

Apple /// Plus

Owner's Guide



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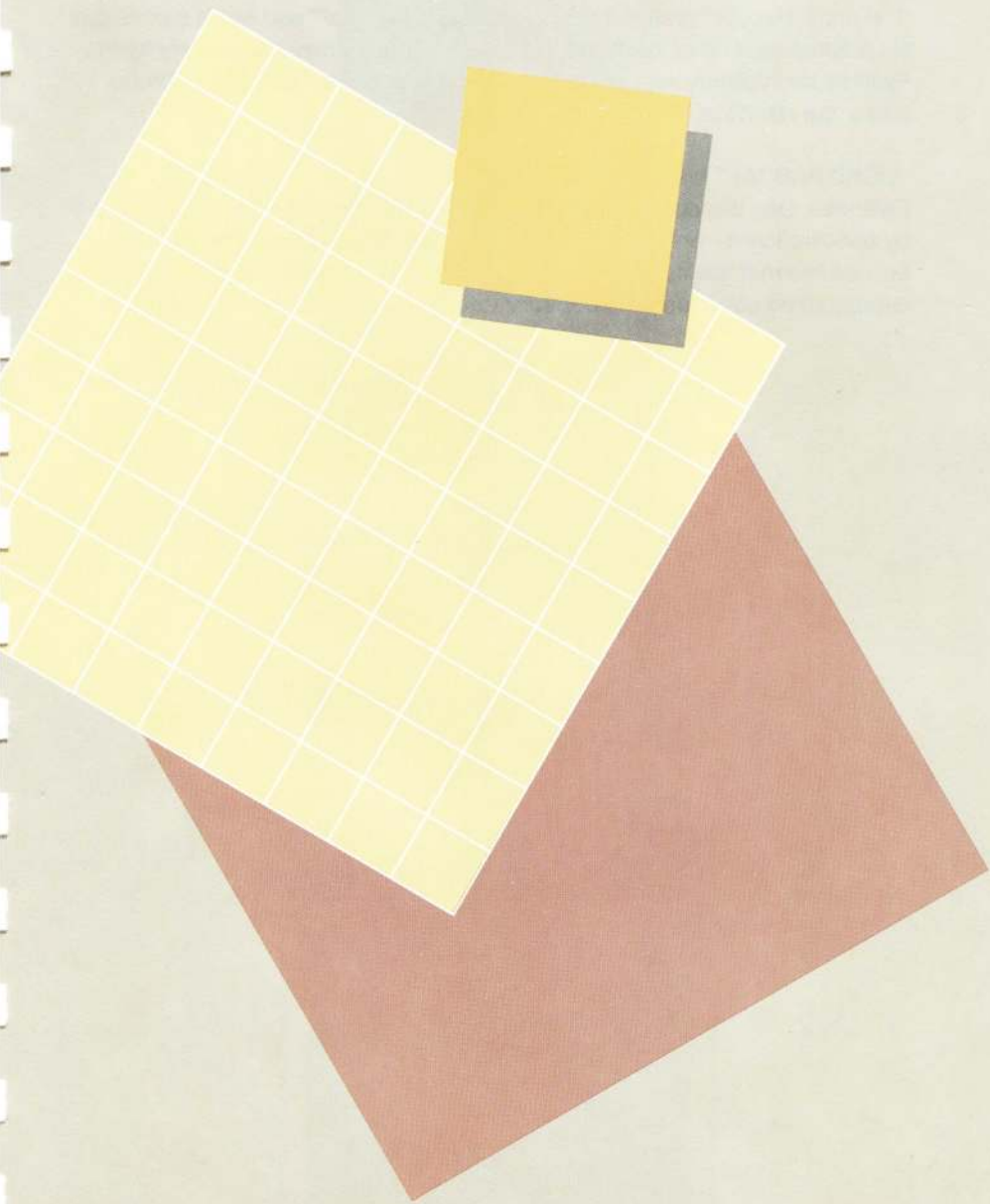
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Apple /// Plus Owner's Guide



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Preface

The *Apple III Plus Owner's Guide* is the first book you should read to understand how to use your Apple III Plus. The *Owner's Guide*

- tells you how to set up your Apple III and start it working.
- shows you some procedures to follow whenever you use your computer.
- describes how the Apple III works.
- explains how to use the System Utilities disk.

Getting Started

The *Owner's Guide* has seven chapters. Read the first chapter after you remove your computer from its shipping carton. Chapter 1 tells you how to set up and start the Apple III. It also discusses the care and handling of your computer.

Chapter 2 describes the parts that make up the Apple III itself. Read this chapter to find out about the capabilities of the built-in devices of your Apple III and to learn how to install peripheral interface cards for external devices.

Chapter 3 leads you through standard procedures you use with your Apple III. The examples in this chapter show how programs allow you to control the computer from the keyboard.

Chapter 4 discusses the Apple III's operating system, which is the means of communication between you, the Apple III, and any extra equipment you may want to connect to the computer. This chapter introduces the concepts of devices, files, and pathnames.

Chapter 5 describes the System Utilities disk that comes with your Apple III. Be sure to follow the steps in the section The Copy Volume Command and Disk Backup.

Chapter 6 shows you how to use the System Utilities disk to organize the information you store on your disks. The examples demonstrate efficient ways to use the Utilities file-handling commands.

Chapter 7 tells you how to set up your copy of the operating system to fit the number of disk drives you have. This chapter introduces the material in the *Standard Device Drivers Manual*, which you'll find in the System Software package.

Appendix A at the end of the *Owner's Guide* explains the messages you may see while operating your computer, Appendixes B and D list the specifications of the Apple III, and Appendix C describes Apple II Emulation Mode. You'll also find a glossary, which defines terms that may be unfamiliar to you, and an index to help you find things.

If you or your dealer have not already done so, please take a few minutes to fill out your Apple Warranty Registration card and drop it in the mail. This card will register your system with Apple Computer, Inc. and place you on the mailing list. Without this card, Apple Computer, Inc. cannot send you newsletters, information about new products, updates to old ones, or any of the information frequently mailed to Apple III owners.

If you need more help with the System Utilities disk and the information in Chapters 5 through 7, ask your dealer about Product Training Packs.

Symbols and Labels

This manual uses three symbols to identify special information:



This signals information that will give you a helping hand.



This signals you to be alert for a special or unusual feature of your Apple III.

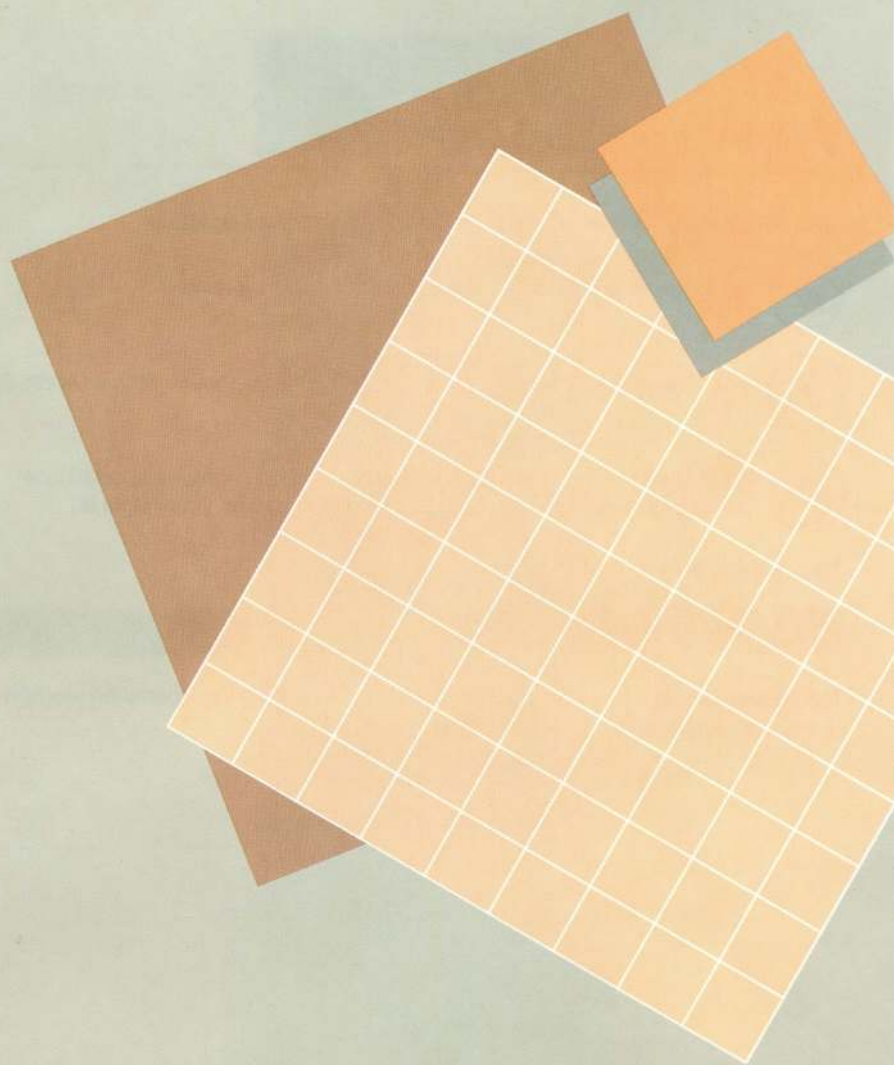


This warns you of a potentially dangerous situation in which you could lose some information you've stored, or possibly damage your Apple III.

This manual shows a section of a video display as

words in a shaded area

These words can be a message or question to you from the operating system or from a program or the System Utilities disk.



***F**irst Steps*

2	Plugging In
3	The Power Cord
4	Connecting the Monitor
4	About Flexible Disks
6	Trying It Out
6	Inserting and Removing Disks
8	Starting Up
10	The System Demonstration Disk
11	Turning It Off
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First Steps

To use your Apple III, you need the contents of the Apple III's carton, the contents of the accessory kit, and a video display device. If you have a display device other than a Monitor III, ask your Apple dealer to help you connect it to your Apple III.

Plugging In

Almost everything you connect to your Apple III plugs directly into the back of the computer. Place the Apple III on a flat surface and turn it around so that the back is facing you. Figure 1-1 is a photo of what you see.



Figure 1-1. The Back of the Apple III

Take the power cord and the video cable from the accessory kit. These are the only two things you need to connect to the Apple III at this time.

If you have purchased additional disk drives for your Apple III, you'll find installation instructions in Chapter 2 in the section The Disk Drive Connector. Before you install equipment such as a printer, it's a good idea to read through this *Owner's Guide* to become familiar with your Apple III and its basic operations.

The Power Cord

As you look from the rear, the power cord plugs into the socket on the right side of the back of the Apple III. The power switch is next to the power plug. It has two positions: "0", or *off*, when you push the switch down, and "1", or *on*, when you push the switch up. Make sure the power switch is in the off position—look for the red circle on the top edge of the switch. Then plug one end of the power cord into the power plug and the other end into a standard three-prong grounded wall outlet. Figure 1-2 shows the power switch and also the monitor connector.



For your own safety, and to protect the Apple III against static charges, be sure that your Apple III is grounded. If the outlet you're going to plug your system into won't accommodate the Apple III's three-prong grounded plug, an electrician can replace the outlet with the correct type and, if necessary, install a grounding conductor. If you must use an extension cord to plug in your Apple III, make sure it is a three-wire grounded cord.

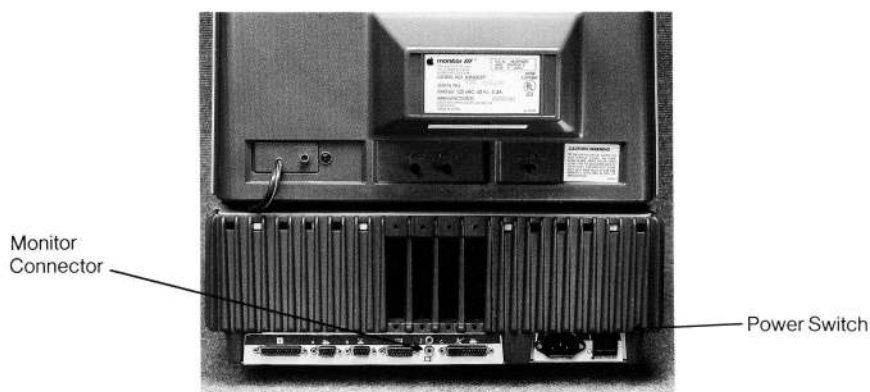


Figure 1-2. The Power Switch and Monitor Connector

Connecting the Monitor

As shown in Figure 1-3, attach one end of the video cable to the monitor connector on the back of the Apple III and the other end of the cable to the jack marked VIDEO IN on the back of the monitor. Make sure all connectors fit firmly.



The video cable is tightly coiled for shipping purposes. Sometimes the coils in the cable set up a magnetic field that interrupts the video signal before it can get to your monitor. Be sure to uncoil and straighten the video cable before connecting it.



Figure 1-3. Connecting the Monitor

After you connect the video cable, plug the monitor's power cord into a wall outlet. Now turn the computer around so that the keyboard is facing you.

About Flexible Disks

Most of your programs and the information you'll create and use will be stored on *disks*. The Apple III stores information on the coated surface of a disk in much the same way a tape deck records music on magnetic tape. As a tape deck can play back recorded music, your Apple III can retrieve the information stored on a disk.

You'll find several types of disks on the market. Among them are 5-1/4 inch (13.33 cm) flexible disks, larger flexible disks, and rigid disks like those used in Apple Computer's ProFile. This manual discusses the 5-1/4 inch flexible ("floppy") disks, the type that goes into the Apple III's built-in disk drive. Occasionally, this manual mentions ways you might use rigid disk drives like ProFile.

Each flexible disk is protected by a square black jacket that is sealed shut and should never be opened. The Apple III writes (records) and reads (retrieves) information on the disk through the oval cutout in the jacket. Handle a disk only by its jacket and label; *never touch the surface of the disk itself*.

Use a felt-tip pen to write on a label that's already attached to a disk. Do not press hard. It is better to write on a label before you then attach it to the disk.

Do not write on an attached label with a pencil or a ball-point pen. They can dent the recording surface. Do not use an eraser on the label since eraser dust is abrasive and can damage the disk.

Store disks upright in their paper envelopes, away from direct sunlight, moisture, or extremes of heat or cold. Do not bend them or attach paper clips to them.

Keep disks away from magnets or electrical devices, especially telephones, television sets, and large motors. You may lay disks temporarily on the computer or on an external disk drive. (See Figure 1-4.)

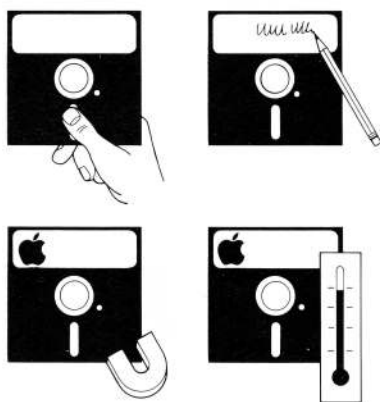


Figure 1-4. Don't Do These Things

Trying It Out

If you followed the instructions in the previous sections, your Apple III is set up and ready to go. The next sections describe how to put a disk into the built-in disk drive, start up the computer, and turn it off. To follow the steps, you'll need the disk labeled SYSTEM DEMONSTRATION. It's in the box that contained this manual.

Inserting and Removing Disks

The built-in disk drive is on the right side of the front of the Apple III, above the keyboard. Remove the protective tape from the disk drive door, then open the door by pulling out on the door's bottom edge, as shown in Figure 1-5.



Figure 1-5. Opening the Disk Drive

Inside the disk drive is a white card; remove it and throw it away.



Under no circumstances should you put the card back in the disk drive.

As shown in Figure 1-6, remove the System Demonstration disk from its paper envelope.



Figure 1-6. Removing a Disk From Its Envelope

Figure 1-7 displays the correct way to insert a disk into a drive. Gently insert the disk, oval-cutout end first and label side up, into the slot in the disk drive. Be careful not to force or bend the disk. If you feel any resistance, slide the disk back out of the drive and try again. You may need to wiggle the disk gently to slide it in and out of the drive.



Figure 1-7. Inserting a Disk

When the disk is all the way inside the drive, push the door down until it clicks shut. If you can't close the door, the disk isn't all the way in. Remove the disk and insert it again.

When you want to remove a disk from the drive, open the door and slide the disk out (and a little upward) without bending it. Be sure to put the disk back into its envelope for safekeeping.

Starting Up

Now that the disk is in the drive, you're ready to start up. First turn on your video display; then reach behind the Apple III and turn on the power switch by pushing it up. You'll see the green power light on the keyboard come on, the display screen flash briefly, and a red light below the door of the disk drive. The power light tells you that your Apple III is on; the red light on the disk drive tells you that the computer is looking for instructions from the built-in disk drive.



You should not open the drive door, remove a disk, or turn off the Apple III's power while the disk drive's red light is on. Doing so might interrupt the Apple III while it is writing on the disk, causing some of the information to be scrambled.

The screen should display something like that in the photo shown in Figure 1-8:

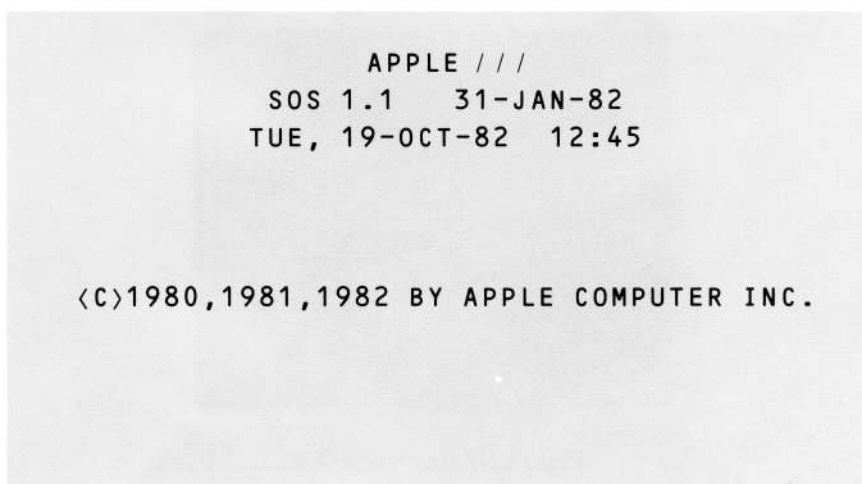


Figure 1-8. Demonstration Disk Startup Screen



If the screen shows the word **RETRY**, make sure you've inserted the disk correctly. Then hold down the key marked **CONTROL** on left side of the keyboard while you press and release the flat button marked **RESET** at the top of the right side of the keyboard section. Now release the **CONTROL** key. If **RETRY** appears again, see your dealer for instructions.

