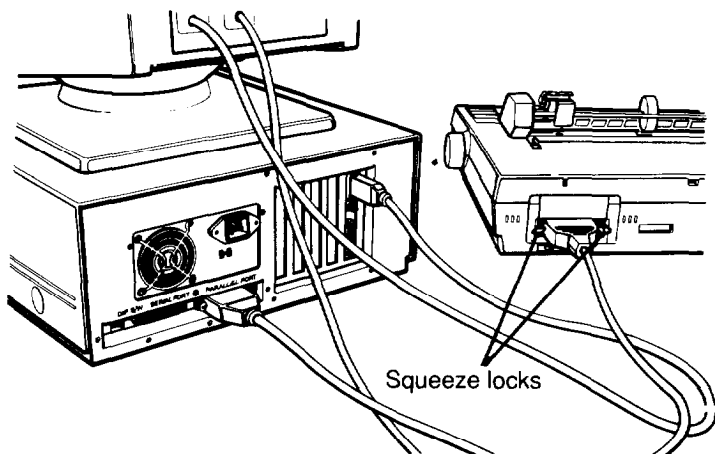
To connect a printer to your Apex, make sure you have an IBM PC-compatible printer cable. Then follow these steps to connect your printer to the parallel interface on the main unit:

1. Place the printer next to your system.
2. Before you connect the printer, make sure the power switches on the main unit, monitor, and printer are off.

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



4. Connect the other cable connector to the printer. Secure the cable by pressing together the squeeze locks from the printer port and pushing them into each side of the connector.



5. Plug the printer's power cord into an electrical outlet.

## Serial interface

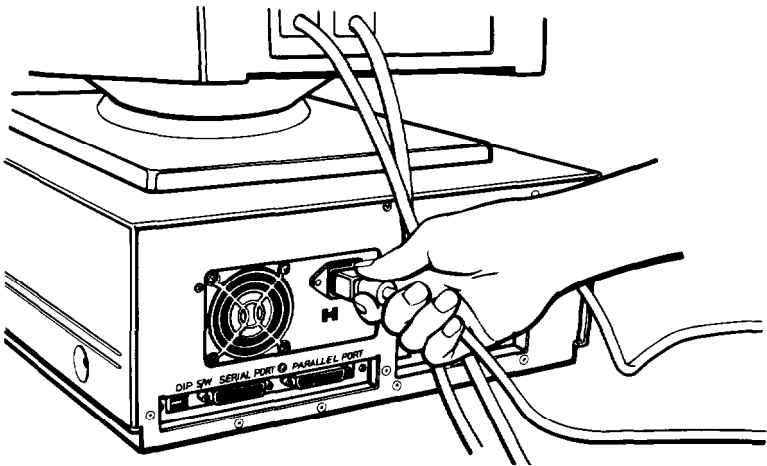
If you have a printer (or another peripheral such as a modem) with a serial interface, connect it to the serial (RS-232C) port on the back panel. The Apex uses a DB-25P connector, so be sure you have an XT-compatible cable. To connect a serial device, follow the same steps as for connecting a parallel printer.

You need to ensure the serial port is set up so it functions properly. If you are using the port for a serial printer, you must also redirect printer output to the serial instead of the parallel port. Use the MS-DOS SETMODE program (or the MODE command) to make these changes. See your MS-DOS reference manual for instructions.

---

## 6 Connecting the Power Cord

To avoid an electric shock, first insert the power cord into the AC input connector on the back panel as shown below, then plug the other end into the wall socket.



---

## 7 Turning On the Computer and Loading MS-DOS

Before you turn on the computer, be sure to read the safety rules.

### Safety rules

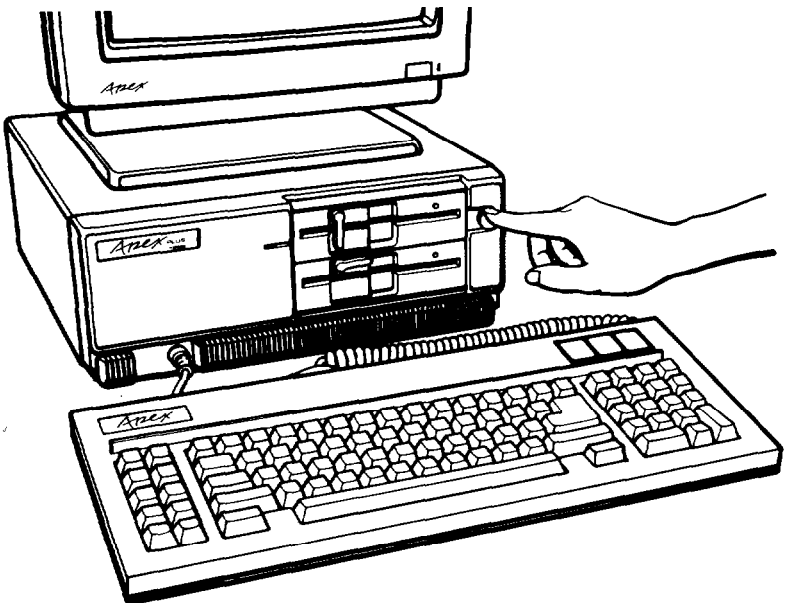
Follow these rules to avoid accidentally damaging your computer or injuring yourself:

- ☐ Never turn the computer on with a disk drive protector card in the disk drive.
- ☐ Do not attempt to dismantle any part of the computer. If there is a hardware problem you cannot solve after reading Chapter 5 on troubleshooting, contact your Authorized Epson Customer Care Center.
- ☐ Do not unplug cables from the computer while the power switch is on.
- ☐ Never turn off or reset the computer when any disk 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 minute before removing the cover from the computer. (Installing option cards is described in Chapter 4.)

## System startup

Now you're ready to turn on your Apex. Follow these steps:

1. Make sure one end of the power cord is securely plugged into the power inlet (AC input) on the back panel of the main unit and the other end is plugged into a 3-prong, 120-volt, grounded electrical outlet.
2. Turn on the monitor so you can see messages that appear as your computer starts up. If you have a printer, turn it on.
3. You can turn on your computer with or without a system diskette in the top disk drive, but for now, leave the drive empty. Press the power switch *on*.



The power indicator on the front panel lights up and the cooling fan inside the main unit starts. After a few seconds, the computer begins to perform a power-on self test.

## Initial screen display

Before the self test begins, a message similar to this displays:

```
Phoenix 8088 ROM BIOS Ver. 1.00  
Copyright (c) 1984, 1985, 1987  
Phoenix Technologies Ltd  
All Rights Reserved.
```

Then the computer immediately begins to test the memory. The Apex computer checks each kilobyte of memory twice, counting from 0 to 512 and then starting over again. It displays this message as it performs the test:

```
RAM Testing . . . XXXKB
```

The test takes about 45 seconds to complete. You can skip the memory test by pressing the space bar after you turn on the computer.

---

### NOTE

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.

---

If you have an Apex Plus, the following messages display:

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

These messages tell you that the computer is ready to load an operating system from a diskette in the top drive. The Apex Plus comes with MS-DOS version 3.2. Continue with the section called "Loading MS-DOS on the Apex Plus."

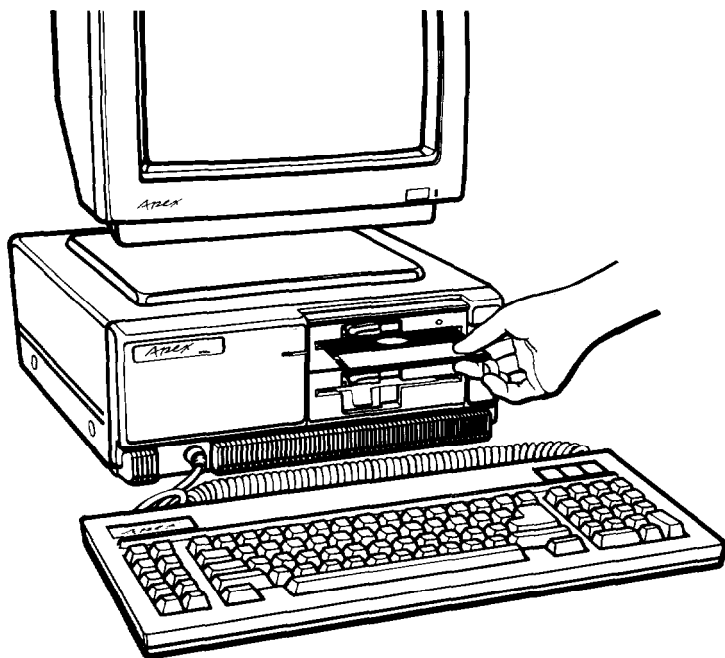
If you have an Apex Plus 20, your computer automatically loads MS-DOS version 3.2 from the hard disk drive. The MS-DOS command prompt `C>` displays. Continue with the section called “The command prompt.”

## **Loading MS-DOS on the Apex Plus**

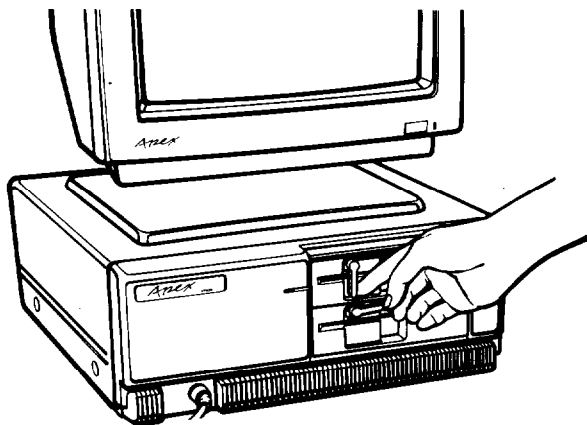
Before you can use a software program designed to run on the MS-DOS operating system, MS-DOS must be running in the computer's memory (this is also called booting the system). Once MS-DOS is loaded, you can give instructions to the computer and begin to use various software programs.

Follow these steps to load MS-DOS on the Apex Plus:

1. Make sure the disk latch is in the horizontal position. Hold the diskette with the label up and the notch to the left as shown. Insert your MS-DOS system diskette completely into the top drive.



2. Turn the latch down until it locks in the vertical position.  
For a complete description of inserting diskettes, see Chapter 2, "Using Diskettes and Diskette Drives."



3. Press any key to begin. Your computer begins loading MS-DOS into memory.

If you did not insert your system diskette, or you inserted another diskette by mistake, you see these messages:

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

4. In this case, insert your MS-DOS diskette, and press any key to continue.

After MS-DOS is loaded, the operating system title and version number display on the screen. Then you see the date prompt, which appears every time you boot the system:

```
Current date is   DDD mm-dd-yy
Enter new date:
```

5. You can 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:
```

You can enter the correct time or bypass the prompt by pressing **Enter**. For now, press **Enter** to bypass the prompt.

The system now displays the MS-DOS command prompt, **A>**, which is your starting point for putting MS-DOS to work.

## **The command prompt**

The command prompt tells you that MS-DOS is loaded and your computer is ready to receive instructions. The command prompt also identifies the current operating drive: A, B, or C. It displays on the screen when you load MS-DOS, complete an MS-DOS command, or return to MS-DOS from an application program. If your current operating drive is A, it looks like this:

```
A>
```

On the Apex Plus system, the top drive is drive A and the bottom drive is drive B. On the Apex Plus 20 system, the diskette drive is drive A and the hard disk drive is drive C. MS-DOS reserves the label B for a second diskette drive, whether or not it is installed.

If you are using an Apex Plus 20 and you booted from the hard disk; you'll notice that your prompt is not the MS-DOS default command prompt **C>**. Instead, your prompt looks like this:

```
C:\ >
```

That's because Epson changed the prompt by adding a command in a file named AUTOEXEC.BAT. This file contains a series of commands that your computer automatically runs when you turn it on. One of these commands is PROMPT \$P \$G, which modifies the prompt to display your directory location on the disk. For simplicity, all of the examples in this manual show the default command prompt, `A>` or `C>`.

For more information about the AUTOEXEC.BAT file, see "Using an AUTOEXEC.BAT file" in Chapter 3, or see your MS-DOS reference manual.

Before you continue, make a working copy of the diskette containing the MS-DOS operating system and the diskette containing GW-BASIC; then store the originals safely away.

---

## 8 Copying System Diskettes

Follow the steps below to make copies of your two system diskettes. Use these working copies for daily use and store the originals in a safe place.

The procedure for copying a diskette differs slightly depending on whether you have an Apex Plus or an Apex Plus 20. Follow the procedure below that applies to your system. In either case, you will need two blank 5 1/4-inch, 360 KB double-sided, double-density diskettes. Make sure the system diskettes are write-protected to prevent accidental erasure (see "Write-protecting diskettes" in Chapter 2).

### Copying diskettes on the Apex Plus

1. The `A>` prompt should be displayed on the screen. If it is not, follow the steps in the previous section, "Loading MS-DOS on the Apex Plus."

2. Type:

DISKCOPY A: B:

and press **Enter**. The screen displays these prompts:

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

3. Insert the MS-DOS system diskette you want to copy (the source) into drive A.
4. Insert a blank 5 1/4-inch, 360 KB diskette (the target) in drive B, the bottom disk drive, and close the diskette drive latch.
5. Press any key to begin the copy process. If the diskette in drive B is not formatted, the DISKCOPY program formats it. Then the program copies the data from drive A to the formatted diskette in drive B.

When the copy is complete, the screen displays the following prompt:

Copy another diskette? (Y/N)

6. Press Y so you can make a copy of the diskette containing GW-BASIC. Remove the diskettes from drives A and B (turn the latch on each drive to remove the diskette). Then insert the GW-BASIC diskette in drive A and another blank diskette in drive B. Follow the prompts to copy this system diskette.

When the copy is complete, this prompt displays again:

Copy another diskette? (Y/N)

7. Press **N** to return to the MS-DOS command prompt.
8. Store the original system diskettes in a safe place.
9. Properly label the working copies you just created.

### **Copying diskettes on the Apex Plus 20**

1. The **C>** prompt should be displayed on the screen. If it is not, type **C :** and press **Enter**.
2. Type:

**DISKCOPY**

and press **Enter**. The screen displays the following prompts:

**Insert SOURCE diskette in drive A:  
Press any key when ready...**

3. Insert the MS-DOS system diskette (the source) into drive A and turn the diskette drive latch to lock the diskette in place. Then press any key.

The DISKCOPY program copies the contents of the diskette to the computer's memory and then displays these prompts:

**Insert TARGET diskette in drive A:  
Press any key when ready...**

4. Release the disk latch and remove the MS-DOS system diskette from drive A.
5. Insert the blank diskette (the target) in the drive and turn the diskette drive latch to lock the diskette in place. Then press any key.

If the diskette in drive A is not formatted, the DISKCOPY program formats it. Then the program copies the data from the computer's memory to the formatted diskette. When the copy is complete, you see this prompt:

Copy another diskette (Y/N)?

6. Press Y so you can make a copy of the GW-BASIC diskette. Follow the instructions above and the prompts on the screen to make the copy.

When the copy is complete, this prompt displays again:

Copy another diskette? (Y/N)

7. Press N to return to the MS-DOS command prompt.
8. Store the original system diskettes in a safe place.
9. Properly label the working copies you just created.

---

## 9 Setting the Real Time Clock

Your Apex computer includes a real time clock. This battery powered clock stores the current time and date even if you turn off the computer.

To set the real time clock, use the SETRTC program supplied by Epson on your GW-BASIC diskette.

---

### NOTE

You cannot set the real time clock using the MS-DOS TIME and DATE commands; when you reset or turn off the computer, any time or date settings you make are erased from memory.

---

To set the real time clock, follow these steps:

1. If you are using the Apex Plus, insert the GW-BASIC diskette into drive A. At the command prompt, type the following and press **Enter**:

```
SETRTC /I
```

The screen displays a prompt similar to this:

```
Set Real Time Clock Ver. 1.00
Current Time is 12:05:31
Enter New Time:
```

2. Using a 24 hour format, type the new time and press **Enter**. Use colons to separate the hours, minutes, and seconds. It's not necessary to type the seconds.

The screen then displays a prompt similar to this:

```
Current Date is Wed 05-25-88
Enter New Date (mm-dd-yy) :
```

3. Type the new date and press **Enter**. Use dashes to separate the month, day, and year.
4. The screen displays the current time and date you set and returns you to the command prompt.

## Chapter 2

---

# Using Your Apex

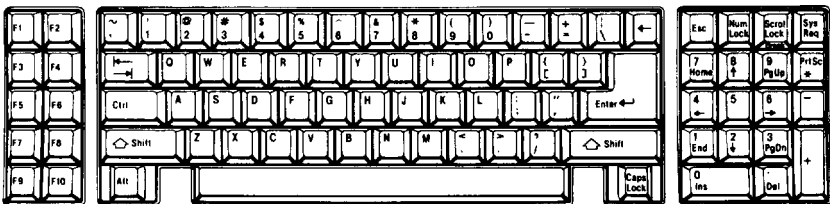
This chapter covers these basic procedures for using your Apex computer and keyboard:

- ☐ Using the special keys on the keyboard
- ☐ Changing your computer's operating speed
- ☐ Interrupting a command or program
- ☐ Resetting and turning off your computer
- ☐ Using diskettes, diskette drives, and hard disk drives.

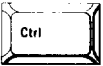
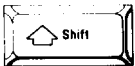
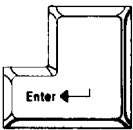
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### Special Keys on the Apex Keyboard

Some of the keys on your keyboard serve special functions when your computer is running application programs.

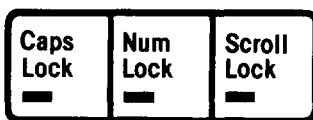


Take a look at the special keys and their functions:

| Key Name                                                                            |           | Purpose                                                                                                                              |
|-------------------------------------------------------------------------------------|-----------|--------------------------------------------------------------------------------------------------------------------------------------|
|     | F1-F10    | 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).                           |
|    | Ctrl      | 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. |
|    | Alt       | Works with other keys to enter alternate character codes not otherwise available.                                                    |
|   | Backspace | Moves the cursor back one space, deleting the character to the left.                                                                 |
|   | Enter     | Ends a line of keyboard input or executes a command (may be called the Return key in some manuals).                                  |
|  | Caps Lock | Changes the letter keys from lower-to uppercase; changes back to lower-case when pressed again.                                      |
|  | Esc       | Cancels the current command line or operation.                                                                                       |

|                                                                                                                                                                                                                                                                                                                                            | Key Name                          | Purpose                                                                                                                                |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------|----------------------------------------------------------------------------------------------------------------------------------------|
|                                                                                                                                                                                                                                                           | Num Lock                          | Changes the function of the keys on the keypad from numeric entry to cursor movement; changes when pressed again.                      |
|                                                                                                                                                                                                                                                           | Scroll Lock                       | Controls scrolling in some applications.                                                                                               |
|                                                                                                                                                                                                                                                                                                                                            | Break                             | When you hold down the <b>Ctrl</b> key and press this key, it sends a break signal to the computer to terminate the current operation. |
|                                                                                                                                                                                                                                                           | PrtSc                             | Prints the screen display on a dot-matrix printer.                                                                                     |
|  <br>  | Home, End, PgUp, PgDn,<br>↑ ↓ → ← | Within application programs, these keys control cursor movement.                                                                       |
|                                                                                                                                                                                                                                                           | Ins                               | Turns the insert function on and off.                                                                                                  |
|                                                                                                                                                                                                                                                         | Del                               | Deletes characters to the right of the cursor position.                                                                                |

The Caps Lock, Num Lock, and Scroll Lock keys work as toggles, that is, they alternately turn functions on and off when you press them. When the function is enabled, the corresponding light on the top right corner of the keyboard is on to show the feature is on. When the function is disabled, the light is off.



---

## Selecting Execution Speed

The Apex can operate at two speeds: 4.77MHz or 9.54MHz. At 9.54MHz, the Apex performs all tasks faster. Certain applications may have specific timing requirements and only operate at the slower speed. See the application program manual to determine the best operating speed.

When you turn on the computer, it runs at 4.77MHz. An orange power light indicates the system is set at the slower speed.

You can change the execution speed by typing a keystroke combination, or by running the SPEED program that Epson supplies on the GW-BASIC diskette.

To change the execution speed using the keystroke combination, hold down the **Ctrl** and **Alt** keys and press the slash (/) key. The computer changes from one speed to the other each time you press **Ctrl Alt /**.

You can also change the execution speed by running the SPEED program. To change the execution speed to 4.77MHz, type the following and press **Enter**:

**SPEED /1**

To change the execution speed to 9.54MHz, type the following and press **Enter**:

**SPEED /2**

When you change the speed to 9.54MHz, the power light is green and the computer sounds a high-pitched beep. When you change the CPU speed to 4.77 MHz, the power light is orange and the computer sounds a low-pitched beep. You can also display the current execution speed by typing **SPEED** and pressing **Enter**.

---

**NOTE**

If you want to set your computer to run at 9.54MHz every time you turn on or reset the computer, insert a **SPEED** command in your **AUTOEXEC.BAT** file. See “Using an **AUTOEXEC.BAT** File” in Chapter 3 or your MS-DOS reference manual for more information.

---

---

## **Stopping a Command or Program**

You may need to stop a command or program while it is running. To stop the operation of an MS-DOS command, hold down **Ctrl** and press **C** or hold down **Ctrl** and press **Break**. Both combinations send the ASCII code 03, which is known as the Break signal, to the computer.

You can try the same approach to stop the operation of an application program. If it the program does not stop, you may need to reset the computer, as described in the next section.

---

## **Resetting the Computer**

Occasionally, you may want to clear the computer’s current settings or memory without turning it off. This is called resetting the computer.

You may want to do this if an error occurs and the computer does not respond to your commands. In this case, you can reset the computer and try the same operation again. However, since resetting erases all data in the computer’s internal memory (RAM), you should reset your computer only as a last resort.

---

**WARNING**

Do not reset the computer simply to exit a program. Some application programs classify and store new data when you exit the program. If you reset the computer without properly exiting the program, you may lose data.

---

To reset the computer, hold down **Ctrl** and **Alt** and press **Del** (on the numeric keypad at the right of the keyboard). The screen is blank for a moment, then MS-DOS is loaded from the diskette in drive A or from drive C.

If this does not correct the problem, remove any diskettes from the disk drives. Turn off the computer. Wait for five seconds, then turn off the monitor and any peripherals. Wait for another five seconds, then turn the computer, monitor, and peripherals on again.

---

## **Turning Off the Computer**

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

If you are using an Apex Plus 20, run the HDSIT program to position the hard disk drive heads. Running HDSIT moves the read/write heads away from the recording area. See “Preparing the hard disk for moving” in this chapter.

Turn off the computer first, then turn off the monitor and any peripherals.

---

## Using Diskettes and Diskette Drives

The disk drives in your computer let you store your work and programs for use at any time. Apex Plus systems have two 360 KB diskette drives. Apex Plus 20 systems have one 360 KB diskette drive and one 20 MB hard disk drive.

Read the following sections to learn how diskettes work and how to do the following:

- ☐ Choose diskettes
- ☐ Care for your diskettes and disk drives
- ☐ Insert and remove diskettes
- ☐ Write-protect diskettes
- ☐ Make backup copies of your diskettes.

If you have an Apex Plus 20, also read these sections to learn how to do the following:

- ☐ Use a hard disk
- ☐ Use a single diskette drive system
- ☐ Prepare the hard disk before moving the computer.

### How diskettes work

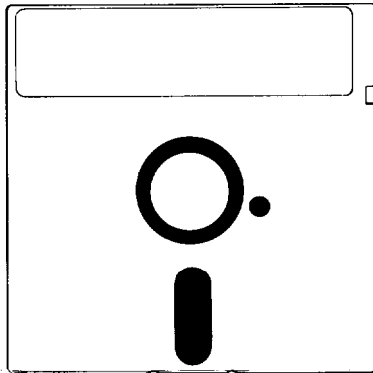
The diskettes you use are made of flexible plastic, coated with magnetic material, and enclosed in protective jackets. Like a record, a diskette has circular tracks on both sides. Your computer stores the data you enter as magnetic patterns on these circular tracks.

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 directly over the large oval hole. The hole allows read / write head access to the diskette so you can store, retrieve, and delete data. The data is stored magnetically so you can retrieve it, record over it, and erase it - just as you play, record, and erase music on cassette tapes.

## **Choosing diskettes for the Apex**

The Apex uses diskettes that are 5 1/4-inch, double-sided, double-density, 48 TPI (tracks per inch). The diskette boxes are usually marked DS-DD or 2S-2D, soft sector, 48 TPI. Each diskette can hold 360 KB of data, which is the equivalent of about 150 pages of text. For best results, use only high-quality diskettes with reinforced hub rings - the added reliability is well worth the extra cost.

These diskettes are compatible with those used with the IBM PC. This means you can use diskettes on the Apex that were prepared and used on another IBM-compatible computer.



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. See Chapter 3 (or your MS-DOS reference manual) for instructions on how to format diskettes.

## **Caring for your diskettes and diskette drives**

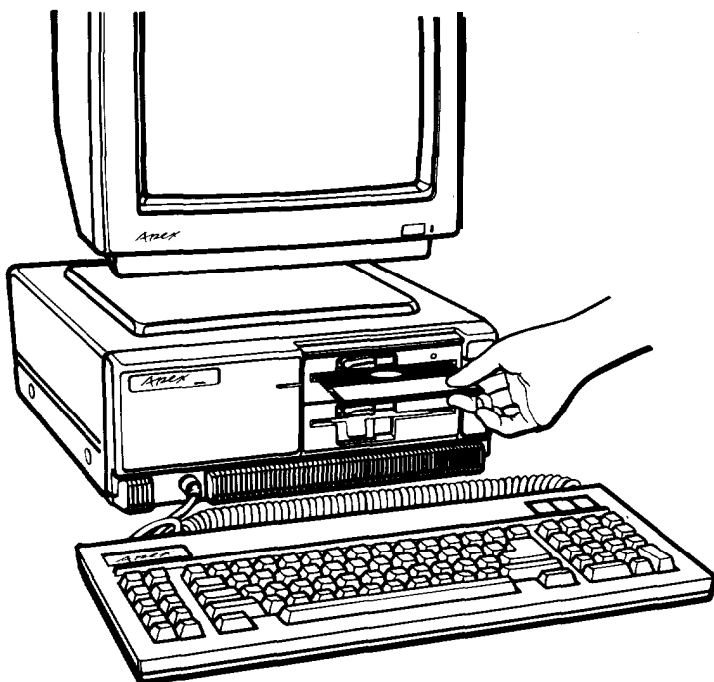
Follow these basic precautions to protect your diskettes and help you avoid losing data:

- ☐ Keep your diskettes away from dust and dirt. Small particles of dust or dirt can scratch the magnetic surface and destroy 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.) Be careful 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 or near a hard disk drive.
- ☐ Keep your diskettes in a moderate environment. They work best at normal room temperature and in normal humidity. Don't leave your diskettes sitting in the sun, or in extreme cold or heat. Extreme temperatures inside a car in the middle of summer or winter can damage 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. Do not store diskettes flat or stack them on top of each other. 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 does not rotate properly in the drive if it has been damaged.
- ❑ Never wipe, brush, or try to clean diskettes in any way.
- ❑ Carefully label diskettes. Attach the label firmly but gently, and only along the top of the diskette (next to the manufacturer's label). Do not stick several 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 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.



When 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 lets the read / write heads in the disk drive access the diskette.

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. Keep your diskettes in a special diskette container.

---

### **WARNING**

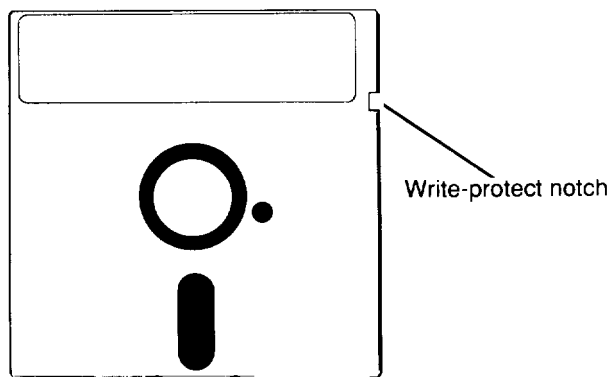
Never remove a diskette or turn off the computer while the drive indicator light is on. You could lose data. Also, be sure to remove all diskettes before you turn off the computer.

---

## Write-protecting diskettes

You can 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, the computer displays an error message.

To write-protect a diskette, 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 need to change data on a write-protected diskette, remove the write-protect tab.

## Making backup copies

Always make 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.

Copy your data diskettes regularly (preferably every day, or every few hours if you're creating a lot of data) to keep your backup data current, then store the backup copies away from your originals.

Chapter 1 describes how to use DISKCOPY to copy your MS-DOS system diskettes. To make backups of other MS-DOS diskettes, use the DISKCOPY command or the DU (Disk Utility) program. See your MS-DOS reference manual for instructions on using DISKCOPY and DU.

If you are using an Apex Plus 20, it's best to put most of the programs and data files you use regularly on the hard disk. Keep backup copies of all your program files on diskettes and regularly copy important data files to diskettes as well. For more information, see "Copying Data" in Chapter 3 and refer to your MS-DOS reference manual.

---

## Using Your Hard Disk

The Apex Plus 20 system includes an internal 20 MB hard disk. Here are some precautions to take when using a hard disk system:

- ❑ Never attempt to open the hard disk drive. The disk itself is enclosed in an airtight container to protect it from dust.
- ❑ If you are going to move your computer (even to another part of the room), run the program called HDSIT to prepare the hard disk for moving. See "Preparing the hard disk for moving" in this chapter for more information.

Working with a hard disk is very similar to working with a diskette. MS-DOS treats files on a hard disk just like files on a diskette. However, the hard disk provides several advantages:

- ❑ The 20 MB hard disk can store as much data as 55 360 KB diskettes.
- ❑ Your computer can read from and write to a hard disk faster than when using a diskette.
- ❑ You can store all your frequently used programs and data files on the hard disk, reducing the amount of time you spend swapping between diskettes with different information on them.

The added storage capacity makes it easy to move back and forth between different programs and data files. However, because it is so easy to add programs and files to your hard disk, you may find yourself trying to organize hundreds of files.

MS-DOS lets you keep related files together in directories and subdirectories. Epson also includes the XTREE utility with your Apex system, which gives you an easy-to-understand visual representation of your directory structure. XTREE contains many powerful features that let you move, create, delete, and rename files and directories, and view and execute files. See “The XTREE Utility” in Chapter 3 or your MS-DOS reference manual for instructions.

## **Using a single diskette drive system**

An operating system expects the computer to have at least two physical disk drives, and it displays prompts and messages accordingly. Although the Apex Plus 20 system has a single diskette drive, MS-DOS recognizes this one drive as two logical diskette drives. This helps you perform operations that normally require two diskette drives.

For example, if you give a command to copy from one drive to another, MS-DOS copies from the first diskette you place in the drive to the computer’s memory. Then MS-DOS prompts you to

insert another diskette and copies from memory to the new diskette. When copying is complete, you see a prompt to insert the original diskette.

Because you may often swap diskettes this way, it is important to remember which diskette is which. One way to avoid accidentally losing data is to hold the diskette for one drive in your left hand and the diskette for the other drive in your right. You can also write-protect your source diskette.

## **Preparing the hard disk for moving**

If you need to move your Apex Plus 20, even across the room, you should prepare the hard disk for moving to avoid damaging it. To do this, run the HDSIT program just before turning off the computer.

The HDSIT program moves the read/write heads away from the disk surfaces and securely locks them into position. If the heads are not secured and the computer is subjected to shock or vibration, the heads may bump the disk surfaces and the drive may be damaged or you may lose valuable data.

To run HDSIT, at the command prompt type:

### **HDSIT**

and press **Enter**. The screen displays a message reminding you that the heads will not be unlocked until you reset the computer or turn it off and on again. The heads are locked and the keyboard is disabled. You can now turn off the computer and move it to a new location.



## Chapter 3

---

# Using MS-DOS with Your Apex

In this chapter, you'll learn the basics of using MS-DOS with your Apex. The MS-DOS operating system manages the routine work of your system, such as keeping the computer's memory organized, controlling the monitor display, accepting keyboard input, and directing external communication.

---

## Introducing MS-DOS

Your application software cannot communicate with your Apex hardware without instructions from MS-DOS. The operating system controls the system input and output, and the operation of all disk drives.

Before you can use an MS-DOS application program, MS-DOS must be running in the computer's memory. This means you must first load MS-DOS so that the operating system can accept your instructions and make the right connections.

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, the few MS-DOS commands you need are introduced in this chapter. If you plan to use advanced features or create your own programs, you'll want to know as much as possible about MS-DOS. See your MS-DOS reference manual.

---

## Starting and Exiting MS-DOS

Before you can run an MS-DOS application program, MS-DOS 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 the computer.
3. If you have an Apex Plus, insert your MS-DOS system diskette into the top drive and press any key.

---

### NOTE

If you are using an Apex Plus 20, your system is set to boot MS-DOS automatically from the hard disk when you turn on or reset the computer. To boot from the hard disk, make sure that drive A does not contain a diskette. You can load MS-DOS from the diskette drive instead of the hard disk drive if you insert your MS-DOS system diskette before you reset or turn on your computer. Your computer, however, remembers that you loaded MS-DOS from drive A and prompts you to insert the system diskette whenever it needs to access a command.

---

4. If you have an Apex Plus, respond to the Date and Time prompts, or press **Enter** twice to skip them.

Now you see the MS-DOS command prompt, which tells you that MS-DOS is loaded and identifies the current drive. You can now enter commands to instruct MS-DOS to perform tasks and run application programs.

Always end your sessions with MS-DOS from the command prompt. Then it is safe to remove your diskettes, turn off the computer, and all peripherals.

---

## Changing the Default Drive

When you see the **A>** prompt, you know that MS-DOS is operating from drive A.

If you want to run a program or find a file on a different drive, however, you must specify that drive. You can do this by including the drive identifier with the filename or by logging on to that drive. The drive identifier is the letter of the disk drive followed by a colon.

For example, to log on to drive B (the bottom diskette drive), type **B :** and press **Enter**.

Your screen now displays the **B>** prompt. This means that you are now operating from drive B as the default drive. The system continues to read from drive B until you log on to another drive, or turn off or reset your computer.

To access a program or file without changing the default drive, use a drive identifier with the filename. For example, if you are logged on to drive A and want to access a file on drive B, type the drive identifier and the filename together like this:

**B: README.TXT**

---

## Entering MS-DOS Commands

You can enter an MS-DOS command whenever you see the MS-DOS command prompt. To enter a command, type the command name and any necessary parameters, and then press **Enter** to execute the command. Parameters include items that identify the data you want to process 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. Just type the correct command line and press **Enter**.

---

## Creating Files

All your data and programs are stored in files. A data file stores information, such as words, numbers, or pictures. A program file stores instructions that the computer can understand and execute.

The kind of file you can create depends on the MS-DOS command or application program you use to create it. In general, a data file that you create using an application program is stored in a special format. If you use a different application program to read that file, you may encounter problems.

Once you create a file, you need to give it a name. You must name your files in a certain format MS-DOS requires.

---

## Naming a File

Each file requires a unique filename. The filename consists of two parts: the file's name and the file's extension.

You can use up to eight characters in a filename. Create a name that identifies the information the file contains. The name can contain any characters or numbers except for blank spaces and the following symbols:

\* \ / { } : | < > + = ; . ?

The file extension is optional and can be up to three characters long. You can use these characters to describe what type of file it is, such as a text file or program file. Some application programs add extensions to the files you create. The application program uses the extension to determine whether it is a compatible data file. Avoid using the same extensions your application programs use. When you use an extension, separate it from the file's name with a period. For example, an MS-DOS filename might look like this:

DATA.TXT

Do not use uppercase and lowercase letters to distinguish between files. MS-DOS does not recognize the difference and displays filenames in uppercase.

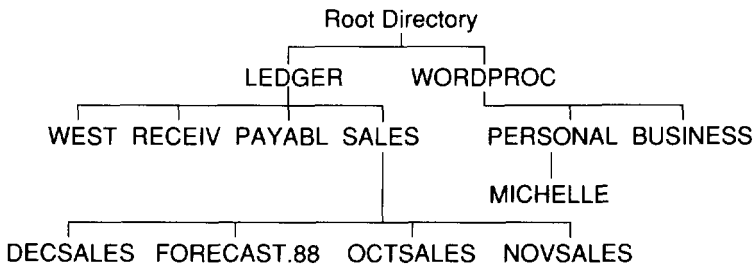
---

## Creating and Using Directories

MS-DOS stores the names of the files in directories. This makes it easy for you to organize and find your files. A directory contains specific information about each file such as its name, size, and the date and time you last updated the file.

As you create more and more files within a directory, you may find it difficult to quickly locate files. You may want to create subdirectories within your main directory so you can group files more efficiently. This kind of organization is called a tree-structured directory.

At the top of the tree-structured directory is the main directory, also called the root directory. The root directory can contain many subdirectories, and each subdirectory can contain other subdirectories. The structure of a directory may look like this:



The root directory does not have a name, but is always identified by a backslash (\). Each subdirectory has a name, and you can access any file in any subdirectory by using a pathname. The name of a subdirectory can be up to eight characters long, consisting of letters and numbers.

The directory you are working in is called the `cm-rent` directory. Usually, when you first load the operating system, the root directory is the current directory. To list the files in the root directory, type `DIR` and press **Enter**. The screen displays the following above the file names:

Directory of A:\

If you are working in a directory named `LEDGER`, the screen displays the following above the list of files:

Directory of A:\LEDGER

There are six basic operations you need to know about to use directories:

- ☐ Creating directories
- ☐ Changing directories
- ☐ Using pathnames
- ☐ Copying from one directory to another
- ☐ Displaying a list of all directories
- ☐ Deleting a directory.

## Creating directories

Use the MKDIR command to create a directory. For example, to create the LEDGER directory under the root directory, type the following and press **Enter**:

```
MKDIR \LEDGER
```

You can abbreviate the name of this command to MD. For example, to create the SALES directory under LEDGER, type the following and press **Enter**:

```
MD \LEDGER\SALES
```

To check that the LEDGER directory is in the root directory, type **DIR** and press **Enter**. The screen displays a list of files in the root directory, along with the new subdirectory:

```
LEDGER  <DIR>
```

The **<DIR>** after a name identifies it as a subdirectory of the current directory (in this case, the root directory).

Storing files in separate directories is almost the same as storing them on separate disks. You have to specify the pathname or change directories to access files in different directories just as you have to specify the drive or log onto a different drive to access files on different disks.

## Changing directories

To change directories, type **CHDIR** (or **CD**) followed by a backslash and the name of the directory. For example, to change to the LEDGER directory, type the following and press **Enter**:

```
CD \LEDGER
```

The backslash identifies the new directory LEDGER as a sub-directory of the root directory.

Once you are in the directory, you can directly access any files it contains.

To change to a subdirectory of the current directory, you do not need to enter the backslash. For example, to change to the SALES subdirectory while you are in the LEDGER directory, type the following and press **Enter**:

```
CD SALES
```

To return to the root directory from any subdirectory, type the following and press **Enter**:

```
CD \
```

This command takes you back to the root directory from any subdirectory.

## **Using pathnames**

You can access files in a different directory by specifying a pathname. The path consists of a series of directory names separated by backslashes and the filename you want to access. The filename is always last and is always preceded by a backslash. A backslash at the beginning of a pathname signifies the root directory; subsequent backslashes separate directory levels.

Normally, MS-DOS begins searching for a file in the current directory. When you set a path, MS-DOS searches for the file in all the directories in the designated path.

For example, if you are in the LEDGER directory and want to access a file named MICHELLE under the PERSONAL directory, you would type the following pathname and press **Enter**:

**\WORDPROC\PERSONAL\MICHELLE**

The pathname `\ WORDPROC\PERSONAL\MICHELLE` is the full pathname for the file MICHELLE. You can use it no matter what directory you are in (as long as it is on the same disk). The first backslash (for root directory) signifies that the path to the file starts in the root directory. WORDPROC is the name of the subdirectory under the root directory, and PERSONAL is the subdirectory under WORDPROC.

If you want to access a file on a different drive, include the drive letter in the pathname as in this example:

**B:\WORDPROC\PERSONAL\MICHELLE**

## **Other Directory Commands**

SUBST command lets you substitute a drive letter for a directory path. This is helpful when you use a long path.

The APPEND command lets you set a search path to directories containing data files.

The PATH command lets you specify a search path for external commands or program files (those having an extension of .COM, .EXE, or .BAT).

See the descriptions of SUBST, APPEND, and PATH in your MS-DOS reference manual.

## Copying from one directory to another

You use the COPY command to copy files from one directory to another. Specify the pathname of the file you want to copy, then specify the directory where you want to place the copy. For example, if you are in the WORDPROC directory and want to copy MICHELLE from the PERSONAL subdirectory to the BUSINESS subdirectory, type the following and press **Enter**:

```
COPY PERSONAL\MICHELLE BUSINESS
```

Be sure to type a space between the filename and the new pathname. You do not type a backslash before PERSONAL or BUSINESS **because** they are subdirectories of the current directory. If you do enter the backslashes, MS-DOS looks in the root directory for the directory and does not find them.

MS-DOS provides two special notations to identify the current directory and the next directory. These two notations are the first entries in each directory other than the root directory:

This represents the current directory. Typing **DIR.** is **the** same as typing **DIR** without the period.

This represents the next directory above the current one, called the parent directory. If WEST is your current directory, typing **DIR..** displays the contents of the SALES subdirectory.

## Displaying a list of directories

The TREE command lets you display a list of all the directories on the specified drive. For example, to see the names of all the directories on the default drive, type the following and press Enter:

```
TREE
```

The screen displays a report for every directory on the drive, for example:

```
Path:    C:\LEDGER
Sub-directories:RECEIV
                    PAYABL
                    SALES
```

If you want to see a list of all the files in the directories, add the /F switch to the command (see your MS-DOS reference manual):

```
TREE /F
```

The screen displays the directory information shown above plus the names of all files in each subdirectory, for example:

```
Path:    C:\LEDGER\SALES
Sub-directories:None
Files:    DECSALES
          FORECAST.88
          OCTSALES
          NOVSALES
```

---

### NOTE

To use the TREE command, you must log onto the drive (and directory) where TREE.COM is stored or specify the drive location in the command.

---

## **Removing a directory**

If you no longer need a directory, you can remove it with the RMDIR (remove directory) command. To remove a directory, first delete any files it contains or move them to another directory. You cannot remove a directory that is not empty.

To remove an empty directory, such as the WEST directory under LEDGER, type the following and press **Enter**:

```
RMDIR \LEDGER\WEST
```

You must give the complete pathname when removing a directory.

---

## **Formatting Diskettes**

Before you can store data on a new diskette, you must format it. Formatting prepares the diskette to accept data written by MS-DOS.

You can also format previously used diskettes. This process erases all data on the diskette. Always be sure you do not want to save any of the data on a diskette before you format it.

The formatting procedure you use depends on whether you are using an Apex Plus or an Apex Plus 20. Follow the appropriate procedure below for the computer you are using.

### **Formatting diskettes with an Apex Plus**

1. Insert your working copy of the MS-DOS diskette in drive A (and press any key, if necessary).

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. Insert the diskette you want to format into drive B and press **Enter**. MS-DOS displays the head and cylinder numbers as it formats each cylinder of the diskette:

**Head: *n* Cylinder: *nn***

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

**Format complete  
362496 bytes total disk space  
362496 bytes available on disk  
Format another (Y/N)?**

You can press **Y** to format another diskette or press **N** to return to the MS-DOS command prompt.

## **Formatting diskettes with an Apex Plus 20**

1. Insert the diskette you want to format in drive A.
2. If necessary, type **c:** to log onto drive C.

3. When you see the **C>** prompt, type:

**FORMAT A:**

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

Insert new diskette for drive A:  
and strike ENTER when ready

4. Insert the diskette you want to format into drive A and press **Enter**. MS-DOS displays the head and cylinder numbers as it formats each cylinder of the diskette:

Head: *n* Cylinder: *nn*

5. When the diskette is formatted, you see these messages:

Format complete  
362496 bytes total disk space  
362496 bytes available on disk  
Format another (Y/N)?

You can press **Y** to format another diskette or press **N** to return to the MS-DOS command prompt.

---

## Copying Data

It's important to create backup copies of the files you store on your diskettes or hard disk. You can copy data and program files several ways:

- ☐ You can use the **DISKCOPY** command to copy the contents of an entire diskette.
- ☐ You can use the **COPY** command to copy select files.
- ☐ You can use the **BACKUP** command to back up the files on a hard disk or diskette in a compressed format.

## Using the DISKCOPY command

The DISKCOPY command lets you copy all the files on a diskette to another diskette. Epson also provides a disk utility called DU to copy diskettes; this utility is described in your MS-DOS reference manual.

The procedure for copying diskettes depends on whether you are using an Apex Plus or an Apex Plus 20. Follow the appropriate procedure for the computer you are using.

---

### NOTE

If you are using an Apex Plus 20, be aware that you cannot use DISKCOPY to copy files from a hard disk to a diskette.

DISKCOPY only copies files between diskettes. To copy a file from a hard disk to a diskette, use either the COPY command or the BACKUP command. See the appropriate section in this chapter or your MS-DOS reference manual for instructions.

---

## Using DISKCOPY with an Apex Plus

When you use the DISKCOPY command, you need to specify the disk drive (A: and B:). If you do not, MS-DOS copies the diskette in drive A to a second diskette that you insert in drive A. This means you must swap diskettes during the copy process. MS-DOS displays prompts to tell you when you need to change diskettes.

1. Make sure your original diskette is write-protected. (See Chapter 2 for instructions.)
2. Insert your working copy of the MS-DOS system diskette 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 the diskette you want to copy from (the source) in drive A and the diskette you want to copy to (the target) in drive B. Then press any key.

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

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

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

When the copy is complete, you see these messages:

Copy complete  
Copy another (Y/N)?

6. Press **Y** to perform another copy or **N** to end the DISKCOPY command.

## Using DISKCOPY with an Apex Plus 20

1. Make sure your original diskette is write protected (see Chapter 2 for instructions).
2. If necessary, type `C :` to log onto drive C.
3. At the `C>` prompt, type:

`DISKCOPY`

and press `Enter`.

MS-DOS displays these messages:

`Insert SOURCE diskette in drive A:  
Press any key when ready ...`

4. Insert the diskette you want to copy from in the diskette drive and press any key.

DISKCOPY copies the contents of the diskette to the computer's memory. The screen displays a message similar to this while copying:

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

When all the files have been copied, the screen displays these messages:

`Insert TARGET diskette in drive A:  
Press any key when ready ...`

5. Remove the diskette from drive A and insert the blank diskette in the drive. DISKCOPY checks to see if the new diskette is formatted. If not, it formats the diskette. You see this message:

Formatting while copying

The copy operation begins when the format is complete. You see these messages:

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

When the copy is complete, you see this message:

Copy another diskette (Y/N)?

6. Press Y to perform another copy or N to end the DISKCOPY command.

## Using the COPY command

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

- ☐ 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 copy automatically replaces the file on the target diskette. There is no warning that the file on the target diskette is being replaced, so be careful that you do not accidentally erase a file you want to keep.
- ☐ The target diskette must be a formatted diskette.

To copy a file, simply type the COPY command and the file-names at the command prompt, and then press **Enter**.

To copy a file from the diskette in drive A to the diskette in drive B using the same name, type:

```
COPY A:REPORT.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:REPORT.EXT B:FACTS.EXT
```

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

```
COPY REPORT FACTS
```

In this case, you can omit the drive identifier because the source and target files are on the current drive.

An easy way to copy a group of files is by using wildcard characters in the filenames. You can use two wildcard characters: \* and ?. The asterisk represents any group of characters and the question mark represents any single character.

To copy all the files on the diskette in drive A to the diskette in drive B, type:

```
COPY A:*. * B:
```

To copy all the files on drive A whose names begin with the four letters “MEMO” and end with any single character to drive B, type:

```
COPY A:MEMO? B:
```

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

```
COPY REPORT + FACTS + MEMO DATA
```

When you use the COPY command this way it copies the file REPORT, then FACTS, and then MEMO into the new file, DATA. In this example, the files are located on the current drive.

## **Using the BACKUP command**

You typically use the BACKUP command to back up hard disk files. It lets you store files in a compressed format for archive purposes. You can use BACKUP to copy files from any disk to another (hard disk to diskette, diskette to hard disk, diskette to diskette, even hard disk to hard disk).

Unlike DISKCOPY and COPY which make exact duplicates of files, BACKUP creates files that you cannot use until you restore them using the RESTORE command.

You can use switches with BACKUP to back up files created after a certain date, or to specify files stored in a certain directory.

You can also completely back up all your files and then tell BACKUP to add only those files that have been modified since the last time you ran BACKUP. This process, called an incremental backup, makes regular backups faster to perform.

Be sure you have enough formatted diskettes to back up the data on your hard disk drive. It can take about 50 360KB diskettes to copy a 20MB hard disk drive that is completely full (although it is rare that you would store this many files on a hard disk). In any case, you don't want to run out of formatted diskettes during the backup process.

See your MS-DOS reference manual for complete instructions on using BACKUP.

---

## The HELP Utility

The HELP command provides information on all MS-DOS commands and utility programs. This help function provides useful information but is not intended to be a substitute for the MS-DOS reference manual.

The format of this command is:

**HELP [command...]**

Type HELP only to see a menu of all commands. Type HELP followed by the name of one or more MS-DOS commands, each separated by a space, to bypass the menu and display the messages for each command.

When the menu is displayed, you see this prompt at the bottom of the screen:

↑↓→← Select command name, Enter to  
display command,  
Esc to Exit

Use the cursor keys to highlight a command name and press **Enter** to display the help screens for this one command.

If there is more than one page of text, you see the prompt **PgUp** on the top of the screen. Press **PgUp** to display the rest of the text. After reading the help information, press **ESC** to return to the menu.

If you type **HELP** and one or more command names on the command line, the help information for the first command is displayed. Press **ESC** to see the help information for the next command. When you press **ESC** after viewing the information for the last command, MS-DOS returns to the command prompt.

---

## **NOTE**

The help information is stored in the **HELP.TXT** file, which is located **on** your **GW-BASIC** and **Supplemental Utilities** diskette. If you copy **HELP.COM** to another diskette or to your hard disk, you must also copy **HELP.TXT** to the same disk. If they are not in the same path, you can use the **APPEND** command to locate **HELP.TXT**.

---

## **Examples**

To see help information for the **COPY** command, type the following command and press **Enter**:

```
HELP COPY
```

To see help information for the **DISKCOPY** and **FORMAT** commands, type the following and press **Enter**:

```
HELP DISKCOPY FORMAT
```

To see the help menu, type **HELP** and press **Enter**.

## Messages

*command not found*

You may have misspelled the command name. Press **Enter** to return to the command prompt and try again.

Failed to open HELP.TXT

HELP could not find the HELP.TXT file. HELP.COM and HELP.TXT must be in the same directory, or use APPEND to locate the directory that contains HELP.TXT.

---

## The XTREE Utility

Epson has included the XTREE program with MS-DOS to make it easier for you to manage files and run other MS-DOS programs. It is located on the GW-BASIC diskette.

Using XTREE, you can do the work of nine MS-DOS internal commands using a convenient menu format.

### What XTREE does

XTREE offers a wide variety of special functions that allow you to:

- ☐ Display all the directories in a disk, the files they contain, and the file statistics
- ☐ Display, copy, and delete files individually or in groups, to any directory on a disk
- ☐ Make new directories, rename directories, remove empty directories, and change from one directory to another
- ☐ Create, display, or change volume labels

- ☐ Move a file, or files, from one directory to another on the current disk
- ☐ Display and change the attributes of any file; attributes are special switches, which you use to designate files as read-only, hidden, system, or archived
- ☐ Display data in both ASCII and hexadecimal format
- ☐ Execute programs
- ☐ Display how much space is available on your disks
- ☐ Modify screen parameters.

## Using XTREE

To run XTREE, move to the directory where XTREE is located. Type **XTREE** at the command prompt, and press **Enter**. A title screen appears while XTREE reads your disk's directory, then a menu similar to this displays:

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |     |          |     |         |                                       |     |        |     |       |     |        |     |          |     |       |     |        |     |          |     |       |     |        |     |    |     |         |     |         |     |        |     |         |     |       |     |        |     |        |     |          |     |        |     |         |     |          |     |        |     |       |     |    |     |        |     |      |     |       |     |       |     |       |     |    |     |      |     |     |     |      |     |      |     |  |  |                                                                                                                                                                                  |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|----------|-----|---------|---------------------------------------|-----|--------|-----|-------|-----|--------|-----|----------|-----|-------|-----|--------|-----|----------|-----|-------|-----|--------|-----|----|-----|---------|-----|---------|-----|--------|-----|---------|-----|-------|-----|--------|-----|--------|-----|----------|-----|--------|-----|---------|-----|----------|-----|--------|-----|-------|-----|----|-----|--------|-----|------|-----|-------|-----|-------|-----|-------|-----|----|-----|------|-----|-----|-----|------|-----|------|-----|--|--|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Path:\                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |     |          |     |         |                                       |     |        |     |       |     |        |     |          |     |       |     |        |     |          |     |       |     |        |     |    |     |         |     |         |     |        |     |         |     |       |     |        |     |        |     |          |     |        |     |         |     |          |     |        |     |       |     |    |     |        |     |      |     |       |     |       |     |       |     |    |     |      |     |     |     |      |     |      |     |  |  |                                                                                                                                                                                  |
| \                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |     |          |     |         | FILE: *.*                             |     |        |     |       |     |        |     |          |     |       |     |        |     |          |     |       |     |        |     |    |     |         |     |         |     |        |     |         |     |       |     |        |     |        |     |          |     |        |     |         |     |          |     |        |     |       |     |    |     |        |     |      |     |       |     |       |     |       |     |    |     |      |     |     |     |      |     |      |     |  |  |                                                                                                                                                                                  |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |     |          |     |         | DISK: A:<br>Available<br>Bytes 49,152 |     |        |     |       |     |        |     |          |     |       |     |        |     |          |     |       |     |        |     |    |     |         |     |         |     |        |     |         |     |       |     |        |     |        |     |          |     |        |     |         |     |          |     |        |     |       |     |    |     |        |     |      |     |       |     |       |     |       |     |    |     |      |     |     |     |      |     |      |     |  |  |                                                                                                                                                                                  |
| <table border="1"> <tr> <td>ANSI</td><td>SYS</td><td>FORMAT</td><td>COM</td><td>MSDOS</td><td>SYS</td> </tr> <tr> <td>ASSIGN</td><td>COM</td><td>GRAFTABL</td><td>COM</td><td>POWER</td><td>COM</td> </tr> <tr> <td>ATTRIB</td><td>EXE</td><td>GRAPHICS</td><td>EXE</td><td>PRINT</td><td>COM</td> </tr> <tr> <td>CHKDSK</td><td>COM</td><td>IO</td><td>SYS</td><td>RECOVER</td><td>COM</td> </tr> <tr> <td>COMMAND</td><td>COM</td><td>KEYBFR</td><td>COM</td><td>REVERSE</td><td>COM</td> </tr> <tr> <td>DEBUG</td><td>COM</td><td>KEYBGR</td><td>COM</td><td>SELECT</td><td>COM</td> </tr> <tr> <td>DISKCOMP</td><td>COM</td><td>KEYBIT</td><td>COM</td><td>SETMODE</td><td>EXE</td> </tr> <tr> <td>DISKCOPY</td><td>COM</td><td>KEYBSP</td><td>COM</td><td>SETUP</td><td>EXE</td> </tr> <tr> <td>DV</td><td>EXE</td><td>KEYBUK</td><td>COM</td><td>SORT</td><td>EXE</td> </tr> <tr> <td>EPSON</td><td>TXT</td><td>LABEL</td><td>EXE</td><td>SPEED</td><td>COM</td> </tr> <tr> <td>FC</td><td>EXE</td><td>MODE</td><td>COM</td><td>SYS</td><td>EXE</td> </tr> <tr> <td>FIND</td><td>EXE</td><td>MORE</td><td>COM</td><td></td><td></td> </tr> </table> |     |          |     |         | ANSI                                  | SYS | FORMAT | COM | MSDOS | SYS | ASSIGN | COM | GRAFTABL | COM | POWER | COM | ATTRIB | EXE | GRAPHICS | EXE | PRINT | COM | CHKDSK | COM | IO | SYS | RECOVER | COM | COMMAND | COM | KEYBFR | COM | REVERSE | COM | DEBUG | COM | KEYBGR | COM | SELECT | COM | DISKCOMP | COM | KEYBIT | COM | SETMODE | EXE | DISKCOPY | COM | KEYBSP | COM | SETUP | EXE | DV | EXE | KEYBUK | COM | SORT | EXE | EPSON | TXT | LABEL | EXE | SPEED | COM | FC | EXE | MODE | COM | SYS | EXE | FIND | EXE | MORE | COM |  |  | DISK Statistics<br>Total<br>Files: 42<br>Bytes: 292,637<br>Matching<br>Files: 42<br>Bytes: 292,637<br>Tagged<br>Files: 0<br>Bytes: 0<br>Current Directory<br>\<br>Bytes: 292,637 |
| ANSI                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | SYS | FORMAT   | COM | MSDOS   | SYS                                   |     |        |     |       |     |        |     |          |     |       |     |        |     |          |     |       |     |        |     |    |     |         |     |         |     |        |     |         |     |       |     |        |     |        |     |          |     |        |     |         |     |          |     |        |     |       |     |    |     |        |     |      |     |       |     |       |     |       |     |    |     |      |     |     |     |      |     |      |     |  |  |                                                                                                                                                                                  |
| ASSIGN                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | COM | GRAFTABL | COM | POWER   | COM                                   |     |        |     |       |     |        |     |          |     |       |     |        |     |          |     |       |     |        |     |    |     |         |     |         |     |        |     |         |     |       |     |        |     |        |     |          |     |        |     |         |     |          |     |        |     |       |     |    |     |        |     |      |     |       |     |       |     |       |     |    |     |      |     |     |     |      |     |      |     |  |  |                                                                                                                                                                                  |
| ATTRIB                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | EXE | GRAPHICS | EXE | PRINT   | COM                                   |     |        |     |       |     |        |     |          |     |       |     |        |     |          |     |       |     |        |     |    |     |         |     |         |     |        |     |         |     |       |     |        |     |        |     |          |     |        |     |         |     |          |     |        |     |       |     |    |     |        |     |      |     |       |     |       |     |       |     |    |     |      |     |     |     |      |     |      |     |  |  |                                                                                                                                                                                  |
| CHKDSK                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | COM | IO       | SYS | RECOVER | COM                                   |     |        |     |       |     |        |     |          |     |       |     |        |     |          |     |       |     |        |     |    |     |         |     |         |     |        |     |         |     |       |     |        |     |        |     |          |     |        |     |         |     |          |     |        |     |       |     |    |     |        |     |      |     |       |     |       |     |       |     |    |     |      |     |     |     |      |     |      |     |  |  |                                                                                                                                                                                  |
| COMMAND                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | COM | KEYBFR   | COM | REVERSE | COM                                   |     |        |     |       |     |        |     |          |     |       |     |        |     |          |     |       |     |        |     |    |     |         |     |         |     |        |     |         |     |       |     |        |     |        |     |          |     |        |     |         |     |          |     |        |     |       |     |    |     |        |     |      |     |       |     |       |     |       |     |    |     |      |     |     |     |      |     |      |     |  |  |                                                                                                                                                                                  |
| DEBUG                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | COM | KEYBGR   | COM | SELECT  | COM                                   |     |        |     |       |     |        |     |          |     |       |     |        |     |          |     |       |     |        |     |    |     |         |     |         |     |        |     |         |     |       |     |        |     |        |     |          |     |        |     |         |     |          |     |        |     |       |     |    |     |        |     |      |     |       |     |       |     |       |     |    |     |      |     |     |     |      |     |      |     |  |  |                                                                                                                                                                                  |
| DISKCOMP                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | COM | KEYBIT   | COM | SETMODE | EXE                                   |     |        |     |       |     |        |     |          |     |       |     |        |     |          |     |       |     |        |     |    |     |         |     |         |     |        |     |         |     |       |     |        |     |        |     |          |     |        |     |         |     |          |     |        |     |       |     |    |     |        |     |      |     |       |     |       |     |       |     |    |     |      |     |     |     |      |     |      |     |  |  |                                                                                                                                                                                  |
| DISKCOPY                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | COM | KEYBSP   | COM | SETUP   | EXE                                   |     |        |     |       |     |        |     |          |     |       |     |        |     |          |     |       |     |        |     |    |     |         |     |         |     |        |     |         |     |       |     |        |     |        |     |          |     |        |     |         |     |          |     |        |     |       |     |    |     |        |     |      |     |       |     |       |     |       |     |    |     |      |     |     |     |      |     |      |     |  |  |                                                                                                                                                                                  |
| DV                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | EXE | KEYBUK   | COM | SORT    | EXE                                   |     |        |     |       |     |        |     |          |     |       |     |        |     |          |     |       |     |        |     |    |     |         |     |         |     |        |     |         |     |       |     |        |     |        |     |          |     |        |     |         |     |          |     |        |     |       |     |    |     |        |     |      |     |       |     |       |     |       |     |    |     |      |     |     |     |      |     |      |     |  |  |                                                                                                                                                                                  |
| EPSON                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | TXT | LABEL    | EXE | SPEED   | COM                                   |     |        |     |       |     |        |     |          |     |       |     |        |     |          |     |       |     |        |     |    |     |         |     |         |     |        |     |         |     |       |     |        |     |        |     |          |     |        |     |         |     |          |     |        |     |       |     |    |     |        |     |      |     |       |     |       |     |       |     |    |     |      |     |     |     |      |     |      |     |  |  |                                                                                                                                                                                  |
| FC                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | EXE | MODE     | COM | SYS     | EXE                                   |     |        |     |       |     |        |     |          |     |       |     |        |     |          |     |       |     |        |     |    |     |         |     |         |     |        |     |         |     |       |     |        |     |        |     |          |     |        |     |         |     |          |     |        |     |       |     |    |     |        |     |      |     |       |     |       |     |       |     |    |     |      |     |     |     |      |     |      |     |  |  |                                                                                                                                                                                  |
| FIND                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | EXE | MORE     | COM |         |                                       |     |        |     |       |     |        |     |          |     |       |     |        |     |          |     |       |     |        |     |    |     |         |     |         |     |        |     |         |     |       |     |        |     |        |     |          |     |        |     |         |     |          |     |        |     |       |     |    |     |        |     |      |     |       |     |       |     |       |     |    |     |      |     |     |     |      |     |      |     |  |  |                                                                                                                                                                                  |
| DIR Available Delete Filespec Log disk Makedir Print Rename<br>COMMANDS ^Showall ^Tag ^Untag Volume eXecute<br>↑↓ scroll RETURN file commands ALT menu F1 quit F2 help                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |     |          |     |         |                                       |     |        |     |       |     |        |     |          |     |       |     |        |     |          |     |       |     |        |     |    |     |         |     |         |     |        |     |         |     |       |     |        |     |        |     |          |     |        |     |         |     |          |     |        |     |       |     |    |     |        |     |      |     |       |     |       |     |       |     |    |     |      |     |     |     |      |     |      |     |  |  |                                                                                                                                                                                  |

The XTREE display shows you:

|                 |                                                                                                                                                                                                                                |
|-----------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| PATH            | Provides the current location as an MS-DOS style pathname.                                                                                                                                                                     |
| \               | Provides a tree diagram of the directory structure of the disk. This window currently shows the disk only has a root directory (\).                                                                                            |
| FILE            | Shows you the files XTREE is set to display. This window shows that XTREE is set to display all files matching the DOS specification *.*; in other words, all files.                                                           |
| DISK            | Shows the name of the disk being displayed and the number of free bytes.                                                                                                                                                       |
| DISK Statistics | Summarizes information about the files on the disk.                                                                                                                                                                            |
| FILES           | Lists all filenames on the disk.                                                                                                                                                                                               |
| DIR COMMANDS    | Shows you a menu of keystroke commands you can give XTREE. Regardless of which XTREE function you are using, this line identifies the keys that control the screen display and the commands you need to complete the function. |

You use the cursor keys, character keys, function keys, the **Ctrl** key, and the **Alt** key to perform various functions in XTREE.

Cursor keys move the pointer. To select a file, use the arrow keys to highlight the file and directory names within the Directory and File windows. Press **Enter** to move the cursor from the Directory window to the File window and back again.

Character keys execute an XTREE command. The available XTREE commands appear on the DIR/COMMANDS or FILE/COMMANDS line at the bottom of your screen. The highlighted letter of the word (D in Delete, for example) indicates the key you press to execute the command. You can execute some commands on more than one file or directory by tagging all the desired files or directories with the Tag command, and then holding down the Ctrl key as you press the character key.

Alt key commands execute additional XTREE commands. The available XTREE commands appear on the DIR/COMMANDS or FILE/COMMANDS line when you press the **Alt** key. To **execute** the command, hold down the **Alt** key and press the highlighted letter of the command name.

Function keys control XTREE itself. Press **F1** to quit XTREE, press **F2** to display a screen of help information, and press **F3** to cancel a command. XTREE displays the available commands and the key that executes the command on the lower right of your screen.

There are many ways you can put XTREE to work. All disk setup and maintenance functions can benefit from this utility. You can add XTREE to batch files like any other MS-DOS command—you could even put it in an AUTOEXEC.BAT file to display a disk's file structure when you turn on the computer.

## Cautions

With a utility as powerful and as fast as XTREE, you must always be aware of the danger of accidentally erasing important files. Follow these guidelines to protect your files:

- ❑ You can cancel commands, even commands in progress, by pressing F3. This stops any function.
- ❑ Use Ctrl A (the attributes command) to give read-only status to all the files in the directories. Then, in order to erase a file, you must first remove its protection.
- ❑ XTREE is limited in the number of files and directories it can handle. XTREE checks to see if a disk has more than 180 directories or 2800 files; if the disk does, XTREE automatically aborts.

## Example

XTREE offers too many commands to demonstrate all the various combinations in this introduction; just remember that everything you can do is shown on the screen display.

The best way to learn XTREE is to use it. In this example, you create a new directory on your system diskette or hard disk, copy a few files into it, and then remove them all.

1. At the MS-DOS command prompt, type **XTREE** and press **Enter**. You see the XTREE menu:

```

Path:\
\
| FILE:'.*'
DISK: A:
Available
Bytes          49,152
DISK Statistics
Total
Files:         42
Bytes:        292,637
Matching
Files:         42
Bytes:        292,637
Tagged
Files:         0
Bytes:         0
Current Directory
\
Bytes :        292,637

DIR      Available Delete Filespec Log disk Makedir Print Rename
COMMANDS ^Showall ^Tag ^Untag Volume execute
↑scroll RETURN file commands ALT menu F1 quit F2 help

```

2. Press **M** (for Makedir) to create a directory for your files. Type **TEST1** and press **Enter** to name your directory. XTREE opens a new directory and updates the directory structure so it looks like this:

```

Path:\
└─TEST1
| FILE:*. *
DISK: A:
Available
Bytes          48,129
DISK Statistics
Total
Files:         42
Bytes:        292,637
Matching
Files:         42
Bytes:        292,637
Tagged
Files:         0
Bytes:         0
Current Directory
\
Bytes :        292,637

DIR      Available Delete Filespec Log disk Makedir Print Rename
COMMANDS ^Showall ^Tag ^Untag Volume execute
↑scroll RETURN file commands ALT menu F1 quit F2 help

```

3. Now you can copy files into this directory. Press **Enter** to move the cursor from the root directory to the files window.
4. Press **T** to tag a few files. A diamond appears next to each file you tag. Copying duplicate files uses up space quickly. It is a good idea to always check the total of Tagged Bytes in the DIRECTORY Statistics box to make sure you don't tag more bytes than the Available Bytes (shown in the DISK box).
5. Press **Ctrl C** to copy all tagged files in the directory. Press **Enter** to use the \*.\* file specification. If a destination already appears on the prompt line, press the backspace key or **ESC** to remove it.
6. **Now** type **\TEST1** and press **Enter**; you don't need to include a drive letter and a colon. Press either **Y** or **N** at the file replacement prompt (it doesn't matter because there are no files in the new directory).

XTREE displays the name of each file as it copies it. When the process is complete, the commands display and the cursor appears at the beginning of the list of files in the originating directory.

7. Press **Enter** twice to return the cursor to the root directory; then move the cursor to the new directory. Your display should look like this:

```

Path:\

      T E S T 1

ANSI      SYS
ASSIGN    COM
ATTRIB    EXE
CHKDSK    COM
DISRCOMP  COM
DISRCOPY  COM

DIR          Available  Delete  Filespec  Log disk  Makedir  Print  Rename
COMMANDS    ^Showall  ^Tag    ^Untag   Volume  execute
↓scroll    RETURN  file   commands ALT  menu  F1  quit  F2  help

FILE: *.*
DISK:  A:
Available
Bytes              7,168

DISK Statistics
Total
Files:             48
Bytes:            331,246
Matching
Files:             40
Bytes:            331,246
Tagged
Files:              7
Bytes:            45,921
Current Directory
TEST1
Bytes:            38,609

```

8. You probably don't want to keep this directory on your diskette or hard disk. The first step in deleting your new directory is to delete its files. Make sure the cursor is on the TEST1 directory; then press **Enter** to place it in the files window.
9. Press **Ctrl T** to tag all the files in this directory. Press **Ctrl D** to delete the files. Press **Y** to delete them without confirmation (after first making sure you have the right directory). When this is done, XTREE reports that there are no more files in the directory, and the cursor returns to the directory name.

If any of the files you tagged are marked read-only, you have to use the **A** command, with its **-R** switch, to remove their protection before you can delete them.

10. Press **D** to delete the directory. Confirm the deletion by pressing **Y**. The cursor returns to the root directory.

---

## Starting Your Application Program

Once you have loaded MS-DOS, you can start using your application program. Remove your MS-DOS diskette from drive A and insert your application program diskette.

Once you start using your application program, you see the prompts and screen displays that are unique to the application program. See your application manuals for more information.

---

## Using an AUTOEXEC.BAT File

You may find that there are some commands you want to run every time you turn on your computer.

To run a command or a series of commands automatically upon startup, you can type the commands into a batch file called AUTOEXEC.BAT. MS-DOS automatically looks for this file at startup. If MS-DOS finds an AUTOEXEC.BAT file in the root directory, it executes the commands in that file.

If you are using an Apex Plus 20, Epson has included an AUTOEXEC.BAT file in the root directory of your hard disk. It contains these commands:

```
ECHO OFF
PATH C:\;C:\DOS;C:\BASIC
PROMPT SP$G
CLS
```

The first line instructs MS-DOS not to display the commands in the batch file before executing them. The second line sets a command search path; now MS-DOS automatically looks for programs in the root directory (C:\), the DOS directory, and the BASIC directory as well as the current directory. The third

third line changes the command prompt to display the current directory as well as the current drive, and the fourth line clears the screen.

Here are some other suggestions for commands you can include in an AUTOEXEC.BAT file:

- ❏ Modify the PATH command to include the directories containing other software programs you commonly use.
- ❏ Add the XTREE command to the end of the list of commands so that you start each session within XTREE.
- ❏ Add the SPEED command so your computer is running at fast speed at startup.

## Creating an AUTOEXEC.BAT file

You can create an AUTOEXEC.BAT file using any command or program that lets you create a text-only file. If you have a word processing program that can save a file as a text-only file (sometimes called an ASCII text file), you can use that program to create an AUTOEXEC.BAT file.

The MS-DOS COPY command provides an easy way to create an AUTOEXEC.BAT file. At the MS-DOS command prompt, type the following and press **Enter**:

```
COPY CON: C:\AUTOEXEC.BAT
```

**C :** is the drive which will contain the AUTOEXEC.BAT file you are creating. Type the commands you want to include in the file exactly as you want MS-DOS to execute them. Press **Enter** at the end of each line. After you type the last command, press **Enter** to move the cursor to a blank line. Now press **F6** and then **Enter**. COPY copies everything you entered (from CON:, a special name for the keyboard) to the file AUTOEXEC.BAT.



## Chapter 4

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# Installing Option Cards

You can use your Apex in many additional ways by adding option cards to its present configuration. Option cards are accessories that provide extra capabilities to your Apex. For example, you may want to install an internal modem so you can communicate with another computer over the telephone, or a video card that allows you to use an EGA monitor.

You can install up to five 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. If you are using an Apex Plus 20, a second position is occupied by a hard disk controller card.

Option cards are available from Epson as well as other vendors. In addition, multifunction boards (available from various vendors) allow you to add multiple features using only a single slot.

Before you install an option card in your computer, 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 computer's cover and install and remove an option card.

---

## Removing the Cover

To remove the cover, you'll need a cross-head screwdriver. Follow these steps:

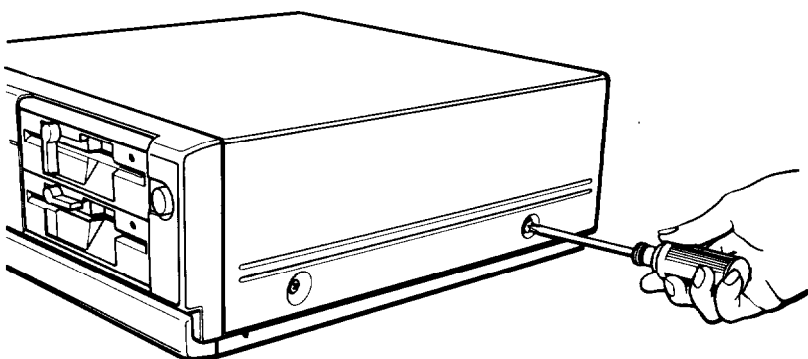
---

### WARNING

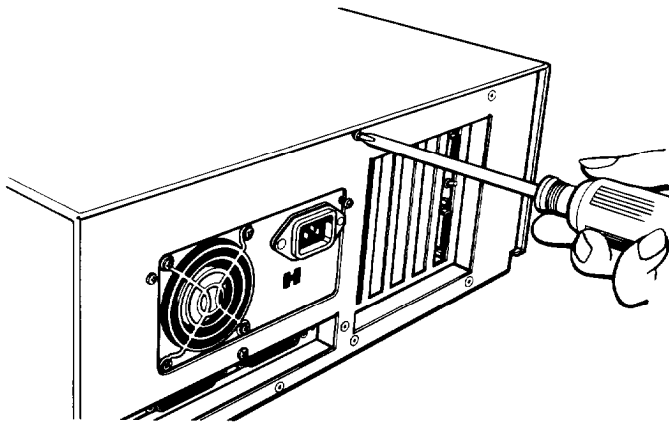
Never open the cover of the Apex while it is plugged into an electrical outlet. Turn off the power switch to the computer, then turn off any other peripheral devices connected to it. Wait for a few seconds, then unplug the power cord before removing the cover.

---

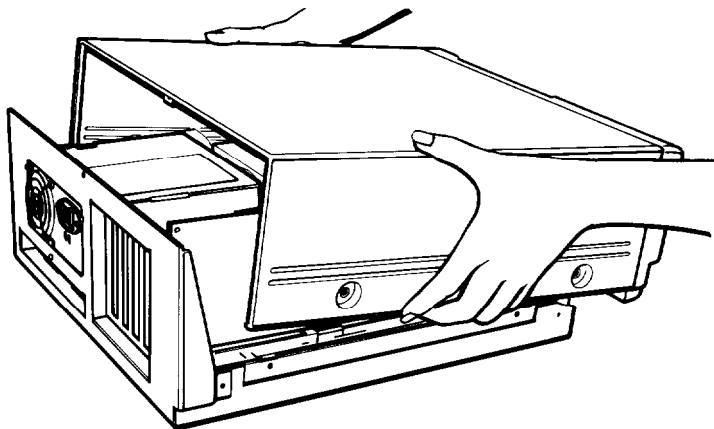
1. If your monitor is on top of the computer, disconnect it and move it to one side. Disconnect the keyboard and your printer and set them out of the way, too.
2. The top cover is secured by two screws on either side of the computer, as shown below. Remove the screws and place them to one side. Turn the computer around so that the back panel faces you.



3. You'll see that the cover is secured to the back panel with one screw. Remove the screw and put it safely to **one** side.



4. Now tilt the cover up slightly from the back and push it away from you and the computer.



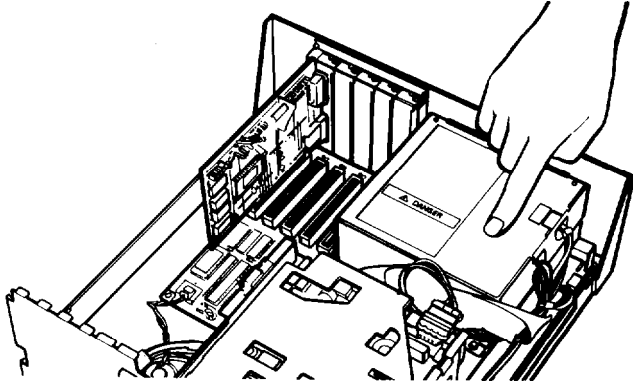
5. Set the cover aside for now.

---

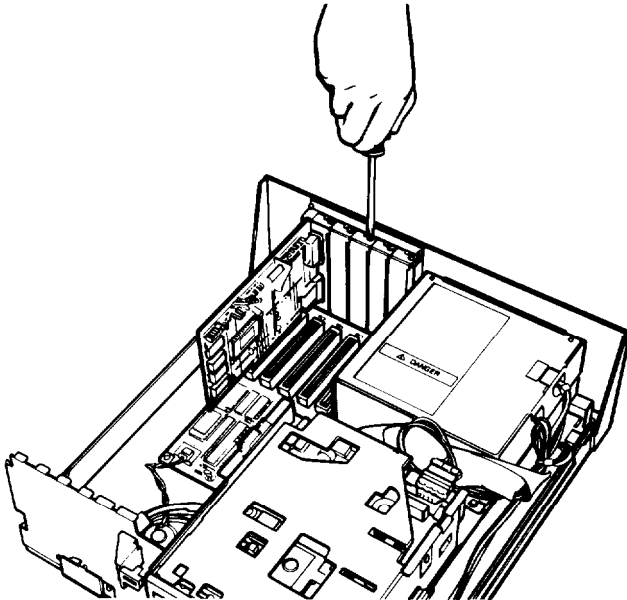
## Inserting the Option Card

Now that the cover is off, you can place the option card in any of the open 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. Touch the power supply cover inside the computer to discharge any static electricity that may be on your clothes or body.



2. 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.



3. Next, unpack the option card and read all instructions that come with it. Adjust any switches or jumper connections on the option card if necessary.

---

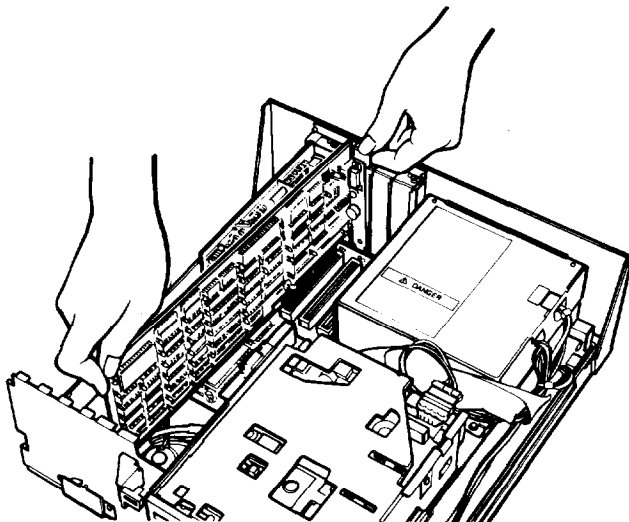
**NOTE**

Pay special attention to the warnings in your option card instructions. Some devices have delicate CMOS chips that you should not touch.

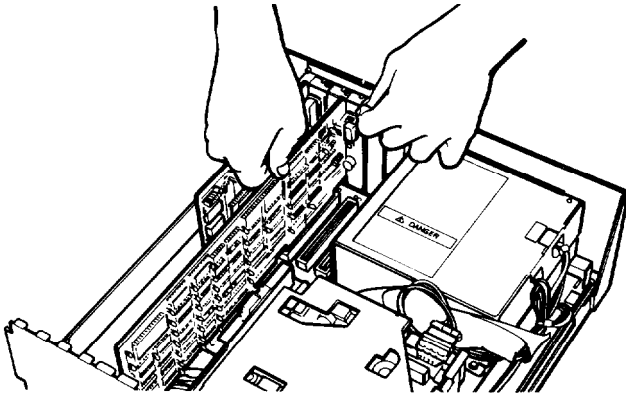
---

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 the card down before installing it, place it with the component side (the chips and transistors) facing down on top of the original packing.

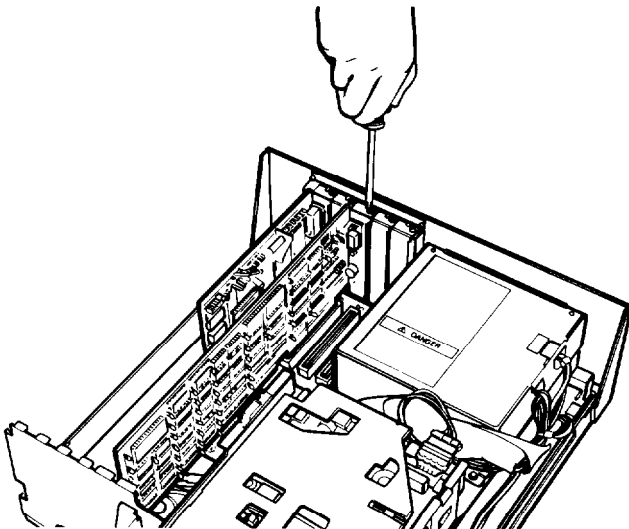
4. Grip the card firmly by the top corners. Keep the contact pins pointing down and the components facing toward the inside of the computer.



5. Now, insert the card straight down into the slot. Slide the tab at the bottom of the retaining bracket between the back panel and the green main circuit board.



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

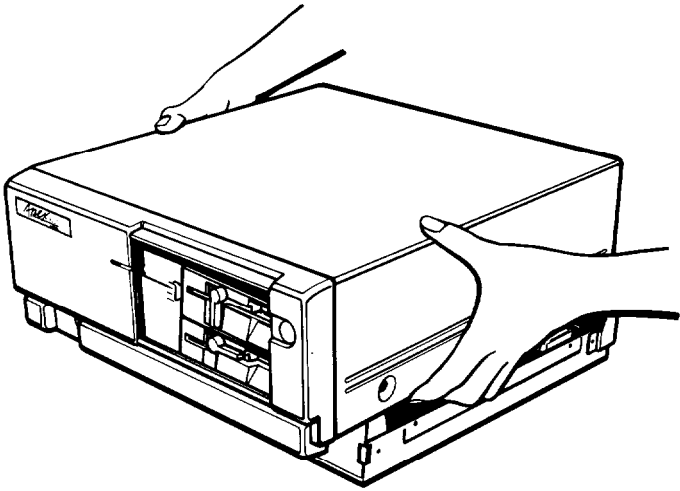


---

## Replacing the Cover

After you have installed the card, all you need to do is replace the cover of the computer:

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



2. Lower the cover onto the computer making sure that the edges fit around the back panel.
3. Secure the cover by replacing the screw on the back of the computer and the four screws on the sides of the top cover.
4. You can return the computer to its original position 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 cord to the back of the computer and then to an electrical outlet.

---

## Post-installation Setup

With the option card in place, your Apex may need a few adjustments to accommodate its new configuration. If you have already replaced the computer's cover and reconnected the power cord, you may now need to change your DIP switch settings to reflect the new configuration. For example, if you add an extra parallel interface, you need to change switch 2 so the computer recognizes the additional interface. See Appendix A for more information on DIP switch settings.

---

### NOTE

When you change DIP switch settings, you must turn the computer off, then turn it on for the setting to be in effect.

---

You may also need to add some commands to the configuration files on your system diskette as well. Your MS-DOS reference manual provides 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 cables connected to the option card. Disconnect the monitor and keyboard, and remove the computer cover. Then check 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 (using 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 computer, remember that you may need to reset the computer's DIP switches to properly configure your system.



## Chapter 5

---

# Troubleshooting

**You should** not encounter any serious difficulties as you set up and use your Apex. But if anything out of the ordinary happens, **check this** chapter for a solution. You can usually correct most problems by adjusting a cable connection, repeating a software procedure, or resetting the computer.

Use the suggestions in this chapter to help you solve most of the problems that you may encounter. If the problem still exists, call toll-free 1-800-922-891 1 for the location of your nearest Epson Customer Care Center (24 hours a day, seven days a week). You can also send any questions you have about the Apex to Epson at the following address:

Epson America, Inc.  
Product Support Department  
23610 Telo Avenue  
**Torrance, CA 90505**

When you contact Epson, please provide the serial number of your computer, the configuration (Apex Plus or Apex Plus 20, number of drives, type of monitor, option cards), and the software you are using.

---

### **WARNING**

If you need to turn off the computer for any reason, always wait at least five seconds before turning it back on. You can damage your computer if you turn it off and on rapidly.

---

---

## **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 on. 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 cord is securely connected to both the AC input-inlet on the back panel and the electrical outlet. Then turn 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 light on the main unit is on) but you don't see any images on the screen, follow these steps 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 screen displays any text.

2. If the display doesn't appear on the screen, use the controls on the monitor to adjust the brightness and contrast of the display.
3. Check DIP switches 3 and 4 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 cord is securely connected to its power outlet, 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 electrical outlet for power. Turn off your monitor. Then plug a portable lamp into the monitor's outlet, and turn it on to see if it supplies power.

---

## **The Computer Locks Up**

If the computer "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 an internal function. For example; a spreadsheet program takes quite a bit longer to recalculate an entire spreadsheet than to record one figure. Also, GW-BASIC programs with many calculations to perform can take several minutes, or even hours to complete. 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."

---

## Diskette Problems

If you have trouble with one of your diskettes, read 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 1/4-inch, 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 do not work if you write-protect the diskette. See Chapter 2 for information about write-protecting diskettes.

---

## Hard Disk Problems

If you have problems with your hard disk when you first start to use it, make sure it has been set up properly. First check to see if you can boot from the hard disk.

1. Can you boot from your hard disk? You may be missing one of the MS-DOS system files needed to boot from the hard disk. Turn off your computer. Insert a working copy of the MS-DOS system diskette into drive A and turn your computer on to boot from the diskette. Then log on to your hard disk drive and make sure you have the file `COMMAND.COM` in the root directory of your hard disk. If not, use the `COPY` command to copy `COMMAND.COM` from the diskette to the hard disk, and then restart your system. If you do, use the `COMP` command to compare the `COMMAND.COM` file on your diskette with the `COMMAND.COM` file on your hard disk.
2. If `COMMAND.COM` is okay, you may be missing `IBMBIO.COM` or `IBMDOS.COM` from the root directory of your hard disk (these two files are hidden files that do not display when you list the files in the root directory using the `DIR` command). To copy these system files from your MS-DOS system diskette to the root directory of the hard disk, log on to the diskette drive, type the following command, and press **Enter**:

`SYS C:`

3. If you can boot from a diskette, but cannot access data stored on your hard disk, you may have accidentally re-partitioned or reformatted part or all of the disk. Use the `FDISK` program to see if your hard disk has a bootable (active) DOS partition on it. If it doesn't, use `FDISK` to create one. If it does have a bootable DOS partition, then try reformatting your hard disk using `FORMAT` or `SELECT`. Reformatting destroys all the data currently on your hard disk, so do this only after careful consideration.

4. If reformatting the hard disk using `FORMAT` or `SELECT` doesn't work, you can try to prepare the hard disk as if it were a new, unformatted hard disk using the `HDFMTALL` program. See Appendix B, "Preparing a Hard Disk For Use," for instructions.

As a last resort, have an Authorized Epson Customer Care Center check your hard disk. Never open the airtight container that encloses the recording disk.

---

## 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 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. Check the application software manual and try the routine again according to the instructions. If this does not work, reset the computer, reload the program, and try the routine again.

Remember, some programs require the computer to run at 4.77MHz or 9.54MHz. Try changing the CPU operating speed by holding down the `Ctrl` and `Alt` keys and pressing the slash (/) key. 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, check to make sure the printer has power and is properly connected to the computer. If you need additional 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 to make an adjustment for your configuration.

Be sure your software is set up 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? Check 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 reference manual to see that you properly followed the instructions in your option card manual.

---

## **Expanding Your System**

### **Q: Can I use other types of diskette drives with the Apex?**

**A:** Half-height, 720KB 3 1/2-inch diskette drives and 1.2MB 5 1/4-inch high-density diskette drives are not supported.

### **Q: Can I install a math coprocessor chip? What type do I need?**

**A:** A math coprocessor chip is an option that speeds up the math functions used in many spreadsheet and math-intensive software applications. You can buy the chip at electronic parts retailers and computer stores (Epson America, Inc. does not supply them). An 8087-1 math coprocessor chip which runs at 10MHz is recommended for use with the Apex computer. The math coprocessor is installed in the socket provided on the Apex CPU board.

### **Q: What other monitors are compatible with the Apex? Is it possible to use a television set?**

**A:** IBM-PC compatible RGB color or TTL monochrome monitors work with the multi-graphics adapter card provided with the Apex computer.

IBM compatible Enhanced Graphics Adapter (EGA) monitors can also be used if an EGA video board is installed (available from computer dealers).

Composite monochrome monitors can be used if a composite video board is installed (available from computer dealers). The multi-graphics adapter card supplied with the Apex does not support composite monitors.

A standard television set cannot be used with the Apex, although there are some new TV sets being manufactured that can also be used as computer monitors with the proper interface card. Check with your dealer.

**Q: Will my Apex work in foreign countries?**

**A:** The Apex computer can be used in both the United States and internationally simply by selecting the appropriate input voltage with the voltage selection switch located on the rear of the unit. The Apex will operate on either 115VAC or 230VAC at 50/60 Hz power. Use a hard, thin object, such as a small screwdriver, to slide the switch to the appropriate setting.

Check the specifications of your other system components such as the monitor and printer before using them in foreign countries.

**Q: What kind of mouse works with the Apex?**

**A:** There are many IBM-PC compatible mice that work with the Apex. Some come with their own interface boards which must be installed in an option slot, such as the Microsoft bus mouse. A serial mouse like the Microsoft serial mouse can be connected to the serial port. See your local computer dealer for more information.

**Q: What kind of joystick can I use with the Apex? Where do I connect it?**

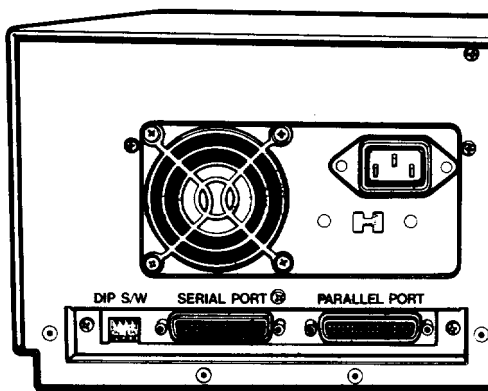
**A:** There are many IBM-compatible joysticks and some have different types of connectors. Make sure the joystick connector matches the connector type on the board you are using. An IBM-compatible joystick such as the Kraft® Premium III Joystick with a 15 pin IBM compatible connector must be used with the connector on the multi-graphics adapter card.

## Appendix A

---

### Setting the DIP Switches

The DIP switch settings on the Apex provide your computer with information about its configuration. Each time you turn on your Apex, it checks the settings to determine the type of monitor and the type of interfaces in use. The DIP switches are located on the back panel of your main unit:



These switches are preset for you by the manufacturer. However, read this appendix to become familiar with the DIP switch settings and 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.

---

#### **NOTE**

Set the DIP switches only while your computer is off. Software programs check the settings only when you turn on the Apex, so changing the settings while a program is running has no effect.

---

The Apex has four DIP switches. To turn a DIP switch on or off, use a hard, thin object, such as a small screwdriver, to flip the switch to the appropriate setting.

This table lists functions controlled by each DIP switch:

| <i>Function</i>       | <i>1</i> | <i>2</i> | <i>3</i> | <i>4</i> |
|-----------------------|----------|----------|----------|----------|
| Serial (RS232-C) port |          |          |          |          |
| COM1 primary *        | OFF      |          |          |          |
| COM2 secondary        | ON       |          |          |          |
| Parallel port         |          |          |          |          |
| LPT1 primary •        |          | OFF      |          |          |
| LPT2 secondary        |          | ON       |          |          |
| Video type            |          |          |          |          |
| 40x25 color           |          |          | ON       | OFF      |
| 80x25 color •         |          |          | OFF      | ON       |
| 80x25 mono            |          |          | OFF      | OFF      |
| Special settings      |          |          | ON       | ON       |

\*Factory setting

---

## Switch 1 (serial port)

Switch 1 tells the computer how to access the built-in serial port, as follows:

- ❑ The built-in serial port functions as either the primary or secondary serial port. You may decide to install an option card that has its own serial port. Make sure you set the DIP switch or jumper on the option card as well as the DIP switch on the Apex so there is no conflict between the built-in serial port and the added card.
- ❑ If you install an option card that has only a serial port, you must set the DIP switches to designate this as the secondary port and leave the built-in port as the primary port.
- ❑ MS-DOS needs to know the number of serial ports you have. If MS-DOS searches the system for a serial port and finds only one, it names it COM1:. If it finds two serial ports, it names the primary port COM1: and the secondary port COM2:.

---

## Switch 2 (parallel port)

**Switch 2** tells 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. You may decide to install an option card that has its own parallel port. Make sure you set the DIP switch or jumper on the option card as well as the DIP switch on the Apex so that there is no conflict between the built-in parallel port and the added card.
- ❑ 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.
- ❑ MS-DOS needs to know the number of parallel ports you have. 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:.

---

## Switches 3 and 4 (monitor and adapter type)

These switches define the type of video card and monitor you are using and help the system address the adapter memory correctly. The factory setting is 80x25 color for a CGA color graphics monitor. If you are using a monochrome monitor, set the DIP switch for 80x25 mono. If you are using an EGA or VGA monitor, set the DIP switches for special settings. If you install a different video card, follow the instructions included with your card.

---

**NOTE**

The Apex computer can automatically detect the correct video mode for the connected monitor and make the appropriate adjustments regardless of the current DIP switch settings. However, to ensure complete compatibility between your computer, video card, and monitor, you should set the computer's DIP switches for the correct monitor.

---

## Appendix B

---

# Preparing a Hard Disk For Use

The Apex Plus 20 comes with a preformatted hard disk that has MS-DOS and GW-BASIC already loaded and ready to use. You do not need to format this hard disk drive unless you have a serious problem with it.

If you encounter signs of a hard disk problem when booting MS-DOS, run the Non-destructive surface analysis test (option 4 on the HARD DISK FORMAT MENU) to make sure that formatting is absolutely necessary. If errors occur during this test, back up your disk, and run the Conditional format followed by Destructive surface analysis. These tests are described below.

There are several steps to preparing an unformatted hard disk drive for use with MS-DOS. First, you format the hard disk drive to accept data. After the hard disk is formatted, you partition and format it for a particular operating system. Formatting destroys all data on the hard disk, in all partitions, so follow this procedure with extreme care.

After the disk is partitioned and formatted for MS-DOS, you can copy your programs onto it, and then reorder the files into an efficient working arrangement.

This chapter shows you how to use the following MS-DOS commands to prepare a hard disk:

- ☐ **HDFMTALL** lets you check your hard disk for the location of bad sectors and format it to accept data.
- ☐ **FDISK** reserves all or part of your hard disk for use by MS-DOS.
- ☐ **SELECT** formats your hard disk to receive MS-DOS files and installs MS-DOS on your disk.

- ❑ MKDIR and COPY let you move the files on your hard disk into the recommended arrangement.
- ❑ COPY lets you create an AUTOEXEC.BAT file to automatically execute the PATH command so you can keep the MS-DOS commands and the GW-BASIC program **in a** separate directory from the rest of your program and data files.

---

## Using HDFMTALL

To format or check the integrity of the hard disk, run the MS-DOS HDFMTALL command.

After you install a new hard disk drive, run HDFMTALL and choose option 1, Conditional format (Normal). After formatting, you need to partition and format the hard disk for your operating system(s). Follow the procedures described in this chapter to partition and format your hard disk for MS-DOS, or see your MS-DOS reference manual for complete details.

### Formatting and checking options

Use the HDFMTALL command to check or format the hard disk drive. Insert your MS-DOS system diskette into drive A, and at the command prompt, type the following and press **Enter**:

```
HDFMTALL
```

You see a menu of formatting and checking options:

**HARD DISK FORMAT MENU**

- 1 - Conditional format (Normal)
- 2 - Unconditional format
- 3 - Destructive surface analysis
- 4 - Non-destructive surface analysis
- 0 - Exit

Enter selection number:

The first two options format a hard disk. Normally, you use option 1, Conditional format (Normal). This option automatically locates any bad tracks that are flagged by the manufacturer and marks them so that they cannot be used. Option 2, Unconditional format, requires you to enter the list of bad tracks.

The other two options test a hard disk for problems. Use option 3, Destructive surface analysis, to test the entire disk and update the bad track table. Because this option writes data to the disk as well as reads it, it destroys all data on tracks that produce errors. To check for unflagged bad tracks without destroying data, use option 4, Non-destructive surface analysis.

Many hard disk drives are supplied with a list of bad tracks. These drives may also have the bad track list printed on a sticker attached to the disk, but do not have the bad tracks flagged on the disk. Other hard disks are supplied with the bad tracks already flagged. The hard disk that comes with the Apex Plus 20 has all its bad tracks flagged at the factory. In all cases, run Non-destructive surface analysis before formatting the hard disk drive; this routine finds all bad tracks that are not flagged.

If the analysis shows that all tracks listed as bad are already flagged, you can then use the Conditional format (Normal) option to format the disk. If the analysis matches the list of bad tracks, but they are not flagged, run the Destructive surface analysis (to flag the tracks) before formatting the disk. If the list

provided by the drive manufacturer contains bad tracks that the analysis does not detect, you can use the Unconditional format option to flag all the bad tracks manually.

When you select an option from the HARD DISK FORMAT MENU, the program determines the number of hard disk drives installed in your computer. If you have more than one drive, each time you select an option you see this prompt:

Enter drive letter (C/D)?

Press C or D, and then press Enter.

If you have only one hard disk drive, the option you select starts immediately.

### **Conditional format (normal)**

Use this option to format the hard disk. All flagged tracks are marked so that they are never used.

To start the Conditional format, press 1 and then Enter.

The program starts to scan the disk to find all tracks flagged as bad, starting from the innermost cylinder of the disk. During the scan, you see the number of the cylinder being checked. For example, if you have a 20MB hard disk, the first messages you see are:

```
Format Hard Disk
Scanning for flagged bad tracks...
Current cylinder is 614
```

When the scan is complete, the program displays information about the condition of the disk. For a 20MB hard disk with no bad tracks, the display looks like this:

```
Scanning finished.  
Count of tracks flagged bad           = 0  
Count of tracks with other errors     = 0  
Count of good tracks                  = 0
```

The program then displays a warning about the consequences of proceeding with formatting:

```
WARNING! ALL DATA WILL BE DESTROYED IN  
ALL PARTITIONS OF HARD DISK, NOT JUST IN  
MS-DOS PARTITION!  
Do you want to start formatting (Y/N)?
```

If there are no other tracks with other errors and you are absolutely sure that you want to format the hard disk, press Y then Enter.

The program then asks you once more if you want to continue. You see this message and prompt:

```
DOUBLE CHECK THAT YOU HAVE BACKUP  
DISKETTE COPIES OF ALL YOUR FILES.  
Do you want to exit and check your file  
copies (Y/N)?
```

When you are certain that you won't lose any valuable data, press N and Enter.

If you cancel formatting at either stage, you see these messages:

```
Format cancelled.  
Press ENTER to return to the menu.
```

If you continue with formatting, you see:

```
Now formatting . . .
```

When formatting is complete, any bad tracks are flagged, and you see a series of messages like these:

```
Format finished
Flagging bad tracks...
Cylinder is xxxx, head is yy
Format completed.
Press ENTER to return to the menu.
```

Flagged tracks are identified by xxxx and yy. At this point, press Enter to return to the HARD DISK FORMAT MENU.

If there are any tracks with other errors, scanning stops and you see these messages:

```
Scanning cancelled.
Warning: This drive has an unflagged
error(s), or is unformatted.
Press ENTER to return to the menu.
```

Press Enter.

This may mean that the drive has never been formatted or that an error was not flagged. If you want to format the disk after receiving this error message, do the following:

1. If the drive is not formatted, run the Unconditional format (option 2) and enter any tracks you know are bad in the Bad Track Table. (See “Unconditional format” below.)
2. Run the Destructive surface analysis (option 3) to flag any remaining bad tracks. (See “Destructive surface analysis” below.)
3. Run the Conditional format again. No errors should occur; if one does, contact the store where you purchased your computer or call the toll-free Epson number for the location of your nearest Authorized Epson Customer Care Center.

# Unconditional format

You can also use this option to format your hard disk. The difference between unconditional and conditional formatting is how bad tracks are identified. The unconditional format requires you to enter a list of bad tracks before formatting begins.

To start the Unconditional format, press 2 and then **Enter**.

You are first given the option to change the interleave factor for formatting from the default value of three. Only do this if the documentation with your hard disk recommends a different value. The hard disk that comes with the Apex Plus 20 uses the default value of three. You see this prompt:

Do you want default interleave of 3  
(Y/N) ?

To accept the default, press Y and **Enter**. To change the value, press N and **Enter**. You see this prompt:

Enter interleave factor (1-16):

Type the recommended value and press **Enter**. Next, enter the list of bad tracks. The empty bad track table looks like this:

| Bad Track Table                                                                               |      |          |      |          |      |          |      |          |      |
|-----------------------------------------------------------------------------------------------|------|----------|------|----------|------|----------|------|----------|------|
| Cylinder                                                                                      | Head | Cylinder | Head | Cylinder | Head | Cylinder | Head | Cylinder | Head |
|                                                                                               |      |          |      |          |      |          |      |          |      |
| Move highlighted area to desired track with cursor keys.<br>A - Add track, F - Finish editing |      |          |      |          |      |          |      |          |      |
| Enter command letter:                                                                         |      |          |      |          |      |          |      |          |      |

To add a bad track, follow these steps:

1. Press **A**. You see this prompt:

Enter cylinder number (1 - xxxx)

2. Type the number of the cylinder containing the missing bad track, and press **Enter**. You see this prompt:

Enter head number (0 - yy):

3. Type the head number for the bad track, and press **Enter**.  
The maximum valid cylinder and head numbers  
(xxxx and yy) vary according to the type of hard disk.

To cancel this operation, press **Enter** without entering a value.  
You see this message:

Table unchanged.

If you enter an invalid cylinder or head number, a reminder of the range of values is displayed, and the program asks you to enter the value again. When you complete a valid entry, it appears in the table, and you can select another command.

If you make a mistake, move the cursor block to the incorrect track, and press **C** to change the track data. Or, press **D** to delete the track from the table. If you need to correct the track data you just entered, follow the procedure for adding a track.

When you have finished editing, check the entries in the table once more. When you are sure the table is correct, press **F**.

The program displays a warning about the consequences of proceeding with formatting. The remaining steps are exactly the same as for a normal conditional format.

## Destructive surface analysis

Use this option to accurately locate any bad tracks on a hard disk, and to flag any bad tracks that are not flagged.

---

### WARNING

If any errors occur during this check, all data on the track that produces the error is destroyed. For this reason, if you think that an unflagged bad track is causing trouble, first run option 4, Non-destructive surface analysis, to check the disk surface.

---

This test operates by a complex process of writing, reading, and verifying information on every track of the hard disk, except for tracks that are already flagged as bad tracks.

To start the test, press 3 and then Enter. You see these messages:

```
Analyze Hard Disk
Read/Save/Write/Read/Restore/Read
check for all tracks...
Current cylinder is xxxx
```

As each track is checked, the cylinder number (xxxx) counts down to zero. When the analysis is complete, the program displays a complete report on the status of the disk, including a table of unflagged tracks that produced write, read errors. For a 20MB hard disk with one unflagged bad track, you see this display:

```
Analysis finished.
Count of tracks flagged bad                =1
Count of tracks with write, read errors=0
Count of good tracks                      =2459
No write, read error was detected.
No data was destroyed.
Press ENTER to return to the menu.
```

If the program finds one bad track that is not flagged, the summary above shows one track with a write, read error, and only 2458 good tracks. The report is then followed by a table like this:

| Write, Read Error Trackn                                                              |      |          |      |          |      |          |      |
|---------------------------------------------------------------------------------------|------|----------|------|----------|------|----------|------|
| Cylinder                                                                              | Head | Cylinder | Head | Cylinder | Head | Cylinder | Head |
|                                                                                       |      | 237      | 2    |          |      |          |      |
| Confirm to register the tracks in the Write, Read Error<br>Track Table as bad tracks. |      |          |      |          |      |          |      |
| Do you want to register the error tracks as bad tracks (Y/N)                          |      |          |      |          |      |          |      |

To flag the error tracks as bad, press Y and Enter. You then see a list of the tracks as they are flagged. You see these messages:

```
Flagging bad tracks...
Cylinder is 237, head is 2
Press ENTER to return to the menu.
```

Press Enter to return to the HARD DISK FORMAT MENU.

## Non-destructive surface analysis

The Non-destructive surface analysis is not as complex as the Destructive surface analysis. It does not destroy any data, and you can safely use it to check the condition of your hard disk drives. However, this test will not flag any bad tracks that are detected.

To start the test, press 4 and then Enter. You see these messages:

```
Analyze Hard Disk
Read/Verify check for all tracks...
Current cylinder is xxxx
```

As each track is checked, the current cylinder is displayed. The cylinder number counts down to zero as the disk is checked.

When the analysis is complete, the program displays a summary of the status of the disk. This summary lists these counts:

- ☐ Flagged bad tracks
- ☐ Tracks with read, verify errors
- ☐ Good tracks.

If no errors occur, you see this message:

No read, verify error was detected.

If errors are found, the program displays a table of the tracks that produced errors.

After the status reports, you see this message:

Press ENTER to return to the menu.

Check the information displayed, then press Enter.

---

## Using FDISK

FDISK partitions a hard disk so it can run the operating system you want to use. Follow these steps to partition your hard disk for MS-DOS:

1. If you have not already done so, insert your MS-DOS system diskette into drive A and press Enter. The MS-DOS command prompt displays:

A>

2. At the MS-DOS command prompt, type FDISK and press Enter. The screen displays the FDISK Options menu.

3. Press 1 and then **Enter** to select the Create DOS Partition option. The screen displays:

Create DOS Partition

Do you wish to use the entire fixed  
disk for DOS (Y/N) . . . . .?[Y]

4. Press Y and **Enter**. The system creates the MS-DOS partition.

The screen displays the following message:

System will now restart  
Insert DOS diskette in drive A:  
Press any key when ready...

5. Press any key to restart the system. You do not have to insert any diskettes **because** the DOS diskette is already in drive A. Your computer begins reloading MS-DOS. After the preliminary copyright information displays on the screen, the date prompt displays.
6. Press **Enter twice to accept** the current date and time. (Don't worry about entering the correct date and time; you'll set the real time clock in a later step.) The **A>** prompt redisplay.

---

## Using SELECT

SELECT formats your hard disk and copies the files on your MS-DOS system diskette to it. You'll tell SELECT that you want to copy the MS-DOS files to a directory called DOS. Follow these steps to use SELECT:

1. If you have not already done so, insert your MS-DOS system diskette into the top drive. Press **Enter**. The MS-DOS system prompt displays:

```
A>
```

2. At the A> prompt, type the following and press **Enter**:

```
SELECT A: C:\DOS 001 US
```

The screen displays this message:

```
SELECT is used to install DOS the first
time. SELECT erases everything on the
specified target and then installs DOS.
Do you want to continue (Y/N)?
```

3. Press Y. Formatting does not begin immediately. SELECT gives you one more chance to change your mind. The screen displays this message:

```
WARNING, ALL DATA ON NON-REMOVABLE DISK
DRIVE C: WILL BE LOST!
Proceed with Format (Y/N)?
```

4. Press Y to format the DOS partition. MS-DOS begins formatting your hard disk's DOS partition. The screen continuously displays the changing head and cylinder numbers.

Besides formatting the hard disk partition, SELECT also creates a directory named DOS and copies the operating system files to the hard disk.

When the procedure is complete, the screen displays:

```
Format complete
System transferred
Volume label (11 characters, ENTER for
none)?
```

5. To name the hard disk (or, as the prompt says, give it a volume label), type in an 11-character string. If you do not want to name the hard disk, do not enter any characters; just press **Enter**.

Now you have formatted your hard disk and installed MS-DOS on it.

---

## Finishing Your Installation

When you ran SELECT, you copied all the MS-DOS files on your system diskette into a directory called DOS on the hard disk.

You should perform a few additional operations to organize MS-DOS into an efficient working arrangement:

- ❑ Copy the files from your GW-BASIC diskette onto the hard disk
- ❑ Set the real time clock
- ❑ Create an AUTOEXEC.BAT file so that you can easily access the MS-DOS and GW-BASIC programs while you work.

Follow these steps to complete your installation:

1. Insert the working copy of the GW-BASIC diskette into drive A. At the **A>** prompt, type the following and press **Enter**:

```
COPY *.* C:\DOS
```

This copies all the files from the diskette into the directory called DOS on the hard disk drive. The computer displays the name of each file it copies, and then tells you how many files it copied. The **A>** prompt redisplay.

2. To create a directory on your hard disk named BASIC, type the following and press **Enter**:

```
MKDIR C:\BASIC
```

3. Now type the following command to create a copy of the GW-BASIC program within that directory, and press **Enter**:

```
COPY C:\DOS\GWBASIC.EXE C:\BASIC
```

4. Type the following command to delete the GW-BASIC program from the DOS directory, and press **Enter**.

```
DEL C:\DOS\GWBASIC.EXE
```

Now you'll set the real time clock. This is a battery powered clock in your computer that maintains the correct date and time even if the computer is turned off.

5. To set the real time clock, type the following and press **Enter**:

```
SETRTC /I
```

Follow the prompts to set the date and time. Press **Enter** when you are done.

6. Next, you'll create a file called `AUTOEXEC.BAT`. Type the following and press **Enter** at the end of each line:

```
COPY CON: C:\AUTOEXEC.BAT
ECHO OFF
PATH C:\;\DOS;\BASIC
PROMPT $P$G
CLS
```

7. Press **F6** and then **Enter**. The computer displays this message:

```
1 File(s) copied
```

and the **A>** prompt redisplay.

8. Remove the **GW-BASIC** diskette from drive **A**. To reset the computer, hold down **Ctrl** and **Alt** and press **Del**.

You have completed formatting your hard disk and installing **MS-DOS** and **GW-BASIC**.

## Appendix C

---

### Specifications

#### Main Unit

|                  |                                                                                                                            |
|------------------|----------------------------------------------------------------------------------------------------------------------------|
| 8-bit CPU        | 8088-1 microprocessor; 4.77MHz or 9.54MHz clock rate; keyboard selectable                                                  |
| Main. memory     | 512 KB; expandable to 640 KB                                                                                               |
| Math coprocessor | 8087-1 microprocessor (optional)--for use at 4.77M/9.54Hz<br><br>8087-2 microprocessor (optional)--for use at 4.77MHz only |

#### Interfaces

|                    |                                                                                                                                                          |
|--------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------|
| Parallel interface | Standard 8-bit parallel, 25-pin, D-shell female                                                                                                          |
| Serial interface   | 25-pin, D-shell male                                                                                                                                     |
| Speaker interface  | Internal, non-adjustable                                                                                                                                 |
| Option slots       | Five IBM PC-compatible, 8-bit, input-output expansion slots (one used by video card; one used by hard disk controller card, if a hard disk is installed) |

#### Keyboard

|               |                                                                                                               |
|---------------|---------------------------------------------------------------------------------------------------------------|
|               | Detachable, two positions, 84 sculpted keys                                                                   |
| Layout        | 56-key QWERTY main keyboard, 18-key numeric/cursor pad, 10 function keys (user-definable); LEDs for lock keys |
| Function keys | Three levels (normal/shift/alternate); user-definable                                                         |

# Mass Storage

|          |                                                                                                                                       |
|----------|---------------------------------------------------------------------------------------------------------------------------------------|
|          | Two internal drives maximum                                                                                                           |
| Standard | Two 5 1/4-inch, half-height diskette drives; double-sided, double-density, 360 KB storage capacity                                    |
| Optional | One 5 1/4-inch, half-height diskette drive; double-sided, double-density, 360 KB storage capacity; one 20 MB internal hard disk drive |

# Power Requirements

88W switching mode power supply  
115/230 VAC switch selectable  
+5 VDC, +12 VDC, -5 VDC,  
-12VDC; 50/60 Hz

# Environmental Requirements

|             |                                                                                                              |
|-------------|--------------------------------------------------------------------------------------------------------------|
| Temperature | Operating range: 59° to 95° F<br>(15° to 35° C)<br><br>Non-operating range: -4° to 140° F<br>(-20° to 60° C) |
| Humidity    | Operating range: 20% to 80%<br>non-condensing<br><br>Non-operating range: 10% to 90%<br>non-condensing       |

# Physical Characteristics (CPU Only)

|        |                                          |
|--------|------------------------------------------|
| Width  | 13.8" (356 mm)                           |
| Depth  | 15.4" (395 mm)                           |
| Height | 5.8" (148 mm)                            |
| Weight | Dual diskette system, 20.9 lbs. (9.5 kg) |

## Video and Display Options

|          |                                                                                                                                                                                                                                                                                                                         |
|----------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Standard | Multi-graphics video card; switch-selectable; installed in option slot; game port included                                                                                                                                                                                                                              |
|          | Supports Epson and IBM-compatible monochrome monitor: monochrome text, 80-character x 25-line display, 9 x 14-character block                                                                                                                                                                                           |
|          | Supports Epson and IBM-compatible color monitor: color graphics, 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, and Hercules® (monochrome) 720 x 348 text/graphics |

## Other Apex Options

Check with the store where you purchased your Apex computer for the following options:

|          |                                                                                                                                                         |
|----------|---------------------------------------------------------------------------------------------------------------------------------------------------------|
| Monitors | RGB 13" color monitor with tilt swivel stand. High-contrast screen; 16 colors; etched surface to reduce glare; 18MHz video bandwidth (AP1020B)          |
|          | TTL 12" monochrome monitor with tilt swivel stand. High-persistence, P-39 phosphor screen; etched surface to reduce glare; 22 MHz video bandwidth; 35 w |

Printers and  
printer accessories

**ActionPrinters by Epson**

Apex80

9-pin, 80-column, dot-matrix printer;  
(180 cps draft/30 cps near letter quality)  
(U110)

Black ribbon (8750)

Single bin cut sheet feeder  
(7341A)

T-750

9-pin, 136-column, dot-matrix printer;  
(240 cps draft/48 cps near letter quality)

Black ribbon (8755)

L-1000

24-pin, 80-column, dot-matrix printer;  
(180 cps draft/60 cps near letter quality)

Black ribbon (7753)

Single bin cut sheet feeder  
(7341A)

Optional letter quality font  
modules:

Courier (7400A)

Prestige (7401A)

Script (7402A)

Universal printer stand  
(CPD-552-A)

Printer cable (C1-9E-A)

Computer  
accessories

Internal 300/1200 baud modem  
card (C203A-A)

External 300/1200 baud modem  
(C202A-A)



---

# Glossary

## **Application program**

A software program designed to perform a specific task, such as a word processing or spreadsheet program.

## **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 disk, kept in case your working copy is damaged or lost.

## **Batch file**

A type of file that lets you execute a series of MS-DOS commands by typing one command. Batch files are text files with the filename extension .BAT. In a batch file, each command is entered on a separate line. When you type the filename, all the commands in that file are executed sequentially.

## **Baud rate**

A measure of the speed of data transmission. Usually equivalent to bits per second.

## **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.

**CGA**

Color/graphics adapter. A type of color monitor that can display up to 25 lines of text with 80 characters on each line, or monochrome graphics with a 640 x 200 resolution. The monitor can display four-color graphics at 320 x 200 resolution and eight-color graphics at 160 x 200 resolution.

**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 of 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 a keyboard to direct the computer to perform a specific function.

**Command prompt**

The message that tells you MS-DOS is loaded and ready to receive instructions. The default command prompt in MS-DOS also displays the current operating drive; if it is drive A, the command prompt looks like this: **A>**. See also Prompt.

**Configuration**

The particular setup of a group of components. For example, a typical system configuration consists of a main unit with two diskette drives and a monitor, connected to a printer.

**Control code**

A command (generated when you hold down Ctrl and press another key on the keyboard) that instructs the 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.

**Current directory**

The directory you are working in.

**Cursor**

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

**Cylinder**

See Track.

**Data**

Information stored or processed by a computer.

**Data diskette**

A formatted diskette used to store files.

**Data length**

The number of bits per character in serial transmissions.

**Default**

Values or settings that take effect when the computer is turned on or reset. A default value stays in effect unless you override it temporarily by changing a setting or you reset the default value itself.

**Delimiter**

A character or space used to separate different parts of an MS-DOS command, usually a space or a semicolon.

**Device**

A piece of equipment that is part of a computer system and performs a specific task, such as a disk drive, a monitor, or a printer.

**DIP switches**

Small switches on a piece of hardware such as the computer, an option card, or a printer. 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 diskettes and hard disks.

**Disk drive**

The physical device that allows the computer to read from and write to a disk. A diskette drive has a disk slot into which you insert a diskette. A hard disk is permanently fixed inside the main unit.

**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.

**EGA**

Enhanced Graphics Adapter. A type of high-resolution color monitor. It can display up to 25 lines of text with 80 characters on each line. It can also display monochrome or 16-color graphics at 640 x 350 resolution.

**Execution speed**

See Operating speed.

**Extension**

A suffix of up to three characters that can be added to a file name to better identify it.

**File**

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

**File name**

A name of up to eight characters that MS-DOS uses to identify a file.

**Floppy disk**

See Diskette.

**Format**

To prepare a new disk (or erase an old one) so that it can store information. Formatting a disk divides it into tracks and sectors and 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 diskette, it is fixed in place. It can process data more rapidly and store many more files than a diskette.

**Hardware**

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

**Hexadecimal**

A base 16 numbering system frequently used by programmers. Any decimal number between 0 and 255 can be represented by a two-digit hexadecimal number.

**High-density**

A type of diskette format that allows you to store more data than normal. A 5 1/4-inch high-density diskette can store 1.2MB of data. High density diskette drives are not supported by the Apex disk controller.

**Input/output (I/O) port**

See Port.

**Interface**

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

**Joystick**

A pointing device that uses a moveable stick mounted in a socket. When you push the stick in a certain direction, the cursor moves in the same direction on the screen.

**Keyboard**

A device to enter letters and numbers to the computer that consists of a number of typewriter-like keys mounted on a board.

**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. A substance that illuminates when electricity passes through it, like the indicator lights above the Apex's keyboard.

**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.

**Megahertz (MHz)**

A unit used to measure oscillation frequency (of a computer's internal timing clock). A megahertz is one million cycles per second. The Apex computer operates at 4.77 MHz and 9.54 MHz.

**Memory**

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

**MGA**

Multi-graphics adapter. A type of video card that can be operated with more than one kind of monitor. The multi-graphic video card that comes with the Apex operates a TTL monochrome monitor or a color/graphics monitor.

**Microprocessor**

A small version of a CPU contained on one semiconductor chip.

**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 which can display in several colors.

**Mouse**

A hand-held pointing device, usually with buttons. When you slide the mouse over a flat surface in a certain direction, the cursor moves in the same direction on the screen.

**MS-DOS**

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

**Numeric keypad**

The number keys grouped on the right side of the keyboard.

**Operating speed**

The speed at which the central processing unit can execute commands. Also called execution speed.

**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 circuit board with connectors you install inside the Apex main unit to provide additional capabilities, such as more memory, a hard disk drive, or an internal modem.

**Parallel**

The type of interface that transmits data in groups of bits. See Interface, Serial.

**Parameter**

A qualifier added to a command that tells the computer what particular conditions to look for.

**Parity**

Data signals sent during communications to detect errors in transmitting or receiving data.

**Partition**

To divide a hard disk drive into separate sections for use by different operating systems.

**Pathname**

The list of directories and subdirectories you need to travel through to locate a file. For example, the pathname for the file sales which is located in the subdirectory business of the root directory ( \ ) is \ business \ sales.

**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 displayed on the computer screen that tells you what action you need to perform next.

**RAM**

Random Access Memory. The portion of the computer's memory used to run programs and store data while you work. All data stored in RAM is erased when you turn off the computer; so you must store any data you want to save on a diskette or hard disk.

**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.

**Real time clock**

A battery powered clock in the computer that keeps track of the current time and date even when the computer's power is turned off.

**Reset**

To reload a computer's operating system so you can retry a task or begin using a different operating system. 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.

**Root directory**

The top level directory in MS-DOS, designated by a \ (back-slash). All other directories are subdirectories of the root directory.

**RS-232C**

A widely-used, standard type of serial interface. You can easily connect an RS232C-compatible device to the Apex computer.

**Sector**

A contiguous section of a disk track that provides an address at which the computer can access 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 Interface, Parallel.

**Software**

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

**Source diskette**

**The** diskette that you are reading or copying data from during a copy or backup operation.

**Stop bit**

A signal sent in serial communications to mark the end of a character.

**Subdirectory**

A directory or group of files that branches down from another subdirectory or from the root directory.

**Switch**

An option added to an MS-DOS command that redirects the way the command works. Switches must be preceded by a / (forward slash). For example, if you add the /S switch to a FORMAT command, MS-DOS installs the operating system on a diskette as it formats it.

**System diskette**

A diskette that contains the operating system.

**Target diskette**

The diskette that you are writing or copying data to during a copy or backup operation.

**Track ball**

A pointing device that consists of a ball in a socket mounted over motion sensors. When you roll the ball in a certain **direction**, the cursor moves in that direction on the screen.

**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 360KB diskette.

**TTL**

Transistor to Transistor Logic. A type of integrated circuit logic that accepts digital input. The Apex monochrome monitor uses a TTL circuit to produce its screen display.

**VGA**

Video Graphics Array. A type of high-resolution color monitor that can display monochrome text and graphics at 720 x 400 resolution, 16-color graphics at 640 x 480 resolution, or 256-color graphics at 320 x 200 resolution.

**Wildcard**

A character that represents an unknown character or group of characters. The wildcard character \* (asterisk) represents a group of characters, and the wildcard character ? (question mark) represents a single character.

**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 a 5 1/4-inch diskette. When a diskette is write-protected, you cannot erase, change, or record over its contents.

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