If the word **DIAGNOSTIC** appears in the upper-left corner of your display screen, something is wrong with your Apple III. See your dealer for instructions.

The words **RETRY** and **DIAGNOSTIC** are *error messages*. Appendix A lists and defines these and other messages you may receive while operating your Apple III.

If you have an Apple Monitor III, use the vertical-hold and vertical-size controls to stabilize the picture in the middle of the screen. Adjust the brightness and contrast controls so that the image is clear and sharp. The contrast control is on the front of the Monitor III; the others are on the back.

If you are using a display device other than the Monitor III, stabilize and adjust your picture according to the instructions in the manual that comes with your television or monitor.

The System Demonstration Disk

The System Demonstration disk contains programs that show you some features of your Apple III. If you've been following the start-up instructions, you should see a series of pictures on your display screen. This demonstration will repeat until you stop it by pressing the **ESCAPE** key or by turning off the Apple III.

There are other demonstration programs on the disk that are not continuous. These programs are *interactive*; they need you to control their operation. To use these interactive programs, press the key marked ESCAPE in the upper-left corner of the keyboard. The pictures will stop and the screen will show a display similar to that of Figure 1-9:

```
Apple /// Demonstration Programs
-----
Demonstrations available:

1. Console Demonstration
2. Read & Set the Clock/Calendar
3. Try the Type-Ahead Buffer
4. Adjust Video Monitor

Please type the number of the
    demonstration you wish to see.
```

Figure 1-9. Demonstration Menu

This list of numbered descriptions is called a *menu*. It works like a breakfast menu at a cafe. If you want scrambled eggs with hash brown potatoes you can just say, "I'll have a number 5." If you want to see demonstration number 1, you tell the Apple III that you want it by pressing either key marked "1."

When you select any of the demonstration programs, you'll see messages about what each program does and how to use it. Please read the section Using the Console, in Chapter 3, before you experiment with the Console Demonstration. When you want to leave a demonstration and go back to the menu, press the ESCAPE key.

Turning It Off

When you want to turn off your Apple III, just reach behind and push the power switch down to its “O” (off) position.



You shouldn't turn off your Apple III when you've just typed in a lot of information. Unless you store that information on a disk, you will lose what you have typed.

See Chapter 2 for a more complete discussion of memory; see the manual for the particular program you're using for instructions on saving information.

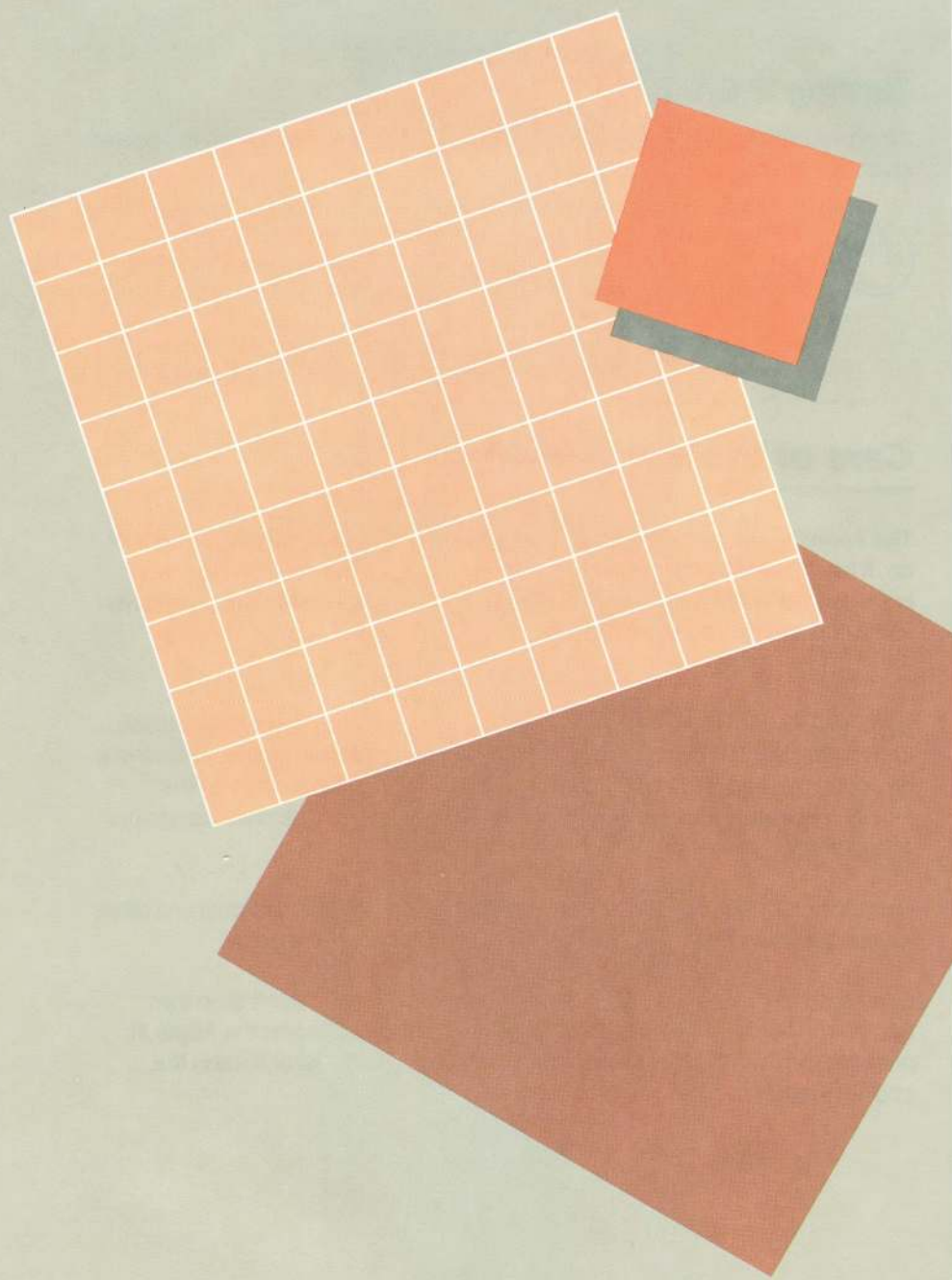
Care of the Apple III Plus

The Apple III, like many other electronic devices, warms up when you leave it on. It has no ventilating fan; it dissipates heat through the cooling fins on the back and the vents on the sides of the case. Be sure the computer is properly ventilated and the room in which you keep it isn't too hot (above 45° C or 113° F).

Treat your Apple III as carefully as you would treat any high-quality electronic equipment. Don't bump or jar it too much, try to keep it level on the surface of a desk or table, and don't spill any liquids on it. Even though the Apple III is mostly electronic, such delicate mechanical parts as the disk drive can go out of alignment if the Apple III is handled roughly.

Keep the disk drive door closed. An open door is an invitation to dust and other foreign particles that interfere with the performance of the drive.

Don't drop anything heavy on the Apple III's keyboard and don't drop the Apple III itself onto anything. If you're going to ship or transport the Apple III, put it back in its original packing material according to the directions in the booklet *Read Me First*.



The Machine

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28	The Security Mount
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29	The Bottom
29	Memory
30	Radio and Television Interference

The Machine

The Front

Two things are prominent on the front of your Apple III: the typewriter-like keyboard and the door for the built-in disk drive.

The Keyboard

The Apple III keyboard has two sections: the 62-key main keyboard and the 13-key numeric keypad.

The main keyboard has letters, numbers, and special characters in traditional typewriter layout. The CONTROL, SHIFT, and ALPHA LOCK keys are used to modify the meaning of the other keys. The  key, to the left of the SPACE bar, and the  key, to the right of the SPACE bar, also modify the effect of the other keys.

The RETURN, ESCAPE, TAB, ENTER, DELETE, and the four directional arrow keys are used in various ways by different programs. Chapters 3 and 6 of this *Owner's Guide* discuss how to use these keys with the programs on the System Demonstration and System Utilities disks. See the manuals that come with your other programs for the way a specific program uses these keys.

Each letter, number, and punctuation key repeats automatically if you hold it down. There are two auto-repeat rates: about 11 characters per second if you simply hold down a key for longer than a second, and approximately 33 characters per second if you hold down the  key and press the key you want to repeat.

Each of the four directional arrow keys has three positions: unpressed, pressed so that it clicks once, and pressed more firmly so that it clicks twice. At the first click, an arrow key repeats at 11 characters per second; at the second click, it repeats at the faster rate.

The thirteen keys on the numeric keypad generate the same characters as their counterparts on the main keyboard. They are grouped as on an adding machine to make entry of numbers easier. Even though the keys on the numeric keypad generate the same codes as their counterparts on the main keyboard, a program can detect whether a pressed key is on the keypad or on the main keyboard.

In some programs and applications, the ENTER key serves the same purpose as the RETURN key on the main keyboard. In other programs, the two keys have different functions. For example, when you use the System Utilities disk, the ENTER key has a special purpose, as described in Chapter 6. Check the manuals for your other programs to see how they use the ENTER key.

The Built-In Disk Drive

The other prominent feature on the face of the Apple III is the door for the built-in disk drive. To insert or remove a disk, you must first open the disk drive door by pulling up on its bottom edge; then follow the instructions given in Chapter 1.

The Apple III can read from or write to a disk only when the disk is fully in the drive and the door is closed. When the Apple III is using a disk drive, the red light under the drive door shines. This indicates that the disk is spinning and that the Apple III is reading from or writing to it.



When the red light is on, don't open the drive door or turn off the Apple III. Either of these actions could cause the drive to write unreadable information on the disk.

Sometimes a disk drive makes a loud raspy noise, as if it's clearing its throat. The noise is nothing to worry about. It indicates that a mechanism is accurately positioning the disk head to read from or write to a disk. This usually happens when the disk drive door is open or when you are formatting disks, that is, preparing them to hold information.

The Text Interlace Switch



Text interlace makes letters, numbers, and punctuation marks look clearer on your display screen. The text interlace switch is on the left side of the computer, about halfway back and just above the bottom of the cover. Chapter 3 discusses how and when to use text interlace.

Installing Other Equipment

Most of the devices you'll add to your computer plug into the back of the Apple III. Many, like the display device and additional disk drives, plug directly into the *ports* on the back of the computer. Some of the ports accept single-prong connectors called *jacks*. Some accept *D-shaped connectors*. You'll find a brief description of each port in this chapter, in the section *The Back*. This section also contains instructions for connecting additional disk drives. Even if you have only the built-in drive, it's a good idea to read these instructions. Most D-shaped connectors attach to the back in the same way the additional drives do.

Devices that don't connect directly to a port will attach via *peripheral interface cards*, which you install inside the Apple III. If you have this type of equipment, read the manual accompanying each device to see how it is to be installed, and read the section *Inside the Apple III* in this manual, to learn about peripheral cards and their connectors. You can also ask your dealer to help you install your equipment.

*** IMPORTANT ***

Before connecting or disconnecting
ANYTHING
on the Apple III,
TURN OFF THE POWER.
This is a *MUST*.

Many devices, especially those installed inside the Apple III, come with disks containing programs called *device drivers*. To operate these devices, you need to connect the hardware to your Apple III and also to add the device drivers to your disks. The *Standard Device Drivers Manual* describes how to add these programs.

The Back

The back and most of the case of the Apple III is made of cast aluminum, with vertical fins along the back and vents along the sides. These fins and vents dissipate heat generated by the computer. The fins and the aluminum part of the case normally get warm while the Apple III is operating.



Place the Apple III on a firm surface so that air can circulate freely beneath it. An Apple III on a deep pile carpet, for example, will overheat and may shut itself off until it has cooled down.

The large, vertical openings among the fins allow you to connect equipment to peripheral *interface cards* installed inside the Apple III. The strip of switches and connectors below the vertical openings is called the *back panel*. The ports and switches on the back panel are labeled with pictures, which are identified in the Figure 2-1.

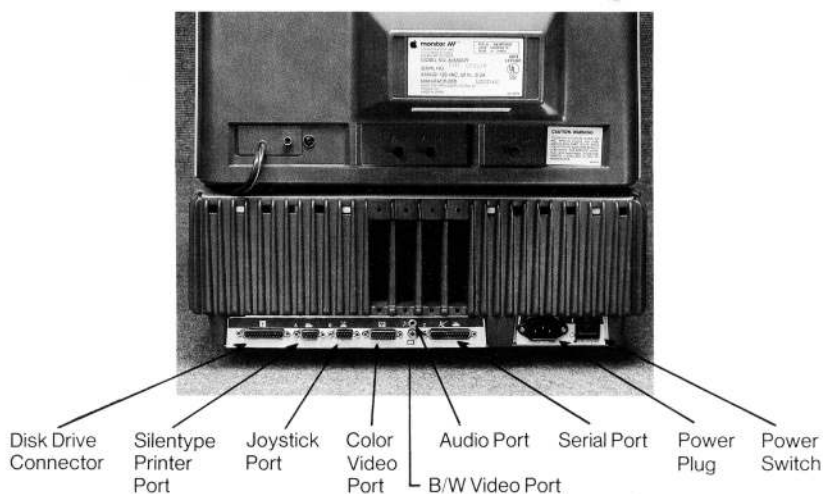


Figure 2-1. The Back of the Apple III

The Power Switch and Connector

Looking from the rear, the power switch and power connector are on the right side of the back panel. The Apple III accepts power-line input in the range of 107 to 132 volts, 60 Hz alternating current. The connector has three prongs, two for line voltage and one for earth ground.

The power switch has two positions: “ | ” is the on position and “O” is the off position. When the power to the Apple III is on, you’ll see a green light on the keyboard, to the left of the SPACE bar.

The Disk Drive Connector



Looking from the rear, the disk drive connector is at the far left of the back panel. You can connect up to three external disk drives to your Apple III via this D-shaped connector. If you have one or more external drives, now is a good time to install them. You’ll need a small, flat-bladed screwdriver.

Unpack the disk drive and unwrap the cable attached to it. Notice the screws, one on each side of the D-shaped connector at the end of the cable. After the disk drive is plugged into the back panel, these screws will fit into the hexagonal nuts on the back-panel connector.

As shown below, hold the cable connector so that its wider side is uppermost. Plug it into the disk drive connector on the back panel, as illustrated in Figure 2-2.



Figure 2-2. Disk Drive Connectors

Press the connectors together until they are firmly seated, but don't force them. If they don't go together easily, first check that the longer row of pins on the cable connector is meeting the same row on the back-panel connector. If the connectors still don't fit easily, check the pins on the cable connector. They may be crooked. Your dealer can show you how to straighten them.

When the connectors are firmly seated, tighten the screws with the screwdriver. The screws lock the connectors together to prevent their accidental separation—an unpleasant surprise. Locking the connectors together also reduces interference from radio frequency energy, discussed in detail at the end of this chapter.



If the cable connector is missing the hexagonal screws, see your dealer.

If you have a second external disk drive, connect it to the back of the first drive in the same way you connected that drive to the back panel. A third external drive connects to the second in the same way. This connection scheme is called a *daisy chain*. Your Apple III can support up to three daisy-chained disk drives.



Never connect more than three external disk drives to the Apple III. Also, the disk drive connector on the back panel is meant to connect only to Apple-compatible drives. Do not connect any other products or peripheral devices to this connector: You may damage both the device and your Apple III.

If you want to connect a ProFile rigid disk drive to your Apple III, you may still have up to three external drives. You connect a ProFile by means of a peripheral card installed inside the Apple III; the card controls the ProFile independently of the Disk III drives.



You may connect a second or third external drive or a ProFile at any time, but before you can use any of these devices, you need to configure the system to recognize them. Configuring the system is explained briefly in Chapter 7 of this manual and in more detail in the *Standard Device Drivers Manual*.

The Silentype III Printer Port



The port next to the disk drive connector is port A. This nine-pin, D-shaped connector accepts several different types of equipment. Most often, you would attach a Silentype III printer here. Details of the the connection, setup, and operation of the Silentype are given in the *Silentype III User's Guide*.

The Joystick Port



Port B is another nine-pin connector. The most common use for this port is to connect a Cursor III joystick. A joystick resembles the control stick of an airplane. The stick moves in two dimensions: left-right, the X-axis, and forward-backward, the Y-axis. Port A will also accept a joystick. See your dealer to obtain Cursor III joysticks.

You'll find the electrical specifications for ports A and B in Appendix B.

The Color Video Port



If you wish to connect your Apple III to a display device other than the Monitor III, you may need to use the color video port located to the right of port B. This port has a 15-pin, D-shaped connector. The signals available on this port allow you to connect your Apple III to any color or black-and-white video monitor, a Red-Green-Blue (RGB) studio-quality monitor, a video tape recorder, or other video devices.

For full details of the signals available from this port, see Appendix B.

The B/W Video Port



The lower jack immediately to the right of the color video port carries only the black-and-white, or monochrome, signal to a display device like the Monitor III. This connector is an RCA-type phono jack and will connect to any RCA-type phono plug. A cable with such a plug is included with your Apple III.

Appendix B describes the physical specifications of this jack and the electrical specifications of its port.

The Audio Port



Any sound generated by the Apple III's speaker can be sent to an external speaker, tape recorder, amplifier, or other device by connecting that device to the audio port, the jack above the B/W video port. You can silence the Apple III's internal speaker by inserting a miniature phone-tip plug into the audio port. If you then connect an amplifier or other device to the plug, that device will receive all audio signals generated by the Apple III.

Appendix B lists the physical and electrical specifications of this jack.

The Serial Port



Port C lets you connect devices that use the RS-232-C standard communication protocol to the Apple III. This includes some letter-quality printers, high-speed data-collection devices, other computers, and modems. Some devices can be connected directly to this port; others need a modem eliminator cable, Apple Product #A3M0019. The manual that comes with the device will tell you if you need a modem eliminator.

Appendix B lists the electrical specifications for this port.

Inside the Apple III Plus

The most important parts of your computer are inside the Apple III. You need to see inside your Apple III only when you install or remove peripheral cards; use the security mount to attach the Apple III to a table or shelf to prevent theft; or install, change, or examine the batteries that power the clock/calendar.



Before removing the cover of your Apple III, or connecting or disconnecting anything on the inside, *turn off the power switch and unplug the power cord from the wall socket.*

Removing the Cover

The cover is attached to the case of the Apple III by two quarter-turn screws. They are located on the base, under the lower-left and lower-right corners of the front of the Apple III. Figure 2-3 shows one of these screws.

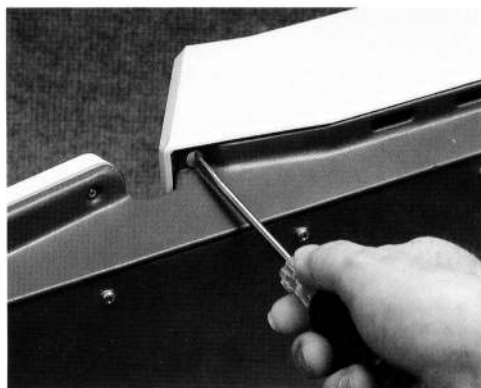


Figure 2-3. A Cover Screw

To remove the cover, first turn off the power, then unplug the power cord from the wall socket. Use a short, flat-bladed screwdriver to turn the screws a quarter turn in either direction. The screws are captive: When loose, they retract and will not fall out of the case.

If you have difficulty getting the screwdriver to engage a cover screw, tilt the Apple III onto the side opposite the screw you're trying to loosen. Do not tip the computer onto its back where devices, cords, and cables are attached.

When the screws are loose, remove the cover by lifting up on its front edge.



Because of electromagnetic-interference regulations, the United States Federal Communications Commission (FCC) prohibits the operation of an Apple III with its cover removed. To remind you of this, when you open the cover of your Apple III, there is a small red light on the left side of the main board, near the back. If you see that this light is on, *turn off your Apple III and unplug the power cord from the wall socket!* (Before you turn your computer off, don't forget to save any programs or data you might be working on.) You should not remove the cover of the Apple III or connect or disconnect anything while the power is on.

Peripheral Interface Cards

Inside the Apple III, between the disk drive on the right and the power supply on the left, is a rectangular well. At the bottom of this well are four long connector sockets, which are mounted on the main board. These sockets, called *expansion slots*, accept Apple III peripheral interface cards. Via these slots, you can connect your Apple III to many devices that cannot be plugged into a port on the back panel. Figure 2-4 shows the interior of the Apple III.



Figure 2-4. Inside the Apple III

The expansion slots are numbered from 1 to 4, counting from left to right, as viewed from the front of the machine. A peripheral card can usually be placed in any of the four slots. To find out the particular slot into which a given peripheral card should be installed, consult the manual that accompanies that card. Figure 2-5 illustrates the parts of a peripheral interface card.

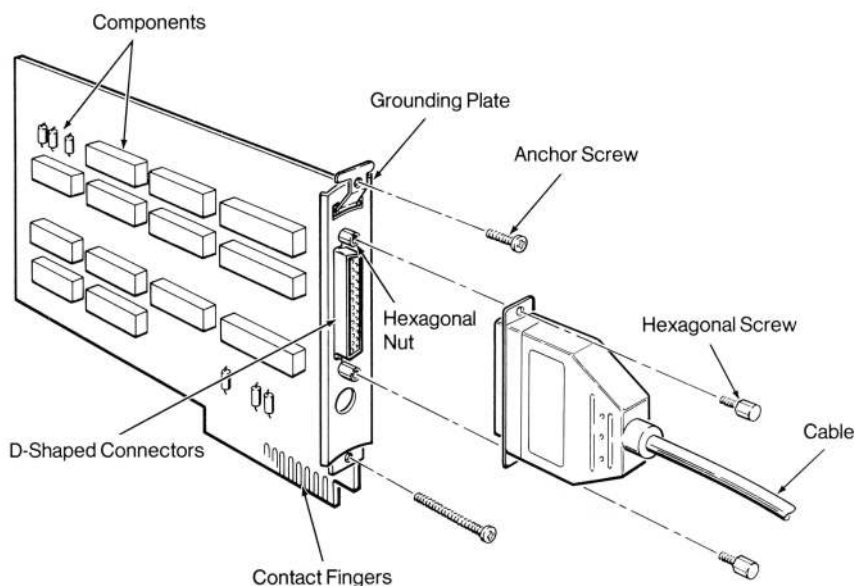


Figure 2-5. A Peripheral Interface Card



Handle any peripheral interface card as you would handle a high-quality, expensive phonograph record. Grasp it only by the corners or edges; try not to touch the delicate components or pins. Don't grasp the card by the gold or silver contact *fingers*: The Apple III uses them to communicate with the card, and their efficiency is decreased if they are dirty or scratched. Peripheral cards are precision instruments and should be handled with care. Store unused cards in the boxes in which they were shipped.

When installed, peripheral interface cards are supported on the bottom by the expansion slots, on the back by their grounding plates, and on the front by card guides, the vertical notches in the front wall of the well.

Installing Peripheral Cards

To install a peripheral card, slide it down into its slot and tighten two screws. The next few paragraphs and photographs illustrate this installation in detail. If you follow the steps, you'll learn each one just right. And if you do it often, it will become second nature.

To install a peripheral interface card in your Apple III, first see the manual accompanying the card to find out which expansion slot the card belongs in. Then turn off the power switch, unplug the power cord, and remove the Apple III's cover.

Pick up the peripheral card by its edges. Hold the card above the slot into which it will be installed. The silver or gold fingers should point down into the Apple III and the components should face away from the power supply.

Touch the cover of the power supply with one hand to discharge any static electricity you may have picked up on your clothes.

With one hand, slide the near edge of the card down into the card guide. With the other, slide the grounding plate down and against the vertical opening in the back of the Apple III. Figure 2-6 illustrates this installation.



Figure 2-6. Installing a Peripheral Card

Slide the card down until its fingers enter the expansion slot. At this point, the grounding plate should be tightening up against the vertical opening in the back of the Apple III. You may need to use just a little force—but not too much—to fit the card completely into its slot. If the peripheral card doesn't seem to fit, remove it completely and try again, making sure that the card is straight up and down in the card guide.

You can tell when the card is fully inserted: The top of the grounding plate is flush with the top edge of the vertical opening in the back, the card connector protrudes slightly from the opening, and the holes for the anchor screws line up with the holes at the top and bottom of the opening (see Figure 2-7).

Now take the anchor screws from their envelope. They are Phillips-type screws—they have a head with cross-recessed grooves.

From the outside of the Apple III's case, insert the shorter anchor screw into the hole above the vertical opening and the longer one into the lower hole. Tighten the anchor screws with a screwdriver so that the grounding plate fits snugly against the vertical opening.



Figure 2-7. A Fully Inserted Peripheral Card

To attach the device to its card, align the D-shaped device connector with the D-shaped card connector. Press the connectors together firmly.

Finally, insert the hexagonal-head screws supplied with the device into the threaded nuts on the card connector. Tighten them with a screwdriver.

Removing Peripheral Cards

To remove a peripheral interface card, first disconnect the device attached to the card. Then remove the anchor screws that hold the grounding plate to the back of the Apple III.



Be sure to turn off the power switch and unplug the power cord from the wall socket *before* you open the cover of the Apple III and disconnect anything inside.

Now pull the peripheral card straight up and out of the well. To assist you, there is a hole drilled in the top of each card, near the back. You can use a hook in this hole to pull the card up, or you can gently pry the card up with a screwdriver, using the side of the well for leverage. The grounding plate may be tight, and you may have to push it up with your forefinger to remove the card. Figure 2-8 illustrates this procedure.

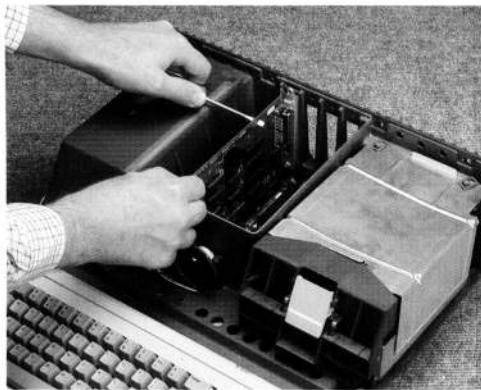


Figure 2-8. Removing a Peripheral Card

The Speaker

The Apple III's internal speaker is mounted on the exterior front wall of the well, right inside the top cover. The speaker faces the front of the computer and is connected to the main board by a twisted pair of wires. You can control the sounds generated by the speaker with your programs, but you cannot manually adjust the volume. If you insert a miniature phono plug in the audio jack on the back panel of the Apple III, you can silence the speaker or transfer the sounds to other audio equipment.

The Clock/Calendar Function

When you set the clock/calendar, the Apple III marks the date and time of the work you do. Chapter 5 describes how to set the clock/calendar; see the section Set Time and Date.

The clock/calendar runs on three size AA battery cells. They fit in a battery clip located between the power supply and the speaker on the exterior front wall of the computer well, inside the Apple III's cover. When installing or replacing the clock/calendar batteries, be sure to align them as indicated on the inner surface of the battery clip.



To use the clock/calendar, you need to install batteries. But be careful: Some types of battery cells are more prone to leak than others. Periodically check your batteries for leakage. When installing or replacing batteries, be sure you *do not* use carbon-zinc cells. Your dealer can tell you which types of battery cells are the most reliable.

The Security Mount

Inside the Apple III, just to the left of the internal speaker, is a hole in the baseplate of the computer through which you can install a strong bolt (see Figure 2-9). With this bolt, you can fasten the Apple III to a table, shelf, or chain to prevent theft.

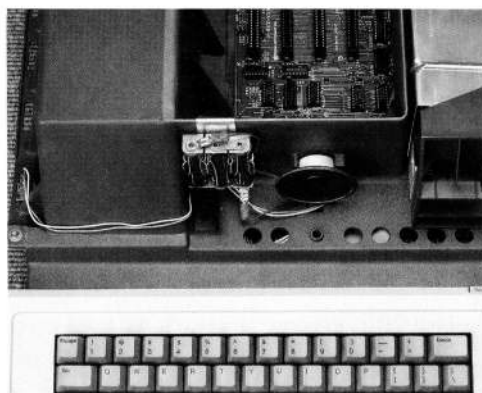


Figure 2-9. Security Mount and Bolt

The unthreaded hole is 0.25 inch in diameter and 0.15 inch deep. The well around the top of the hole is 0.5 inch in diameter and 1.25 inches deep.

Replacing the Cover

Insert the square projections on the back of the cover into the holes at the back of the case. These projections help lock the cover in place. Then lower the cover onto the top of the Apple III so that the back of the cover is flush with the back of the computer and the holes on the underside of the front of the cover fit over the two captive screws.

Tighten the two cover screws by pushing up on them and turning them each one-quarter turn in either direction with a flat-bladed screwdriver. To do this, you may once again need to tip the Apple III onto the side opposite the screw you want to tighten.

The Bottom

The bottom of the Apple III contains access panels for the power supply and main-board electronics. *Do not open these panels.* They are for authorized service personnel only. If you open these panels, you may invalidate your warranty.

Memory

The electronic components in which the Apple III temporarily stores information are collectively called the *main memory*. You can think of memory as the computer's workspace. Whenever you use your Apple III, you put several different kinds of information into its memory:

- Information about the system, which is the Apple III itself and any other equipment connected to it. This information comes into the Apple III from a disk and makes the computer's operation possible.
- The program you are using. The program is a series of instructions that the Apple III reads from a disk.
- Information, such as a memo, financial model, or mailing list, that comes into memory from a disk or from your typing at the keyboard.

If you followed the instructions in Chapter 1, you have already used your Apple III's memory. When you inserted the System Demonstration disk into the built-in disk drive and turned on the Apple III, you instructed the computer to temporarily place a *copy* of some of the disk's information into memory.



Any information in memory is temporary. It disappears when you turn off the computer or clear the memory by pressing CONTROL-RESET. It also disappears during a power failure. The way to save new information is to instruct the computer to write it to a disk. The manual for the particular program you are using will tell you how to do this.

Radio and Television Interference

The equipment described in this manual generates and uses radio-frequency energy. If it is not installed and used properly, that is, in strict accordance with our instructions, it may cause interference with radio and television reception.

This equipment has been tested and complies with the limits for a Class B computing device in accordance with the specifications in Subpart J, Part 15, of FCC rules. These rules are designed to provide reasonable protection against such interference in a residential installation. However, there is no guarantee that the interference will not occur in a particular installation, especially if you use a "rabbit ear" television antenna. (A "rabbit ear" antenna is the telescoping-rod type usually contained on TV receivers.)

You can determine whether your computer is causing interference by turning it off. If the interference stops, it was probably caused by the computer. 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 input/output (I/O) cable. These devices usually require shielded I/O cables. For Apple peripheral devices, you can obtain the proper shielded cable from your dealer. For non-Apple peripheral devices, contact the manufacturer or dealer for assistance.

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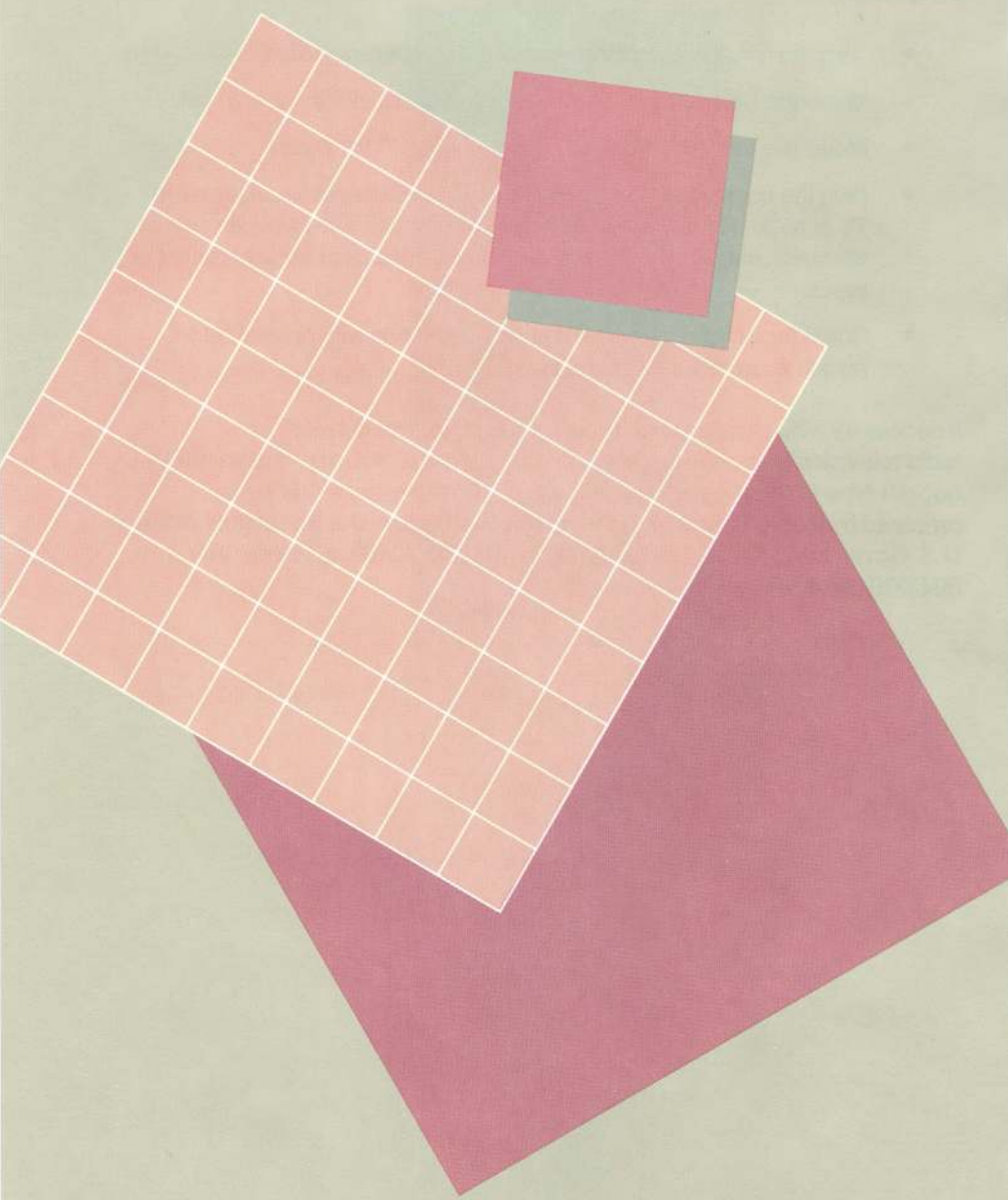
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If your computer does cause interference to radio or television reception, you can try to correct the interference by using one or more of the following measures:

- Turn the TV or radio antenna until the interference stops.
- Move the computer to one side or the other of the TV or radio.
- Move the computer farther away from the TV or radio.
- Plug the computer into an outlet that is on a different circuit than the TV or radio. (That is, make certain the computer and the radio or television set are on circuits controlled by different circuit breakers or fuses.)
- Consider installing a rooftop television antenna with coaxial cable lead-in between the antenna and TV.

If necessary, you should consult your dealer or an experienced radio/television technician for additional suggestions. You may find helpful the booklet *How to Identify and Resolve Radio-TV Interference Problems*, prepared by the Federal Communications Commission. It is available from the U.S. Government Printing Office, Washington, DC 20402, stock number 004-000-00345-4.



***U*sing Your Apple III Plus**

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35	The Usual Startup Procedure
36	Program Disks
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Using Your Apple III Plus

The Importance of Programs

Your Apple III needs programs in the same way that a tape deck needs cassette tapes. Programs turn your Apple III into a word processor, a financial analyst, or an electronic filing cabinet, just as different cassettes change a tape deck from a music maker to a foreign-language teacher or a dictation tool. Programs that contain instructions for a specific kind of task are called *application software*.

You can play precoded music on a tape deck and, with a blank cassette, you can record your own voice or music; you can also go back and change what you've recorded. Similarly, you can write your own programs for the Apple III with *programming languages* such as Apple Business BASIC, Apple Pascal, or Apple COBOL. With programming languages and application software such as as VisiCalc and Apple Writer III, you can create, change, and store many types of information on your Apple III.



Parts of this chapter and of Chapters 4, 5, and 6 ask you to run a program on the Apple III, trying out the commands as they are presented to see what they do and how they are used. It's important to read the manual and try all the examples on your Apple III. The key to making the Apple III work for you is in your experience of the system's capabilities and in your willingness to experiment with new and different things. If you learn the basics of how the Apple III works, there is virtually no limit to what it can do.

The Usual Startup Procedure

You use the same general procedure to start up your Apple III each time you turn it on. It's the same procedure, described in Chapter 1, that you used to start up the System Demonstration disk. This startup procedure is often called *booting*. The term dates back to the early days of computing and refers to the steps the computer takes to *load* the program it needs to operate. Step-by-step, the computer brings (loads) the startup program from a disk to memory, as if it were pulling itself up by its bootstraps.

When your Apple III is turned off, the procedure for starting up is to insert a disk in the Apple III's built-in disk drive, close the drive door, and turn on the power switch. If the power is already on, the standard procedure for starting up is to hold down the CONTROL key while you press and release the RESET button, which is over the top right edge of the keyboard. This process is shown in Figure 3-1.



Figure 3-1. Starting Up With CONTROL-RESET

As soon as you turn on the power switch, or release the RESET button and CONTROL key, the disk drive's red light comes on and the drive starts to whirl. In a matter of moments the computer loads the information it needs from the disk and starts running a language or special program. The amount of time the computer needs to start up varies from program to program.

Program Disks

You must start up your Apple III using a disk that has been specially prepared for that purpose. Such a disk is called a *program disk* or a *boot disk*. A program disk is just like any other disk, except that it contains three special sets of information:

- The *operating system*. This program, named SOS.KERNEL, is the system's internal traffic controller. It directs the Apple III's functions in a uniform manner no matter which programming language or application program you may be using.
- A set of *device drivers*. These are programs that allow the operating system to communicate with devices such as the keyboard, screen, printer, and disk drives. All the device drivers are merged into one program named SOS.DRIVER.
- A *language interpreter*. This program, named SOS.INTERP, translates, or interprets, the instructions you give the Apple III via a programming language or an application program.

Every program disk must contain these three items. If you try to start up your Apple III with a disk that lacks one or more of these, the Apple III will respond with a message such as

SOS.KERNEL FILE NOT FOUND

and then “hang” (do nothing) until you insert a proper program disk and try again.



Whenever you insert a program disk into the built-in drive and start up your Apple III, you actually start up a language interpreter. Then the interpreter starts your program. The way to switch from one language to another is to restart the system with the program disk for the other language or application in the built-in disk drive.

Turnkey Systems

Most program disks also have a fourth important item: a program that runs automatically whenever you start up the Apple III using that disk. Such disks are called *turnkey disks*.

Suppose a doctor has a program that schedules patients' appointments. Ideally, the office staff should be able to turn on the Apple III and immediately begin using the appointment system. The staff members wouldn't need to know anything about the program or languages, just how to use the appointment system. As far as they are concerned, the computer is simply an appointment maker.

This is the essence of a turnkey system: From the user's point of view, the computer is simply a device for one particular application. Getting it started is as simple as turning a key in a lock—the "key" is the turnkey disk itself. Anyone can run a well-designed turnkey system.

The System Demonstration disk you used in the first chapter is a turnkey disk; so is the Apple III System Utilities disk, which you will use later in this manual. Much of the application software you buy for your Apple III will be on turnkey disks. If you are going to write your own programs, you can learn how to create turnkey disks by reading the manual for the programming language you are going to use.

Using the Console

Together, the Apple III's video display and keyboard are called the *console*. Through the console, you send information to and receive information from the program or application you are using. Just as you use the dashboard and pedals of your car to control the car and monitor its operation, you use the console of your Apple III to control and monitor everything the Apple III does.

There are standard ways that the console lets you enter information and standard ways that it displays information on the screen. You will usually use the console in the same general way, no matter which application software or programming language you load into your system.

The best way to learn about the console is to use it. The System Demonstration disk contains programs that will let you try out the general features of the console alone, without using another application or program. These programs are like a driving simulator: Once you have learned the mechanics of driving, you are prepared for most of the conditions you may encounter.

To use these programs, place the System Demonstration disk in the Apple III's built-in disk drive and start up as described in the section The Usual Startup Procedure. Once the demonstrations start, press the ESCAPE key on the Apple III's keyboard. You should see the disk's menu, shown in Figure 3-2:

```
Apple /// Demonstration Programs
-----
Demonstrations available:

1. Console Demonstration
2. Read & Set the Clock/Calendar
3. Try the Type-Ahead Buffer
4. Adjust Video Monitor

Please type the number of the
    demonstration you wish to see.
```

Figure 3-2. The Demonstration Menu

The menu continuously *scrolls*, moving from the bottom to the top of the screen, until you type the number of the demonstration you wish to see.

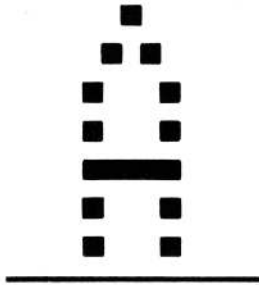
The Video Display and Text Interlace

The Apple III's video display, like any television set, composes its pictures on a matrix, or grid, of tiny dots. The size and number of these dots determine the resolution of the picture: the more dots there are in the picture, the finer (or higher) the resolution. Normally, the matrix on your display screen is composed of 192 lines of 560 dots per line.



For more information, see the section The Graphics Modes in the *Standard Device Drivers Manual*, which you'll find in the System Software package.

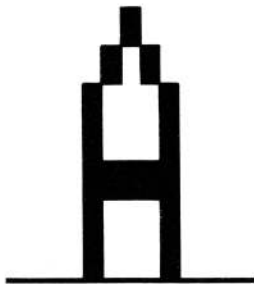
The programmers of SOS have given each letter, number, or punctuation mark its distinctive shape by arranging a set of dots within a character matrix 7 dots wide by 8 dots high. Other arrangements are possible, of course. In the 7-by-8 matrix, the letter *A* appears as



Letter A, Without Interlace

If you look closely at that letter on your screen, you can see each dot.

The Apple III has text interlace, a function that allows you to turn on a second picture, or matrix of dots, which is in computer memory. When you turn on text interlace, the two identical sets of dots merge, creating a grid of 384 lines of 560 dots per line. The two sets of dots that make up the character *A* merge together, or *interlace*, to form a more crisply defined character.



Letter A, With Interlace

The text interlace switch (see Figure 3-3) is about halfway along the left side of the Apple III, just above the bottom of the cover. You can feel the switch protruding from one of the vents under the overhanging section of the chassis.



Figure 3-3. Text Interlace Switch

Turn on text interlace by pressing the switch forward, or toward the keyboard; turn off text interlace by pressing the switch in the opposite direction.

To see the effect of text interlace, choose the Apple III Graphics Show from the menu on the Demonstration disk by pressing the number 5. As each section of the show appears on your video display, press the text interlace switch on and off, noting the difference in the appearance of text and graphics.



Text interlace works best with green-phosphor and other long-persistence video displays. If you have a black-and-white or color display, text interlace may make the picture flicker.

If you see no difference in the appearance of the characters when text interlace is on, adjust the vertical hold on your monitor. Accurate tuning of your monitor is important to the operation of text interlace.



Some graphics programs require both the grids in memory. If you turn on text interlace for these programs, you will see garbled images as the two grids merge. A moment of experimentation will tell you if text interlace can work with the graphics program you are using.

When you are ready to leave the Graphics Show, press the ESCAPE key to return the menu of the System Demonstration disk to your screen. Now turn on text interlace, if you wish, and choose the Console Demonstration by pressing the number 1.

The Console Demonstration begins with some introductory instructions. After you read them and press RETURN, the screen will go blank except for a small square in the upper-left corner and some reminders at the top and bottom of the screen. Type something. As you press each key, the demonstration program reads each character you type from the keyboard and immediately *echoes*, or displays, it on the screen.

Most programs and applications not only echo the characters you type, they also interpret what you type as well. Some programs examine each keystroke for meaning as soon as you type it; others wait until you type a certain number of characters, or press a special key such as RETURN or ENTER, before they interpret what you've typed.

The following exercises acquaint you with the the most common uses of the console: typing, erasing minor mistakes, and controlling the display on the screen.

The Keyboard

Look closely at the keyboard: It looks much like the keyboard on an office typewriter. Type characters until you approach the end of a line, then press the RETURN key to start the next one.

As you type, you can feel that the Apple III's keyboard (see Figure 3-4) is somewhat different from a typewriter's keyboard. First, the keys operate simple switches rather than complicated mechanisms, so you don't have to press hard on them. Second, the keycaps are curved and sloped for easier, more comfortable typing. Third, there's a little bump in the middle of the D and K keys, one on the → key, and one on the number 5 on the numeric keypad, to the right of the main keyboard. If you're a touch-typist, you'll know you're in the home position when you feel those little bumps with your middle fingers.

The keyboard has several characters that are not usually found on typewriters:

Vertical Bar	
Backslash	\
Tilde	~
Grave Accent	`
Brackets	[]
Braces	{ }
Angle Brackets	< >
Circumflex	^

These symbols are included because many programming languages use them.



Figure 3-4. The Keyboard

The group of 13 keys to the right of the typewriter keyboard is called the *numeric keypad*. The keys on the keypad are grouped like those on an adding machine or calculator to make it easier to enter large amounts of numerical information into the Apple III. The keys on the numeric keypad usually work the same as their main-keyboard counterparts, but programs can redefine their meanings (as well as the meanings of most other keys) to distinguish them from the number keys on the main keyboard.



Type a few zeros, using the zero key on the top row of the main keyboard and the one at the bottom of the numeric keypad. Look at the characters displayed on the screen. The slash through the zero distinguishes it from the letter *O*. When the Hindus were inventing the number system we use, they used a symbol for zero that didn't interfere with any letter in their alphabet; but their zero happened to look the same as the Romans' letter *O*. Since computers need to keep them separate, it's important to slash zeros so they won't be confused with *O*'s.

Similarly, if you're accustomed to using the lowercase letter *L* for the number 1, you'll need to readjust. There are two keys you can use to type the number 1, one on the main keyboard and one on the numeric keypad. If you use a lowercase letter *L* for a 1, the Apple III will get incorrect information.

Besides the letter and number keys, there are some special keys on the keyboard. As on a typewriter, there are two SHIFT keys, one on either side of the keyboard. When you hold down one of the SHIFT keys, you change the meaning of other keys on the keyboard.



Some keys, mostly along the top row, have two symbols on them. When you press the key alone, the lower character on that key appears on the display screen. If you hold down one of the SHIFT keys while pressing the same key, you'll get the upper character on the key.

You've seen that when you press the letter keys, lowercase letters appear on the screen. By holding down a SHIFT key, you can type uppercase letters. Experiment with typing lowercase and uppercase letters and other shifted characters. Then press the ALPHA LOCK key and type letters and numbers: ALPHA LOCK works like an automatic shift for letters only. When you depress the ALPHA LOCK key, you still need to press the SHIFT key if you want the upper character of a double-character key.

Have you been noticing the little square that moves along the screen as you type? It's called the *cursor*. It indicates that the Apple III is waiting for you to type something, and it shows you where the next character you type will be placed on the display screen. Each time you press a key, the computer writes a character at the cursor position and moves the cursor one space to the right.

Correcting Errors

Nobody's perfect. If you type a fair amount, you'll probably press a wrong key or two. But you can correct your typing errors in several ways. This Console Demonstration and the examples below give you a chance to experiment with a few.



Be sure you are using the Apple Business BASIC console. (Look at the top of your screen to check.) If you are using the Pascal console, hold down the  key, then press and release the SPACE bar. Finally, release the  key. Now you're ready to find out about correcting errors.

Nondestructive Backspace

Type this line from Shakespeare's Sonnet 30:

When to the sessions of sweat silent thought[]

Immediately you see you've made a mistake: "sweat" should be "sweet." Here's how to correct this error:

First *backspace*. Move the cursor backward to the *a* by pressing the ← key. Each time you backspace over a character, you tell the Apple III to forget that you ever typed it. In this case, you used a *nondestructive backspace*. It cancels what you've typed even though the characters you backspaced over stay on the screen.

Next *overstrike*. When the cursor is over the *a*, type an *e*. The error is gone; the *e* replaces the *a*.

When to the sessions of sweet[t] silent thought

If you pressed RETURN now to begin the second line of the sonnet, the remainder of the first line would be erased since, by backspacing over it, you told the Apple III to ignore it. Before you press RETURN, you need to retype the rest of the line.

There are two ways to do this. You can either type the rest of the line yourself or you can use the → key, called the *retype key*. Each time you press the →, the cursor moves one space to the right. To the Apple III, it's as if you had actually retyped the character under the cursor.

Retype by pressing the → key sixteen times to move the cursor to the right of the word "thought". To the Apple III, it's as if you just typed "t silent thought"—the sixteen characters, including the spaces between the words, over which you moved the cursor.

When to the sessions of sweet silent thought[]

If you haven't pressed RETURN, you can backspace, overstrike, and retype to where you left off whenever you detect a minor mistake in the middle of a line you're typing.



Cancel an Entire Line

But what if you type a line, then change your mind and want to delete the entire line and start again? You could backspace to the beginning and type the correct line, or you can hold down the CONTROL key and type the letter X. This tells the Apple III to cancel the complete line—everything you've typed since you last pressed RETURN.

To practice canceling lines, press RETURN to skip to a new line; then type the next line to Sonnet 30:

```
I sigh the lack of many a thing I sought[ ]
```

Oops. . . this is the third line of the sonnet, not the second. Hold down CONTROL and type an X to tell the Apple III to cancel this entire line. The Apple III acknowledges the cancellation by placing a backslash (\) at the end of the incorrect line. Then the computer moves to the next line and waits for you to type the correct information.

```
I sigh the lack of many a thing I sought \  
[ ]
```

When you hold down the CONTROL key while you press some other key, you type a *control character*. Normally, control characters do not appear on your video display although, as you have just seen, the screen may show their effect.

The CONTROL key works similarly to the SHIFT key. Both keys change the meaning of other keys on the keyboard. You can also use the  key, to the left of the SPACE bar, and the  key, to the right of SPACE, to give multiple meanings to a single key.

Control characters do what their name implies: They control the operation of a program or an application. Depending on the programming language or application you're using, you may need to type many different control characters at various times. The manuals for your programming languages and applications will tell you the control characters you need.

This and other manuals use the phrase “type CONTROL-X”, for example, to mean “hold down the CONTROL key while typing the letter X”.



Destructive Backspace

When you're using programs written in languages like BASIC, error-correction with backspace or CONTROL-X is nondestructive. Other programming languages, such as Pascal, use a *destructive backspace*, which cancels your typed messages and removes the characters you backspace over from the screen.

A language or application program usually uses only one type of backspace, destructive or nondestructive. Normally, you can't change which type of backspace you use, but this demonstration has a special command that allows you to do so. To see how a destructive backspace works, hold down the  key and press the SPACE bar.

Now correctly type the second line to the sonnet:

```
I summon up remembrance of things past[ ]
```

Use the ← key to go back and change “of” to “about”. See the characters disappear as you backspace over them? That's destructive backspacing.

```
I summon up remembrance about[ ]
```

To fix an error in a line when you're using the destructive backspace, you can backspace to the error and correct it. Then you must type the rest of the line again. You cannot use the → as a retype key when you're using destructive backspacing.

When backspacing is destructive, so is canceling lines. Type the fourth line of the sonnet:

And with old woes new wail my dear time's waste.[]

Cancel this line by typing CONTROL-X. Instead of marking a canceled line with a backslash as before, CONTROL-X now erases the entire line you typed and leaves the cursor at the beginning of the same line.



The DELETE key can erase the characters you've typed from the display screen and remove them from the Apple III's memory. Some languages and software use this key; others do not. When a program doesn't use DELETE, pressing that key will display a character—perhaps a picture of an apple—and move the cursor forward. The reference manuals for your software will tell you whether your programs use the DELETE key. If they do not, correct any typing errors according to the directions in your manuals.

Now that you've seen how destructive backspacing works, return to the Business BASIC console by holding down the  key while pressing the SPACE bar.

Wrapping and Scrolling

Type the preamble to the U.S. Constitution, or anything else with more than eighty characters—for example, your full name, followed by your address and telephone number. Don't press RETURN when the cursor gets to the right edge of the screen. Just keep typing and see what happens.

Since the screen is only eighty characters wide, the whole sentence can't fit on one line. If you were writing on a typewriter and you reached the right side of the page, the typewriter carriage would probably stop at the right margin, and you'd have to press the carriage-return key to proceed. But whenever the Apple III's cursor gets to the right side of the screen, it automatically jumps to the beginning of the next line. Sometimes it splits a word in two, leaving the beginning on one line and the end on the next.

This is called *wraparound*. It's as if the screen wrapped around behind itself to connect the right edge to the left. When the cursor reaches the right side of the screen, its next position is the first space on the next line. Figure 3-5 displays an example of wraparound.

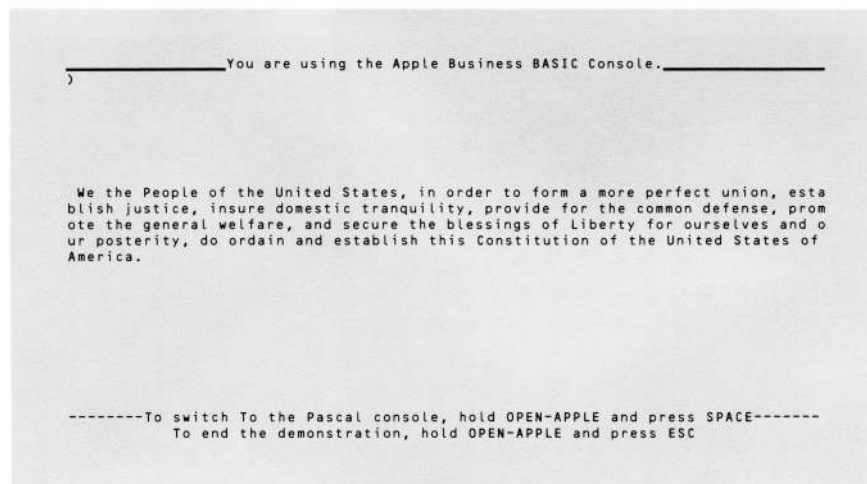


Figure 3-5. Wraparound

If you don't like wraparound, press the RETURN key when the cursor approaches the right side of the screen. Pressing RETURN sends the cursor to the beginning of the next line on the screen. In some programs, RETURN also signals the Apple III that you've finished typing something and that you want the computer to process what you've typed.



Programming languages and application software differ in their treatment of text lines. Some have wraparound; others do not. Refer to the manuals for the specific languages and programs you use.

If you type enough information, or press RETURN often enough, you'll fill up the display screen. When the cursor reaches the right edge of the bottom line of the screen (or you press RETURN), the Apple III *scrolls* the screen, rolling it up one line and giving you a fresh, blank line at the bottom. Figures 3-6 and 3-7 show a video display before and after the screen has scrolled.

Try it: Press RETURN enough times to move the cursor to the bottom of the screen, type something, then press RETURN again. All the text rolls upward, the top line vanishes, and a new blank line appears at the bottom. If you press RETURN several more times, you can scroll the text completely off the top of the screen.

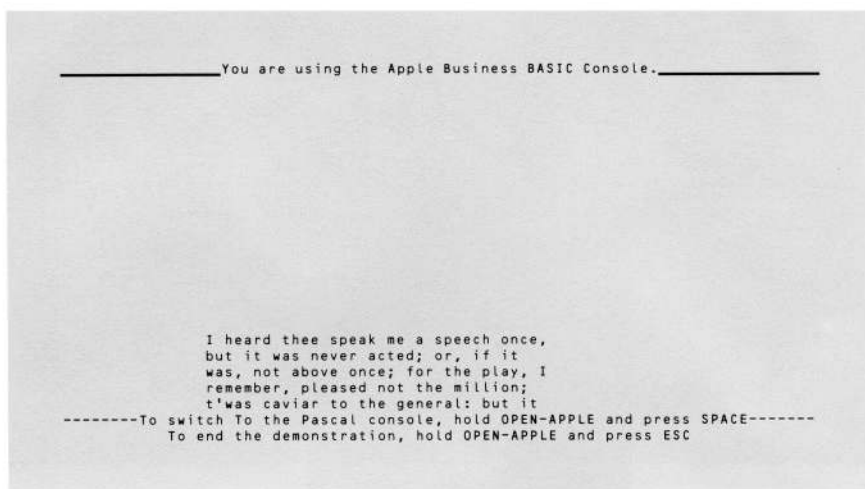


Figure 3-6. Before Scrolling

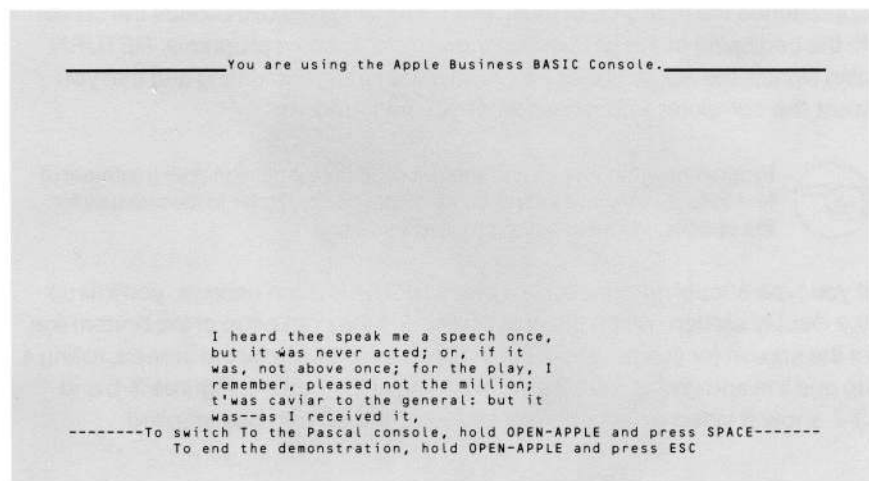


Figure 3-7. After Scrolling

Auto-Repeat

For a few seconds, hold down a key or key combination (like the exclamation point, SHIFT-1). The moment you press that key combination, you see one exclamation point on your display screen; after almost one second, you start seeing more and more exclamation points. It's as if you were pressing that key repeatedly, about 11 times per second. Every standard key—that is, every alphabetic, numeric, and symbol key—automatically repeats if you hold it down for about a second.

Now, once again press the exclamation point. As you hold it down, press the  key. Not only do you get more exclamation points but they come faster, too. When you press and hold the  key while holding down any other standard key, you increase the auto-repeat rate to about 33 keystrokes per second. The four arrow keys also repeat at this faster speed when you simply press them more firmly.



Cursor Movement

So far, you've been able to move the cursor only one space or one line at a time. The Business BASIC console affords you a way of freely moving the cursor to any position on the display screen.

Press **ESCAPE** to enter cursor-move mode, sometimes known as *ESCAPE mode* because of the key you press. Notice that the cursor has changed: Now it is a black plus sign on a light background.

In cursor-move mode, each of the four arrow keys moves the cursor one space in the direction of the arrow. While you are in cursor-move mode, the ← and → keys do not perform their functions as backspace and retype keys.

Experiment. Move the cursor to the middle of the screen, then press almost any other key to leave cursor-move mode. Now type your first name. Return to cursor-move mode by pressing ESCAPE and move the cursor somewhere else on the display screen. Type your surname. (Did you remember to leave cursor-move mode before you began to type?)

For more information on cursor-move mode and the Apple III Business BASIC console, see the section on cursor commands in the *Standard Device Drivers Manual*.

Leaving the Demonstration

The most common uses of the console are the ones you have just seen: typing and correcting minor errors. There's another program on the System Demonstration disk that introduces type-ahead, a keyboard feature that can save time. You may want to experiment with type-ahead now, but first you need to stop the Console Demonstration you're using. Hold down the  key and press ESCAPE. When the menu of the System Demonstration disk returns to the display screen, you can select the Type-Ahead Demonstration.

The console has some other features you may wish to use. The operation of the console is described in full in the *Standard Device Drivers Manual*, which accompanies this manual.

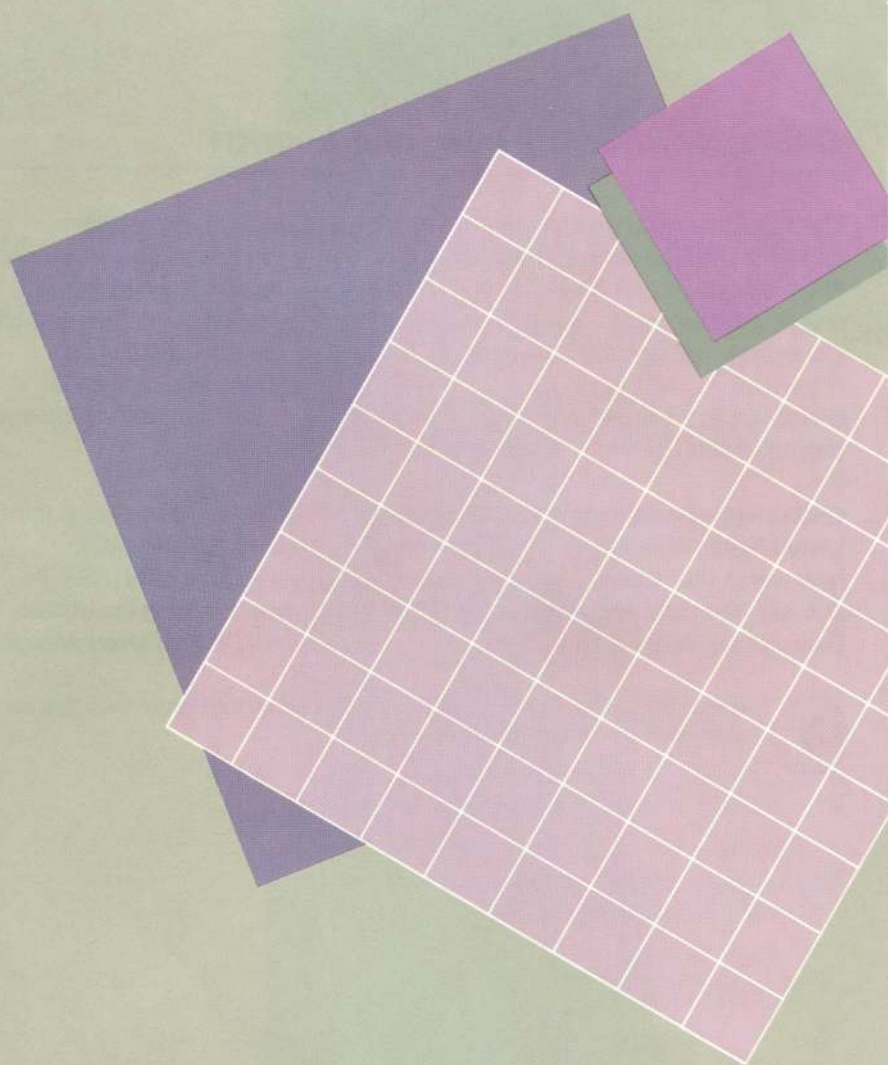
Characters and Keyboard Layout

The 128 different characters that the Apple III can display are called its *character set*. The character set defines the shape, or style, of the characters. The Utilities Data disk contains other character sets as well as the standard one you see on your screen. You can change the character set via the System Configuration Program on the System Utilities disk; the *Standard Device Drivers Manual* tells you how. Also, different programming languages and certain application software, such as Apple Writer III, offer you ways to change character sets; see the manual for the program you are using.

Characters are arranged on the keyboard in a *layout*. Most typewriters in the United States have a layout like the one on your Apple III. Some typists, however, prefer another layout: the American Simplified Keyboard (ASK, or Dvorak). You can switch your Apple III to the ASK layout by using the Utilities Data disk and following the instructions in the *Standard Device Drivers Manual*.



Among the keyboard layouts and character sets on the Utilities Data disk are ones used by several foreign languages.



The Operating System

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The Operating System

About SOS

The Sophisticated Operating System, abbreviated SOS and pronounced “sauce,” runs your entire Apple III system. SOS directs the orderly flow of information through the system, carries out the instructions of your programs, and controls the communication between the computer itself and all the devices attached to it.

SOS is consistent. The devices, programs, and languages for the Apple III are designed to work with SOS. This means that your Apple III handles information in much the same way no matter which application programs or languages you use, or whether you are storing your data on a disk, printing it, or sending it to another computer over telecommunication lines.

A Disk-Based System

SOS is stored on disks, unlike those personal computers whose operating systems or languages are stored in permanent memory. As discussed in Chapter 3, in the section Program Disks, you can start up your Apple III with any disk that contains SOS in the form of three essential sets of information:

- SOS.KERNEL—the operating system
- SOS.DRIVER—the device drivers
- SOS.INTERP—the interpreter

The four disks in the System Software package each contain SOS and are, therefore, program disks. This manual describes many of the operations you can perform with the System Utilities disk, and Appendix C discusses the Apple II Emulation disk. The *Standard Device Drivers Manual* documents the programs and information on the System Utilities Data disk.

It is likely that newer, improved versions of SOS will be issued as time goes on. Because SOS is not in permanent memory, you can move up quickly and easily to a newer version by updating your SOS disks. Your dealer receives each new version as it is issued.

SOS is the internal traffic controller for your Apple III system. It handles information in terms of devices, volumes, files, and pathnames. This chapter discusses these concepts. When you are familiar with them, you'll be able to organize the information you create via your programs in ways that are both convenient for you and accessible to SOS.

Devices

A *device* is any piece of computer hardware, other than the computer itself, that can transfer information into or out of the Apple III. A device may be built-in, like the console (keyboard and display screen), or external, such as an additional disk drive, a ProFile, or a printer.

SOS communicates with devices by means of special programs called *device drivers*. These programs take the streams of characters coming from SOS and convert them to machine actions, or convert the actions of a device into streams of characters for SOS to process. Device drivers for the standard Apple III devices are included on the System Utilities Data disk in the System Software package.

Your Apple III system is flexible because SOS is stored on disks rather than being in permanent memory. You can tell the operating system what devices you have and when you want information to go to or from them. And you can change, delete, or add new device drivers to SOS by means of the System Configuration Program (SCP) on your Utilities disk. Chapter 7, System Utilities: SCP, briefly explains these operations; for detailed information on the SCP and device drivers, see the *Standard Device Drivers Manual*.

Even though you may have physically installed a device, no communication between the computer and that device can occur until SOS contains a device driver for it: If you refer to that device, you'll see an error message on your display screen. Similarly, you may have a device driver for a piece of equipment, but if the device driver is inactive, or the device is not installed, SOS cannot communicate with that equipment. See Chapter 7 for discussions of how and why to use the SCP to change the active or inactive status of a device driver.

Block and Character Devices

SOS recognizes two kinds of devices: *character devices* and *block devices*. A character device sends or receives a stream of characters, one character at a time. The console, serial interface, and printer are all character devices. Some character devices, like the keyboard, are *input* devices. They take characters into the computer. Some, like the screen, are *output* devices. They take characters out of the computer. Others, like the serial interface, are *input/output (I/O)* devices that take characters in or out.

A block device is any device that stores information in blocks of 512 characters and from which the computer can retrieve any given block on demand. A block device is always an input/output device. All disk drives and most other external memories are block devices that move information to and from a storage medium.

Device Names

Every device that can be connected to the Apple III is accessible to SOS through its device driver, which you call by its *device name*. A device name is up to 15 characters long: The first is a period; the second is a letter; the rest can be either letters or numbers, in any combination. Some legal device names are

- .D1
- .PRINTER
- .BLOCKDEVICE
- .PROFILE

Here are some device names that will *not* work, and the reasons why:

PRINTER	(the first character is not a period)
.BLOCK.DEVICE	(only the first character can be a period)
.BLOCK DEVICE	(a device name cannot contain a space)
.BLOCK/DEVICE	(a device name cannot contain a /)

A block device is accessible by either its device name or by the name of the volume currently inside it.

Volumes

A *volume* is any piece of storage medium that, when formatted, can store computer-generated information for subsequent retrieval. In most cases, a volume is a disk of either flexible (“floppy”) or rigid construction. Think of a volume as a disk, although other types of volumes are possible.

When a volume is manufactured, it contains no information at all; it’s like blank recording tape. Before the computer can write (store) information on it or read (retrieve) information from it, a volume must be formatted. Formatting divides the recording *medium* into uniform, standardized blocks in which the Apple III will store your information. During the formatting process, a disk is assigned a unique *volume name*, either by you or by the formatting program. Chapter 5, System Utilities: Device Handling, describes how to format a volume.

A block device takes on the name of the volume currently in the device—the volume name of a flexible-disk drive will change as you insert and remove disks. A block device containing no volume (such as a disk drive without a disk, or with an unformatted disk, or with its door open) has no volume name, and SOS cannot use that block device.

A volume name may contain up to 15 characters: The first is a letter; the rest can be letters, numbers, or periods. A volume name is always preceded by a slash (/).



Do not count the slash (/) as one of the 15 allowable characters of a volume name.

Here are a few legal volume names:

/PROGRAMS
/BLOCK.FILES
/CHAPTER4

Here are some volume names that will *not* work, and the reasons why:

/BAD NAME	(contains a space)
/1.TO.10	(the first character is a number)
/STEVE'S.PROGRAM	(contains an apostrophe)
/ANTHROPOMORPHOUS	(more than 15 characters)

Files

A *file* is a named, ordered collection of information outside the Apple III's main memory. When you want to get to the information stored in a particular file, you refer to that file by its name. You can name a file or your program can, as described in manuals accompanying your software. Files can contain numbers, programs, business letters, graphics, or any other kind of information you can use with your Apple III.

SOS recognizes two types of files, block files and character files.

Block Files

A *block file* is any file on a volume, and any volume can hold many files. You can direct SOS or your programs forward and backward within a block file to read or write any character or group of characters in any order. (Contrast this with character files, described in the next section.)

When a block file has been stored on a volume, the information in that file is permanent and is not lost when the Apple III is turned off or when you remove the volume (if it is removable) from a block device. To change the information in a file, you must load the contents of the file from its volume into memory, change it there, and then store it back into the file.

Files are not stored in the Apple III's memory. As shown in Figure 4-1, the information in a file can be read into memory, changed there, and written back out to the file; but the information in memory is not a file. It has no name and it has no permanence. If you turn the Apple III off, the information goes away.

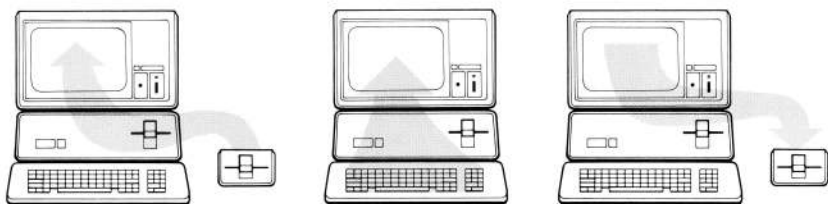


Figure 4-1. Block Files and Memory

Character Files

A *character file* is a stream of characters, accessible one by one. SOS and your programs deal sequentially with information in character files. That is, a program can read or write only the current character, but cannot jump to an earlier or later one. (Contrast this with block files, described in the previous section.)

SOS treats character devices such as the console and the printer as files. To print information on a printer, for example, you simply write it to the character file named `.PRINTER`.

A character device accepts only one character file at a time, and that character file has the same name as its device.

Directory Files

Whereas character devices can accept only one file at a time, block devices can contain dozens, perhaps hundreds, of files. To help you organize your files so that you can easily locate a particular file when you need it, SOS allows you to group related files together on a volume by the use of *directories*. A directory is a file that contains the names and locations of other files on the volume. To find the names of all the files on a disk, look at the contents of the directory file.



A directory file is also called a *catalog* in some programming languages, for example, BASIC.

File Names

A *file name* is the name of one entry in a directory, and all files, including directory files, need a name. A file name may be up to 15 characters long, including periods and suffixes. The first character must be a letter; the rest can be letters, numbers, or periods in any combination. SOS automatically converts all lowercase letters in a file name to uppercase.

Here are a few legal file names:

MIKE.2.JULY.80	
SORTPROGRAM	
LETTER.TO.SUE	
REVUE.TEXT	(.TEXT is a suffix)

Here are some file names that will *not* work, and the reasons why:

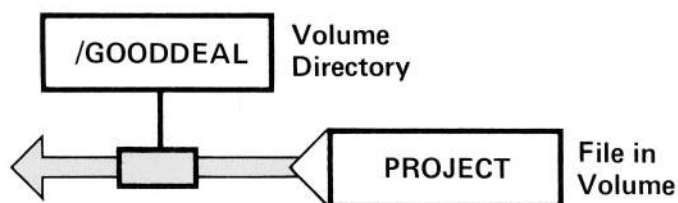
BAD NAME	(contains a space)
1.TO.10	(begins with a number)
STEVE'S.PROGRAM	(contains an apostrophe)
ANTHROPOMORPHOUS	(more than 15 characters)

Subdirectories and Pathnames

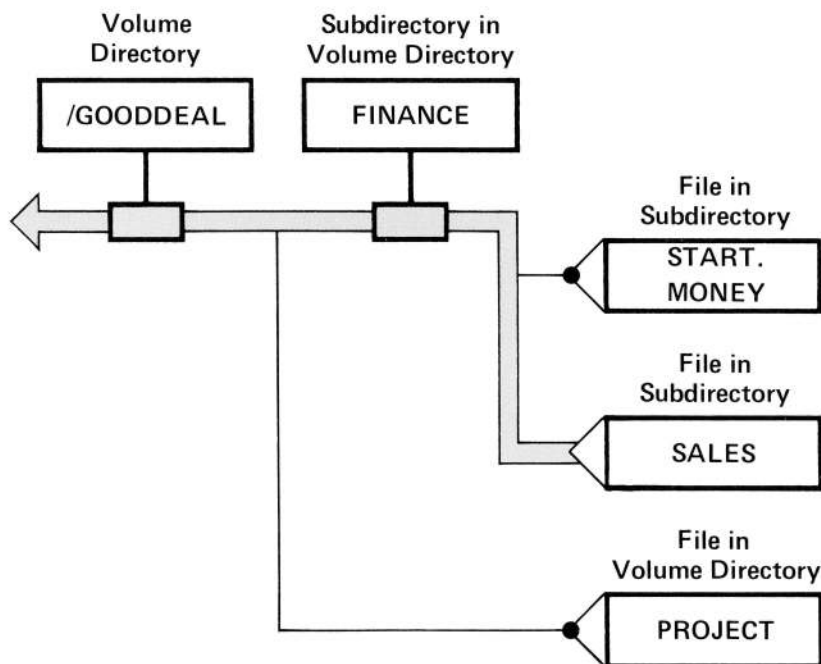
When SOS “looks” at a volume, the first thing it sees is the *volume directory*, which lists the names of the other files stored on that volume and points to their locations. Any of these other files may be a *subdirectory* that lists and points to more files. By using directories and subdirectories properly, you can build a hierarchical storage system whose structure reflects the relationships between the pieces of information you’re storing.

For example, you might put all information about one business transaction on a volume named /GOODDEAL . The name of the volume directory will be identical to the name of the volume.

Along with relevant correspondence, telephone numbers, and diagrams, this volume contains one file, made via the Apple Writer III program, that describes the entire project.



At the beginning of the Gooddeal project, you use the VisiCalc™ program to calculate your initial expenditures and store them in a file called **START.MONEY** . With the same program, you also make some sales projections and store a report on them in a file named **SALES** . So that you can find them easily, you group these files together in the subdirectory **FINANCE** .



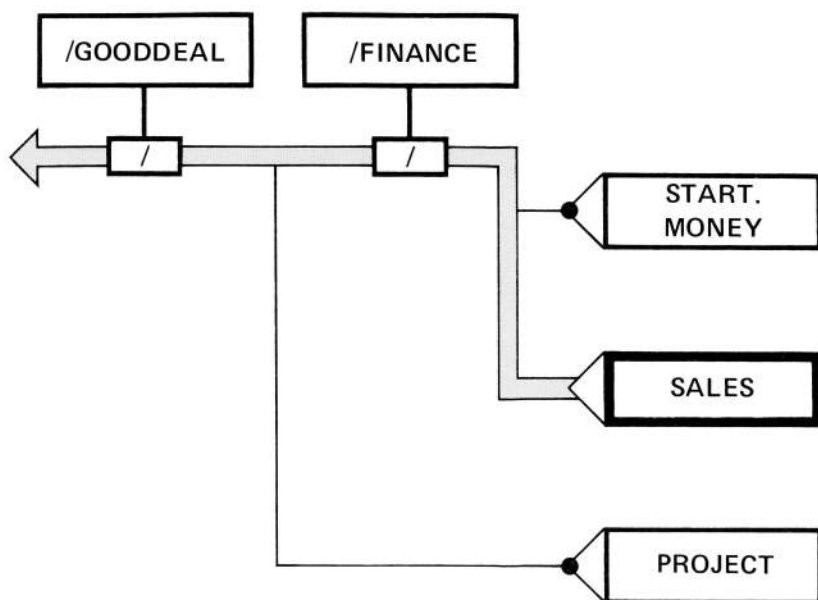
To get to any one of the files on **/GOODDEAL** , you would refer to it by its *pathname* . If you wanted to see the sales projections, for example, you would type the pathname

/GOODDEAL/FINANCE/SALES

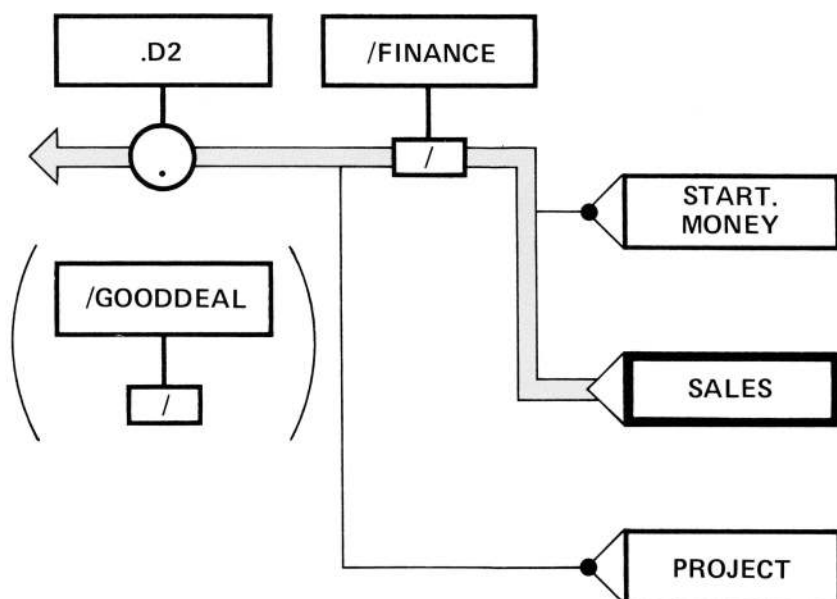
A pathname is a volume name followed by a series of file names. The whole pathname is preceded by a slash, and the component names within it are separated by slashes. The pathname specifies the "path" that SOS must take to find a given file. The path starts at the volume directory; then it may go through one or more subdirectories until it ends with the last-named file. In this case, the directory of the volume /GOODDEAL tells the computer how to find the subdirectory FINANCE , which tells it how to find the file SALES .

Block device names let you refer to a particular block device without knowing the name of the volume it contains. When SOS sees a device name at the beginning of a pathname, it automatically substitutes the name of the volume in the specified device for the device name in the pathname. The Apple III's built-in disk drive has the device name .D1 ; the additional disk drives are named .D2 , .D3 , and .D4 , respectively. If /GOODDEAL is in the first external disk drive, you can refer to the volume name /GOODDEAL or to the device name .D2 .

To see the file of sales projections, you can type the pathname



or the pathname



Either pathname retrieves the file you want.



When you begin a pathname with a block device name, you are instructing SOS to make a substitution. That is, when SOS receives the pathname, it “goes out” to the specified block device, reads the name of the volume the device contains, and then substitutes that volume name for the device name you specified.

If you have two volumes with the same name in the system at the same time, SOS won't be able to tell them apart even if you specify different block devices in the two pathnames. This is why it's vital that you give each volume a unique name.

Later, you might transfer all the files on the volume `/GOODDEAL` to a ProFile because of the speed and storage space it provides. Now the volume directory of `/GOODDEAL` becomes a subdirectory on the ProFile, and to get to the file `SALES` you would type the pathname

`.PROFILE/GOODDEAL/FINANCE/SALES`

You could also combine the information in the file SALES with some of the text in the Apple Writer file PROJECT and make a paper copy of this new report. First you would bring a copy of the file SALES into the Apple III's memory, then change it by copying in the text you need from the PROJECT file. Finally, you would send the new report to the file .PRINTER to get a paper copy. You would also write the report back to the file named PROJECT for future use.

An Example: Widgets, Incorporated

Three large file cabinets (see Figure 4-2) hold the important documents of Widgets, Incorporated, a wholly owned subsidiary of Donothing Gadgets, Ltd.

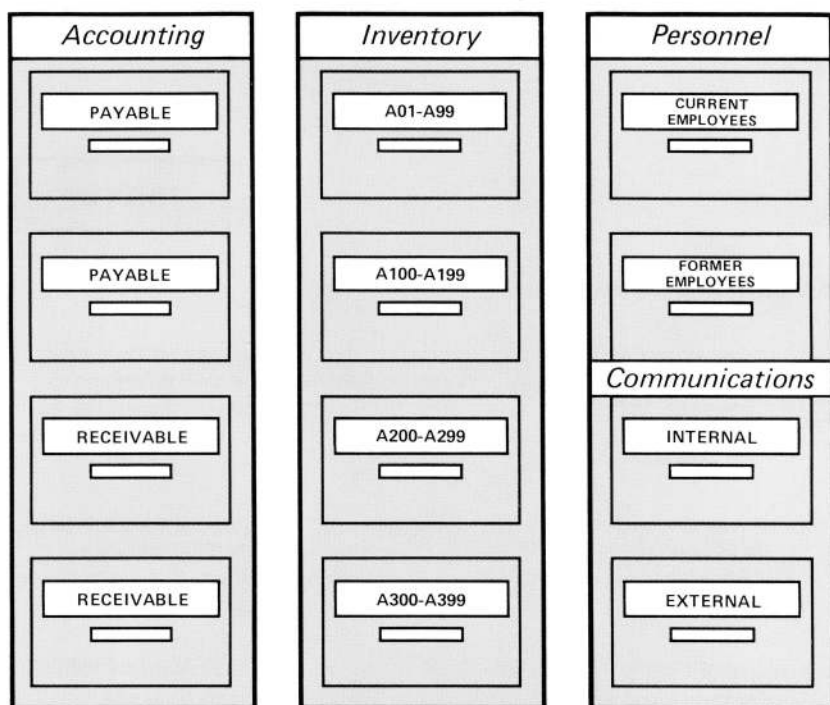


Figure 4-2. The Widgets, Inc., Filing System

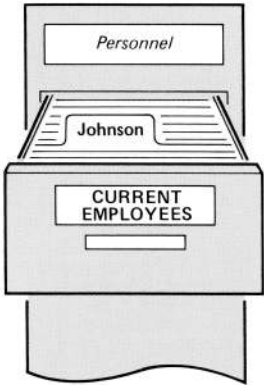
The left cabinet is labeled ACCOUNTING, the right cabinet is labeled PERSONNEL, and the center cabinet is labeled INVENTORY.

The ACCOUNTING file cabinet has two drawers marked PAYABLE and two drawers marked RECEIVABLE. In each drawer are a lot of file folders, one folder for each company that has an open account with Widgets, Inc.

The PERSONNEL cabinet has two drawers for individual file folders. One drawer is marked CURRENT EMPLOYEES; the other is marked FORMER EMPLOYEES. This cabinet also has two drawers for COMMUNICATIONS. The drawer for INTERNAL COMMUNICATIONS contains file folders for each person who's ever sent a memo, and each folder contains every memo that person has sent. The drawer for EXTERNAL COMMUNICATIONS contains all the documentation of Wigdet products, filed by product name.

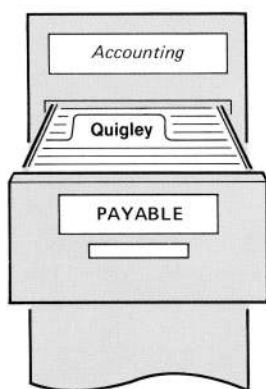
You are in charge of maintaining these file cabinets, getting things from them, and filing documents in them. If you need Sam Johnson's personnel file, you go to the PERSONNEL cabinet, look in the CURRENT EMPLOYEES drawer, and find the Johnson file.

→Personnel→Current Employees→Johnson



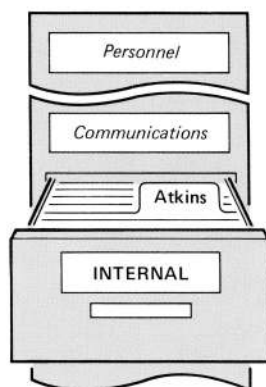
If you need to find out how much is owed to the Quigley Supply Company, you go to the ACCOUNTING cabinet and look in the PAYABLE drawer for the Quigley file.

→ Accounting → Payable → Quigley



If Steve Atkins gives you a copy of a memo he wrote, you return to the PERSONNEL cabinet, open the INTERNAL COMMUNICATIONS drawer, find the Atkins file, and drop the memo in with all of the others Steve has sent.

→ Personnel → Internal Communications → Atkins



Now you are going to store Widgets' records on flexible disks. You set up the filing system in exactly the same way, with three volumes corresponding to the three Widget file cabinets (Figure 4-3):

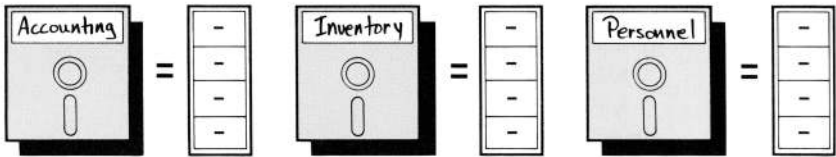


Figure 4-3. Disk = File Cabinet

Each volume takes the same name as the file cabinet it replaces: This name is the *volume name* of the disk and the name of the disk's *volume directory*. So the volume /ACCOUNTING has a volume directory that lists subdirectory files named PAYABLE and RECEIVABLE , corresponding to the drawers in the file cabinet. The PAYABLE subdirectory contains files named QUIGLEY , ACME , and so forth, and these files contain the same information that was previously in the individual file folders.

```
/ACCOUNTING
  PAYABLE
    ACME
    QUIGLEY
  RECEIVABLE
```

The structure is the same throughout the rest of the filing system. The volume /PERSONNEL contains three subdirectory files: CURRENT , FORMER , and COMMUNICATIONS . The COMMUNICATIONS subdirectory contains subdirectory files called INTERNAL and EXTERNAL ; INTERNAL contains subdirectories for JOHNSON , ATKINS , and all the rest of the memo-senders; and finally the subdirectory ATKINS contains a file for each memo Steve Atkins has sent.

```
/PERSONNEL
  CURRENT
  FORMER
  COMMUNICATIONS
    INTERNAL
      ATKINS
        MEMO1
        MEMO2
      JOHNSON
    EXTERNAL
```



Before you can put a file into a subdirectory, you need to create that subdirectory on your volume. Making subdirectories is described in Chapter 6.

Using Pathnames

To get Sam Johnson's personnel file, you tell SOS how to locate that file by typing a pathname. The pathname of Sam Johnson's file, which has the file name JOHNSON , is

```
/PERSONNEL/CURRENT/JOHNSON
```

This pathname corresponds to the PERSONNEL cabinet, CURRENT drawer, JOHNSON folder. If the volume PERSONNEL is in .D2 , this pathname can also be written .D2/CURRENT/JOHNSON .

The pathname for the Quigley accounts payable file is

```
/ACCOUNTING/PAYABLE/QUIGLEY
```

and the pathname of the memo that Steve Atkins sent on March 15 is

```
/PERSONNEL/COMMUNICATIONS/INTERNAL/ATKINS/MARCH. 15
```

(The period is in MARCH.15 because a file name cannot contain a space.)

Each file has one pathname, and each pathname specifies only one file. For example, you may have two files named QUIGLEY, one for accounts payable and one for accounts receivable, but you can still tell them apart by their pathnames. One is named

`/ACCOUNTS/PAYABLE/QUIGLEY`

and the other is

`/ACCOUNTS/RECEIVABLE/QUIGLEY`

Although the two files have the same file name, QUIGLEY, you and SOS can't confuse them because they have different pathnames.

The Prefix and Partial Pathnames

Sometimes it's inconvenient to have to specify a complete pathname whenever you wish to locate a file. For example, if you want to look at all the memos Steve Atkins has sent during his career with Widgets, Inc., you wouldn't want to have to type the entire forty- or fifty-character pathname of each memo. SOS avoids this inconvenience by means of a stored pathname called the *prefix*. A prefix is a pathname that specifies a directory or subdirectory. Once you have set the prefix, you can refer to any file listed in the prefixed directory by its file name alone.

To gain access to all of Steve Atkins' memos, you set the prefix to

`/PERSONNEL/COMMUNICATIONS/INTERNAL/ATKINS`

Then you can see individual memos by typing only their file names: MARCH.15, BUYPLAN, SELLSCHED, and so forth. Setting the prefix is like bringing just one drawer from the filing cabinet over to your desk: You know you won't need the contents of all three cabinets at your fingertips, only the files in the drawer you have.

You can set the prefix to the pathname of any directory or subdirectory, as explained in the section Set Prefix in the chapter System Utilities: File Handling. Individual application programs and languages may have other ways of setting the prefix; refer to their respective manuals.

If the prefixed directory has subdirectories, you locate the files in the subdirectories by using *partial pathnames*. A partial pathname is simply the last parts of the pathname following those parts specified by the prefix. If you are looking at all the Widget employee files, both current and former, you can set the prefix to /PERSONNEL ; then you can refer to current employee Sam Johnson's file by the partial pathname

CURRENT/JOHNSON

and former employee George Simpson's file by the partial pathname

FORMER/SIMPSON

Even when you set the prefix, you can still get to any other file in the system by supplying its full pathname. For example, if you set the prefix to /ACCOUNTING , you could still get to a program that is stored on your ProFile by the full pathname

.PROFILE/PROGRAMS/MAILLIST

without changing the prefix.

When you set a prefix, you can locate any file contained within the prefixed directory by typing either a partial pathname or a file name. With the prefix still set to /ACCOUNTING , you can locate the Quigley receivable file by the partial pathname

RECEIVABLE/QUIGLEY

and you can also use an auditing and balancing program listed in the directory /ACCOUNTING by typing its file name

AUDIT.BAL

all without changing the prefix.

Using Files

Among the standard operations you can perform on disk files are storing information in them from the Apple III's memory, reading information from them into memory, creating new files and destroying old ones, and changing their names. You can also set the prefix and find out what the current prefix is.

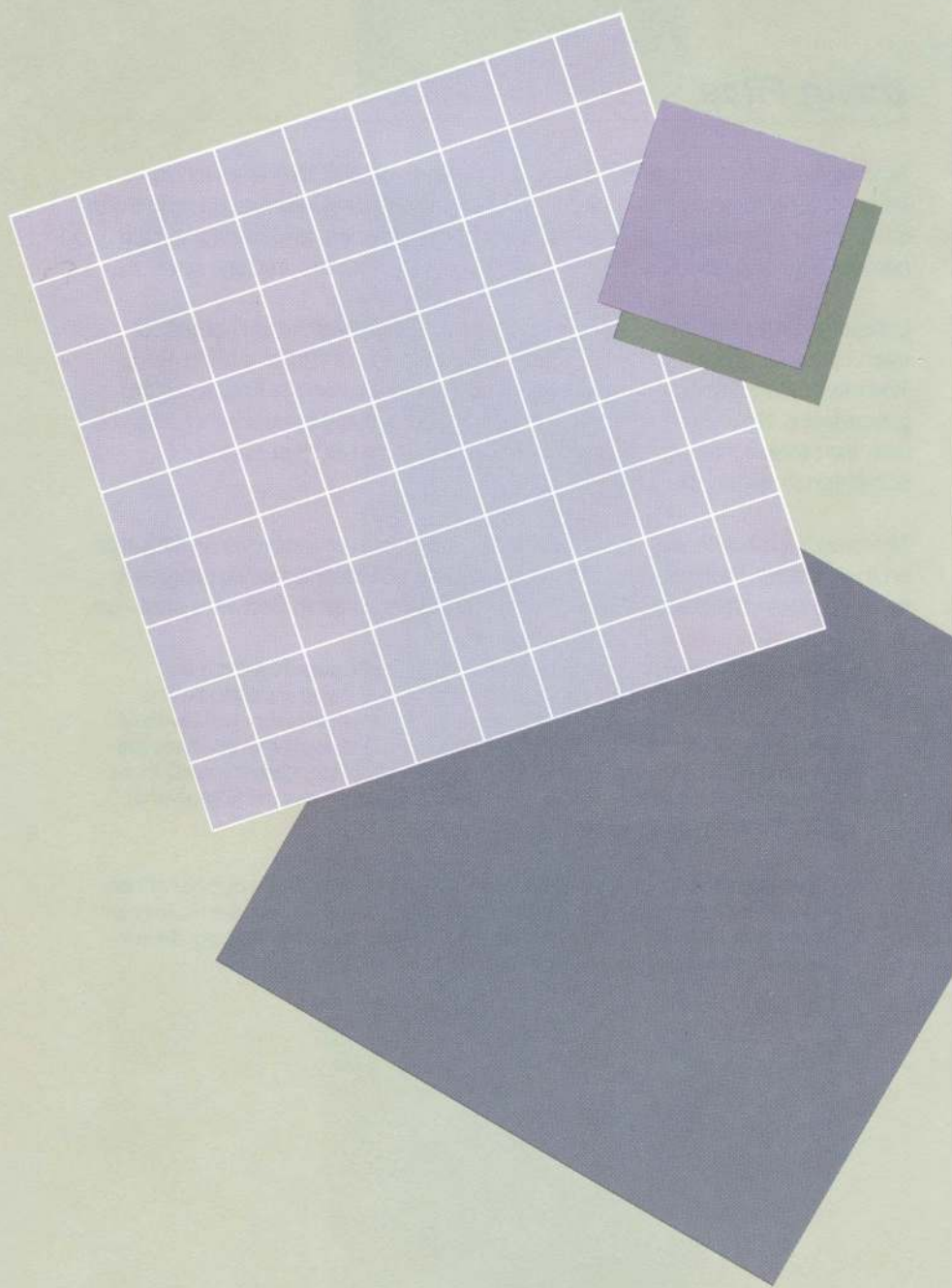
Languages and application programs may have slightly different names for each of these procedures and slightly different ways of implementing them. The manuals that accompany your software describe exactly how to do the procedures. No matter what types of languages and application programs you use, the reason that you can use such a variety is that SOS provides consistency within the Apple III.

The next two chapters discuss how to do some basic procedures on files and on the volumes that contain them. The procedures are all done via programs on the System Utilities disk, which you'll find in the System Software package.



On smaller volumes, you'll rarely need to build a storage hierarchy as complex as the one in the Widget, Inc., example. If you are using flexible disks, you'll find that you usually won't have more than one or two levels of subdirectories on any one volume. The important thing is that you have the capability for complex file organization. If you acquire a disk drive with more capacity, such as the ProFile, you'll probably want to use the full power of pathnames and prefixes.

See Appendix D, System Specifications, for the limits on the number of files in a volume directory or subdirectory: It appears that volume directories can hold fewer files than subdirectories. Remember, however, that any file in a volume directory can be a subdirectory.



System Utilities: Device Handling

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System Utilities: Device Handling

The Utilities Disk

You use text-editing programs to create text files, programming languages to create code files, and accounting programs to create data files. But the programs on the System Utilities disk cannot create these kinds of files, look inside them, or change their contents. Only the programs that you use to create the files allow you to read or edit the information contained in them.

Some of the programs on the Utilities disk allow you to organize files that are created with other programs into convenient arrangements. The Utilities disk is your file clerk: It moves file folders from drawer to drawer, but doesn't write the letters and memos inside them. This chapter and the two that follow show how you use the Utilities programs to organize your files efficiently, regardless of the application software or programming languages you use on your Apple III.

The System Utilities disk contains programs that allow you to

- *manage devices and the volumes they contain* by formatting volumes to hold data, making subdirectories, and copying the contents of one volume onto another. Device-handling operations are discussed in this chapter.
- *manipulate files* by copying, deleting, and renaming them. Chapter 6 discusses file-handling operations.
- *configure the operating system* so SOS knows what devices are connected to your Apple III and has the device drivers to communicate with them. Chapter 7 discusses the System Configuration Program (SCP).

The next two sections of this chapter describe how to move through the Utilities programs and what you'll see on your display screen when you use them.

Insert the Utilities disk into the built-in disk drive and start up your Apple III. In about 40 seconds, you should see the Utilities Main Menu (Figure 5-1) on your display screen.

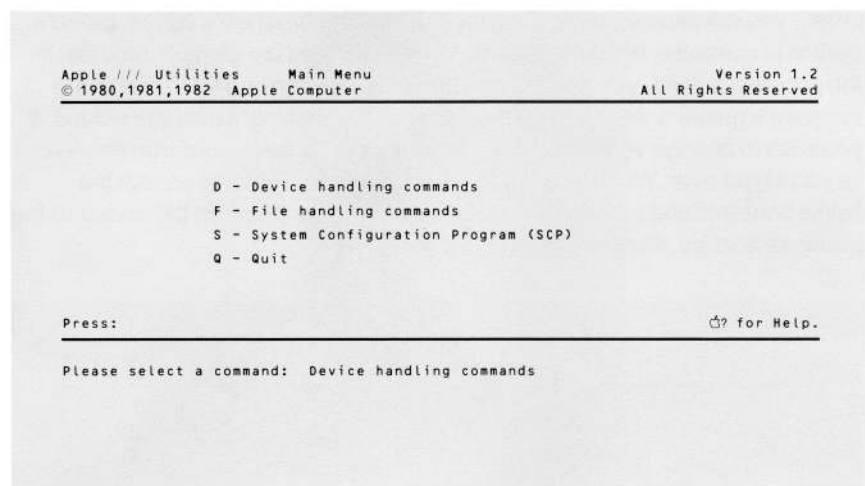


Figure 5-1. Utilities Disk Main Menu

Utilities Menus and Displays

You can select an option from the Main Menu in two ways. You may type the letter associated with the option. Or you may use the ↑ and ↓ keys to move the highlight bar; press RETURN when the option you want is in inverse video, that is, highlighted with black text on light background.



Note that each option on the Utilities menus has one, and only one, capital letter. This is the letter you type to select that option.

When you select any of the first three options, you see a second-level menu with a set of command options. When you choose any of these second-level options, you see a display rather than a menu.

Think of a display as a form you fill out—an application for a driver's license, for example. (A sample is shown in Figure 5-2.) The display contains a series of statements or requests for the information that SOS needs to comply with the command you've selected from the second-level menu. The immediate question you must answer is displayed in inverse video, and each question includes room for your typed answer in an area called a *field*. The cursor will rest in the first space of the answer field.

Often, you will see information in a field. This is the program's guess, called a *default* in computer jargon, about the information you are going to provide. If the program is right, you can accept the guess by pressing RETURN. If the program's guess is wrong, type the correct response right over the default. If you wish to change your response, move the cursor backward with the ← key and type over. When you are satisfied, press RETURN to accept the field's contents and to move to the next field. You can back up the cursor to the previous field by pressing CONTROL-RETURN.

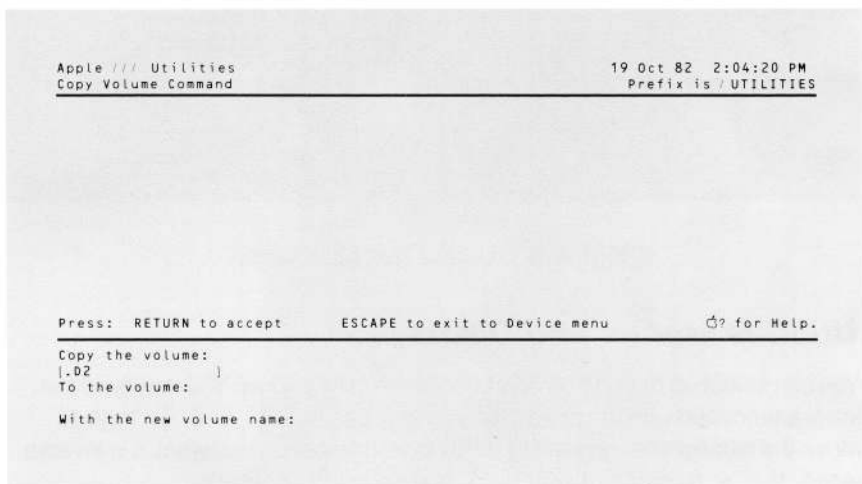


Figure 5-2. A Sample Display



If you hold down the  key while you press the question mark, you'll see a *help message*: reminders about how to choose options and edit fields. Chapter 6 discusses field editing in detail.

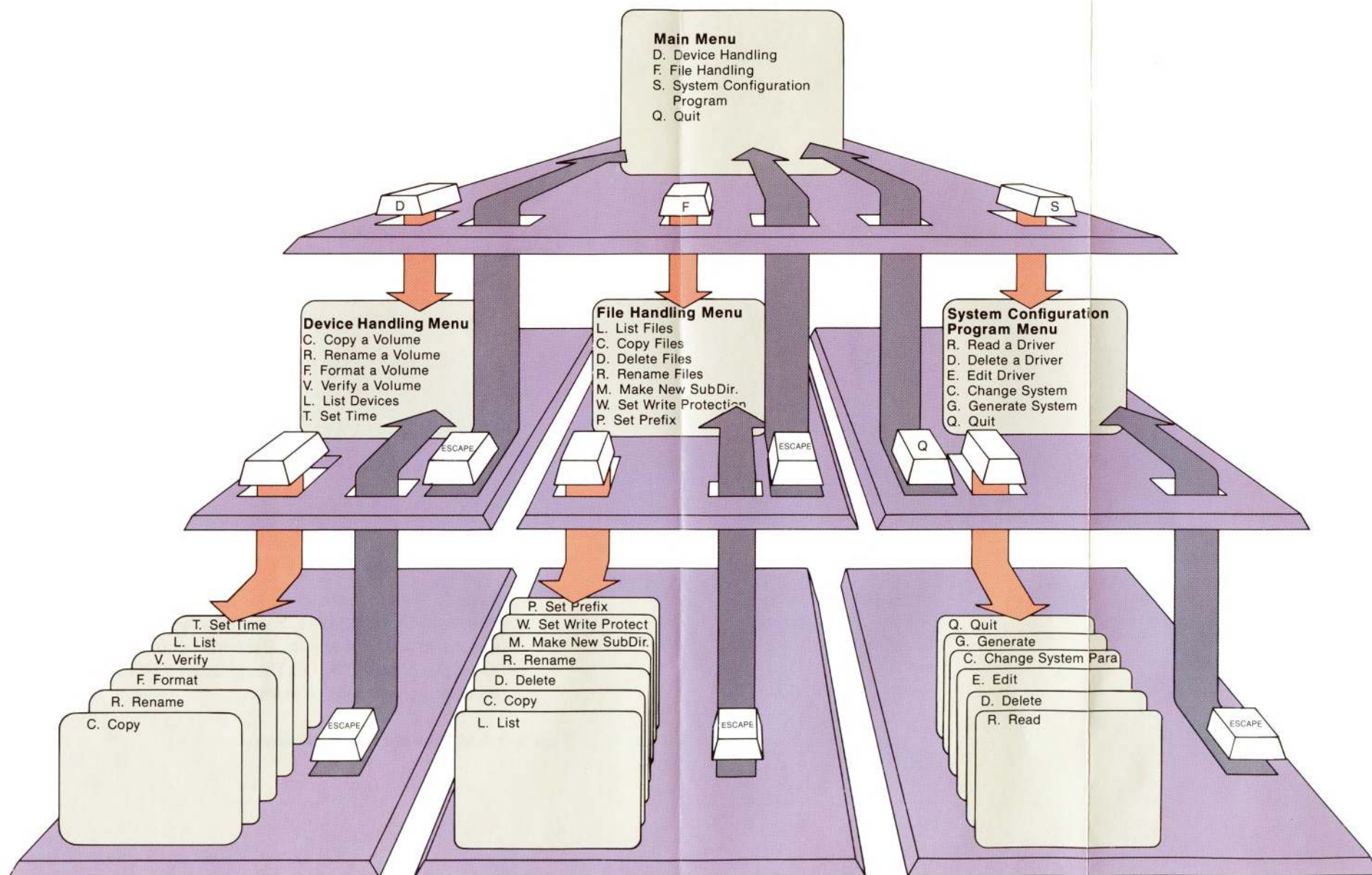


Figure 5-3. The Utilities Menus and Displays

Moving Through the Utilities

The diagram in Figure 5-3 illustrates the levels of the Utilities menus and displays. Movement through the levels is consistent. Choosing an option from the Main Menu brings a second-level menu to your screen; choosing a second-level option brings a display. From a display, press ESCAPE once to return a second-level menu to your screen or press ESCAPE twice to bring back the Main Menu.



If you have been using SCP, you need to press Q to bring back the Main Menu. This is to prevent inadvertent exiting from the SCP option.

Take a few moments now to move back and forth through the menus and displays by choosing options and pressing ESCAPE. Remember that you select a menu option by typing the letter associated with the option. If you wish, you may move the highlight bar by pressing the ↑ and ↓ keys, and then pressing RETURN when the option you want is highlighted.

As you move through the Utilities programs, notice the format of the menus and displays:

- The name of the current menu or display is in the upper-left corner; the date and time and the current prefix are in the upper-right. (This chapter describes how to set the date and time; Chapter 6 discusses setting the prefix.)
- Menu options appear in the center of the screen; display questions and the fields for responses are below the lower horizontal line.
- Immediately above the lower horizontal line are a series of reminders. The reminder on the left tells you when you need to press RETURN to make an operation happen. The center one tells what will happen when you press ESCAPE. The reminder on the right tells how to bring a help message to your screen.

Figure 5-4 illustrates a typical display.

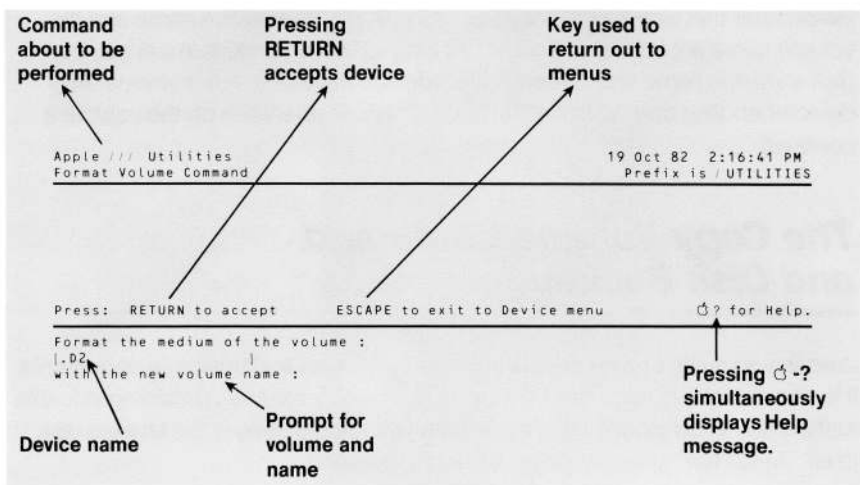


Figure 5-4. Display Format

Exiting from the Utilities Programs

The last option on the Main Menu is Quit. When you have finished with the Utilities disk and are ready to move on to another program, type Q. You'll see

INSERT SYSTEM DISK & REBOOT

Remove the Utilities disk from the built-in drive and insert another program disk. Then start up your new program by pressing CONTROL-RESET.

Operations on Devices

The programs on the Utilities disk contain commands that perform operations on devices and the volumes they contain. Most of the commands work only on block devices like disk drives, which store information: You can copy one volume onto another, rename a volume, format a volume to hold information, or verify the condition of a volume. Other commands work for all devices: You can list the devices the operating system knows about or set the time and date.

Remember that when a disk drive contains a disk, the device name and the volume name are interchangeable. As long as a disk remains in a drive, that disk's volume name and its disk drive's device name are synonymous. Any device-handling operation on that drive is also an operation on the volume it contains.

The Copy Volume Command and Disk Backup

Just as you make copies of your important personal and business documents, it is vital to make at least one backup copy of every volume containing valuable software or information. The first volume you should copy is the Utilities disk itself. To do this, use the Copy Volume command.

The Copy Volume command needs two volumes: a *source volume* that contains the information to be copied, and a *destination volume*. To make a backup copy of the Utilities disk, therefore, you need the Utilities disk itself and one blank disk.

Almost any volume can be the destination volume. The Copy Volume command can copy onto an unformatted disk, formatted blank volumes, or volumes that already have information on them.



The Copy Volume command makes an exact copy of the source volume onto the destination volume. Any information previously on the destination volume will be lost. If you attempt to copy onto a volume that already contains some information, you'll be asked to verify that you do indeed want to destroy the current contents of that destination volume.

To copy the contents of an entire volume onto another, both the source and destination volumes and their respective disk drives must be of the same capacity. A flexible disk and a ProFile disk do not have the same capacity. But, for example, a Disk III drive and a Disk II drive for the Apple III are devices with the same capacity. When you can't copy an entire volume, you must make the copy file by file, as described in the section Copy Files in Chapter 5.

To copy a volume, choose the option

D - Device handling commands

from the Main Menu by typing D. You will see the Device Handling menu shown in Figure 5-5.

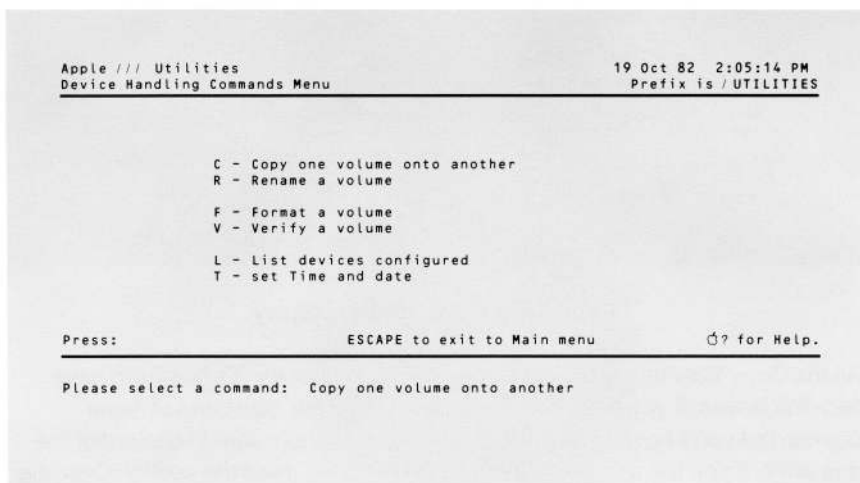


Figure 5-5. Device Handling Menu

From the Device Handling menu, choose the first option

C - Copy one volume onto another

to see the Copy Volume display, Figure 5-6.

Apple /// Utilities
Copy Volume Command

19 Oct 82 2:04:20 PM
Prefix is /UTILITIES

Press: RETURN to accept ESCAPE to exit to Device menu ⌘? for Help.

Copy the volume:
[.D2]
To the volume:
With the new volume name:

Figure 5-6. Copy Volume Display

As the Copy Volume command works with two volumes, it's helpful to have two disk drives. If you have only the built-in disk drive, you can still make copies, but you'll have to swap source and destination disks in and out of the one drive. If you are using only the built-in disk drive, read the section Copying with One Drive.

Copying with Two Drives

Be sure the Utilities Disk is in the built-in disk drive before proceeding.

The first, highlighted, question

Copy the volume:

asks you for the name of the device that holds the source volume. The program's guess is in the field below the question. You won't use this assumption since the Utilities disk, the source volume, is already in the built-in disk drive. Type .D1 , the device name for the built-in disk drive, and press RETURN.



You may type upper- or lowercase letters. If you mistype an entry, backspace with the ← key and type over your mistake.

The highlight will move to the second question:

To the volume:

This question asks for the name of the device that will hold the destination volume. Note that the program's guess is based on your answer to the first question. Insert the destination volume into the external disk drive, called .D2 . Then press RETURN to accept the program's guess.

The program guesses an answer to the last question

With the new volume name:

The program's guess will always be the name of the source volume. If you want the copy to have the same name as the original, you need only press RETURN. It's a good idea to give the copy a different name, so type the new name over the source volume's name and press RETURN. Remember that volume names begin with a slash (/) followed by a letter and up to 14 additional alphanumeric characters. (See Chapter 4, section Volumes.) When you press RETURN, the copy operation begins immediately.

If the destination volume is unformatted, the Utility program formats it before the copy operation proceeds. The external disk drive makes a few raspy sounds and you see the message

Formatting...

in the center of your display screen.



The section Format a Volume, later in this chapter, contains an expanded discussion of formatting.

If the destination volume is a SOS-formatted disk that contains information, the Utility program asks you

Destroy old /BLANK13 ? [Yes/No]

using whatever volume name it finds already stored on the destination volume. This is a safety feature to prevent you from inadvertently destroying valuable information. If you have inserted the wrong volume, you can cancel the copy operation by typing N (No), and no information will be destroyed. If you really intend to replace the old information with the new copy, type Y (Yes).

When the copy operation is complete, you'll see the message

Copy successful

in the middle of the Copy Volume display, and your answers to the questions will remain at the bottom of the display. To make another copy of the Utilities disk, you need only insert another destination volume in .D2 and press RETURN three times.

When you are finished copying, press ESCAPE to return to the Device Handling menu. To go back to the Main Menu, press ESCAPE again.



The Copy Volume procedure described above is a special one. If you have only one external disk drive and are copying a volume other than System Utilities, put the source volume in .D2. After you answer the first question and press RETURN, remove the Utilities disk from .D1 and insert the destination volume.

If the destination volume has never been formatted, you will see

Insert UTILITIES volume
Type SPACE to continue; ESCAPE to quit

Remove the destination volume from the built-in drive. Insert the Utilities disk and press the SPACE bar. The Apple III will retrieve the formatting program. Then you'll be asked to reinsert the destination volume. After the volume is formatted, the Copy Volume operation will continue.

Copying with One Drive

Be sure the Utilities disk is in the built-in disk drive before proceeding.

The procedure for copying volumes with only the built-in disk drive is much the same as the procedure for two drives, except that you must repeatedly swap the source and destination volumes in and out of the single drive.

The first question on the Copy Volumes display

Copy the volume:

asks you for the name of the device you are going to put the source volume in. You cannot use the answer the program provides, so type .D1 , the device name for the built-in disk drive, and press RETURN.



The program provides the device name .D2 until you use the System Configuration Program (SCP) to tell SOS that you have only one disk drive. The SCP is described in Chapter 7 and also in the *Standard Device Drivers Manual*.

The highlight will move to the second question:

To the volume:

This question asks for the name of the device in which you're going to put the destination volume. Since you only have one drive, type .D1 over the program's guess and press RETURN.

The program guesses an answer to the last question

With the new volume name:

The program's guess will always be the name of the source volume. If you want the copy to have the same name as the original, you need only press RETURN. It's a good idea to give the copy a different name, so type the new name over the source volume's name and press RETURN. Remember that volume names begin with a slash (/) followed by a letter and up to 14 additional alphanumeric characters. (See Chapter 4, section Volumes.) When you press RETURN, the copy operation begins immediately.



You may type upper- or lowercase letters. If you mistype an entry, backspace with the ← key and type over your mistake.

You will be asked to insert the destination volume into the built-in disk drive. Remove the Utilities disk, replace it with the destination volume, close the disk drive door, and press the SPACE bar to signal that you're ready to continue the copy operation.

If the destination volume is unformatted, the Utility program formats it before the copy operation proceeds. Return the Utilities disk to .D1 when requested, so the Apple III can load the formatting program into memory. When you put the unformatted destination volume back into .D1, the disk drive makes a few raspy sounds. Then you'll see the message

Formatting...

in the center of your display screen. When the formatting operation is complete, insert the source volume again to begin copying.



The section Format a Volume, later in this chapter, contains an expanded discussion of formatting.

If the destination volume is a SOS-formatted disk that contains information, the program asks you

Destroy old /BLANK13 ? [Yes/No]

using whatever volume name it finds already stored on the destination volume. This is a safety feature to prevent you from inadvertently destroying valuable information. If you have inserted the wrong volume, you can cancel the copy operation by typing N (No), and no information will be destroyed. If you really intend to replace the old information with the new copy, type Y (Yes).

The Apple III now writes (stores) all the information it loaded into its memory onto the destination volume. Then it asks you to insert the source volume again so that it can load more of the information you wish to copy. Open the door, remove the destination volume, and insert the source volume. Close the door and press the SPACE bar.

Continue to swap source and destination volumes as requested until you see the message

Copy successful

in the middle of the Copy Volume display. The program keeps track of which disk is in the drive and tells you which disk it needs next.

When the copy operation is complete, your answers to the questions remain at the bottom of the display. To make another copy of the Utilities disk, you need only press RETURN three times.

When you are finished copying, press ESCAPE to return to the Device Menu. Go back to the Utilities Main Menu by pressing ESCAPE once again.



If you find a volume named HVRMHGL, something went wrong during the Copy Volume operation. Most likely, the entire source volume didn't get copied. Reformat the destination volume and copy again.

Write-Protection

Leave the Main Menu on your display screen and compare the appearance of the original Utilities disk with the copy. The copy has a notch on its right side and the original does not. This notch allows the Apple III to write (store information) to a disk. The original Utilities disk, which has no notch, is *write-protected*: The computer cannot write to it or erase any information it contains.

You can write-protect your own disks, too. Inside boxes of blank disks you'll find silver *write-protect tabs*. You can write-protect a disk by covering the notch with a write-protect tab: Just fold it over the edge of the black disk cover, one end of the tab on each face of the disk; Figure 5-7 shows you how.



Figure 5-7. Putting on a Write-Protect Tab



Write-protect tabs protect an entire disk. You can protect individual files on a disk with the Set Write Protection command described in Chapter 6.

It's a good idea to put a write-protect tab on any disk you wish to copy from. This way, if you specify the source and destination volumes incorrectly, you won't erase the wrong disk. If you wish, you can remove the write-protect tab from the source volume when you finish copying.

Your Computer's Messages

Most of the time, you give messages to your Apple III: program requests or information you want the computer to process. Occasionally, your computer will give you messages. Sometimes your Apple III will beep. This tells you to pay attention; you've probably pressed an incorrect key or neglected a step in a program. At other times, you may see messages on your display screen.

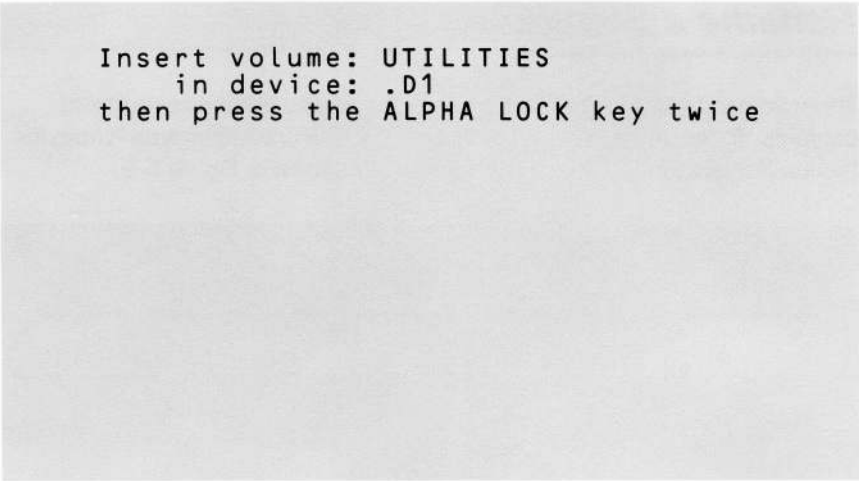
Errors and Warnings

Error and warning messages may come up on your display screen whenever you do something that may destroy information, when you inadvertently omit a step in the procedures of your programs, or when your Apple III diagnoses an internal problem. Often the messages indicate what you can do to remedy the situation. There's no hurry—your Apple III will wait patiently for you to do what needs to be done. The manuals for your languages and applications will tell you what the messages mean and what to do when you see them. For example, Appendix A of this manual describes SOS messages.

The SOS Disk Request

SOS keeps things straight when you're swapping volumes in and out of the same drive to get information from both of them. If SOS can't find the volume it needs or expects, you'll see a disk request.

Try an experiment. You should still have the Utilities Main Menu on your display screen. If you haven't already done so, remove the Utilities disk from the built-in disk drive and insert the System Demonstration disk. Now type S (for System Configuration Program) and see what happens. You'll hear a beep from the Apple III and some raspy sounds from the internal disk drive. Then you'll see the message displayed in Figure 5-8.



```
Insert volume: UTILITIES
      in device: .D1
then press the ALPHA LOCK key twice
```

Figure 5-8. The SOS Disk Request

After you insert the Utilities disk again and press the ALPHA LOCK key twice, the Main Menu will reappear on the screen.

What just happened is this: When you pressed S, the Apple III tried to read the SCP from the Utilities disk. When the computer couldn't find the disk, it asked you to put it in—and it waited for you to do so and confirm that you had. Any time SOS cannot find the disk it expects to find in a given drive, you will see a SOS disk request.

The reason that SOS asks you to press the ALPHA LOCK key (rather than, for example, RETURN) is that ALPHA LOCK does not type a character: If you had typed ahead, ALPHA LOCK would add no spurious character to your entry.

The rest of this chapter describes the other command options on the Device Handling menu.

Rename a Volume

This command lets you change the name of a volume without changing its contents. To rename a volume, first put it into a disk drive, then type R from the Device Handling menu. You'll see the display shown in Figure 5-9.

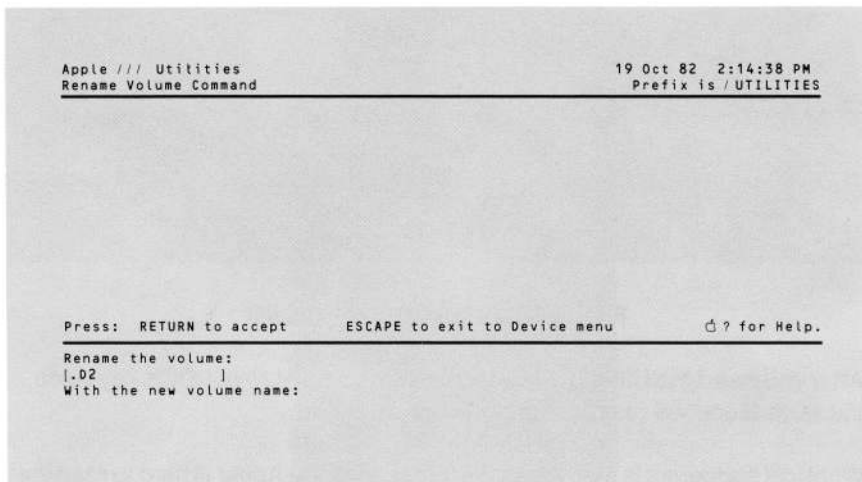


Figure 5-9. Rename a Volume

The first question asks which block device holds the volume you want to rename. If the volume you are renaming is in .D2 , you can use the program's guess by pressing RETURN. If the guess is incorrect, type the correct device name, then press RETURN to move to the next field.

Now type the new volume name over the current volume name, which the program provides as the answer to the second question. (The program provides the current name so that you can be sure you are renaming the correct volume.) The new volume name should *not* match the name of any volume presently in any disk drive. If it does, SOS may rename the wrong volume.



If the volume name you choose does not begin with a slash (/), you may see the message

Blocked volume name expected.

See Chapter 4, section Volumes, for information about the form of volume names.

When both fields are the way you want them, press RETURN. The renaming operation will begin immediately. When it is complete, you will see the message

/OLDNAME→/NEWNAME

Format a Volume

Your Apple III comes supplied with some blank flexible disks, and you can buy more from your Apple dealer. You use these disks to store information and programs you create while using Apple III programming languages or application software. But before your Apple III can store any information on a disk, you must first *format* it.

The Format Command on the Utilities disk calls up the formatting program, designed for use with many kinds of volumes: 5-1/4 inch (13.33 cm) flexible disks, which this manual discusses; larger flexible disks; and rigid disks such as the ones used in the ProFile disk drive.

Formatting a volume prepares it for use in three ways: First, it divides the recording surface, or *medium*, into 280 uniform, standardized *blocks* where the Apple III writes (stores) your information. Note that the medium of some storage devices like the ProFile is divided into blocks during manufacture. Second, the formatting program names the volume. Third, it writes a volume directory and other information that SOS needs to locate files.



You can reformat a volume that isn't blank, but doing so makes its old contents inaccessible.

To format a volume, first choose the option

D - Device handling commands

from the Main Menu by typing D. Then choose the option

F - Format a volume

from the Device Handling menu by typing F. You will see the display shown in Figure 5-10.

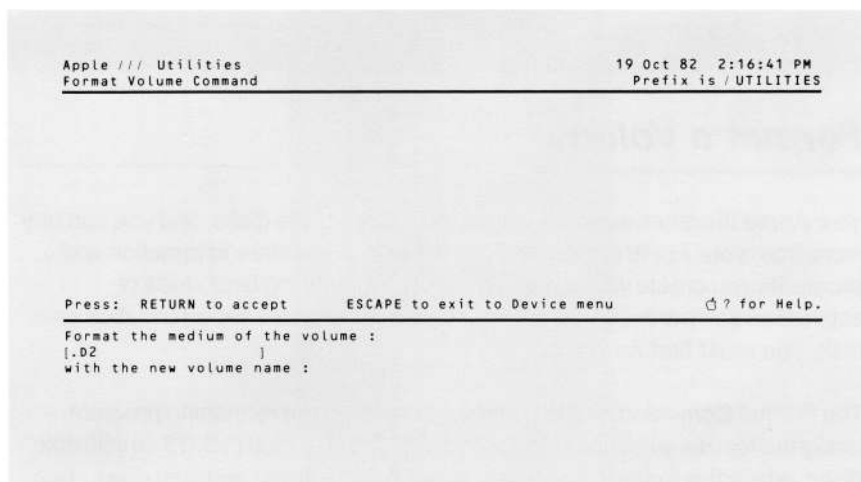


Figure 5-10. Format a Volume

The Format display asks two questions. First, it asks which device you're going to use to format the blank volume. Since this is usually a flexible-disk drive, the program guesses that you'll use .D2 , the name of the first external disk drive. Pressing RETURN accepts this guess as is; if you type anything, it will replace the program's guess.

If you have only the built-in disk drive, named .D1 , open the disk drive door, remove the Utilities disk, and insert the volume you wish to format. Type .D1 and press RETURN.

If you have one or more external disk drives connected to your Apple III, you might want to use one of them to avoid having to remove the Utilities disk from the built-in drive. The additional drives are named .D2 , .D3 , and .D4 , respectively. Storage devices other than flexible-disk drives have different device names, as specified in the manual accompanying the device.

After you specify a device, the highlight moves on to the next question:

With the new volume name : /BLANK23

If you have a name in mind for the volume, type it and press RETURN. However, if you do not choose a name, the formatting program will provide a name, chosen at random. Each time you run the formatting program, it picks a random starting number from 00 to 99 for the last two digits of the volume name /BLANK , and numbers further volumes in sequence from that number. If the numbers go past 99, the program starts the sequence over with 00. If you format several volumes in a row, the program numbers them in series from the first random number. This makes it easy to be sure your volumes have unique names.



You should assign a different name to each volume you use. If you have any external disk drives, it is important *never* to insert two volumes with the same name at the same time since this makes it possible for the computer to write to one volume information that belongs on the other, perhaps destroying existing information in the process.

If the volume you insert is not blank, the formatting program asks

Is it okay to destroy all the contents of /BLANK98?
[Yes/No]

using whatever name it finds assigned to the volume. This is a safety feature to prevent you from inadvertently destroying valuable information. You can safely cancel the formatting operation by typing N (No). If you do wish to reformat the volume you've inserted and erase the previous information, type Y (Yes).



If you formatted your destination volume via SOS or the Apple II Pascal program, you will receive warning before the copy is made because SOS can read these types of volumes. Any destination volume formatted in some other way will be overwritten without warning. It's a good idea to label such "foreign" disks carefully and store them away from SOS-formatted disks.

At the beginning of the formatting process, the disk drive makes a rattling sound. Then it whirs and zicks as SOS formats the volume, and you see the message

Formatting...

The program signals you that the operation is complete with the message

Formatting successful



If something goes wrong during the formatting operation, the program displays an error message. See Appendix A should this happen.

Remove the formatted volume from the disk drive, and label it with its newly assigned volume name. Place the disk back in its protective paper envelope and store it in a safe place.



It's always a good idea to have a supply of formatted disks on hand. Suppose you had entered a lot of information into the computer and then discovered that all your disks were full. You would have no place to store your new information while formatting a fresh disk. Every time you get new, blank disks, format them immediately so that they'll be ready when you need them.

Verify a Volume

Occasionally, you may suspect that a volume has been damaged or that the information stored on it has been scrambled. To check the condition of a volume, choose the Verify command from the Device Handling menu. When you select this command, you call up a program that checks each block of a volume for evidence of errors.

Each block of a volume has a *checksum*, a number that is derived from the contents of the block and that changes any time you change the contents of the block. The program computes the checksum each block should have and compares it with the checksum it does have. If the two numbers match, the block is not damaged; if the numbers are different, the block is faulty.

To find any bad blocks on a volume, type V (Verify) from the Device Handling menu. The program presents the display in Figure 5-11.

Apple /// Utilities Verify Volume Command

Press: RETURN to accept ESCAPE to exit to Device menu ⌘? for Help.

Figure 5-11. Verify a Volume

Verify the medium of the volume:

The next question:

asks you to specify the number of blocks to be checked. Usually you want the program to examine all of the 280 blocks the formatting process puts on a flexible disk, so that is the answer the program provides.



The number of blocks the program provides in the second question depends on the type of storage device attached to your system. If you have a ProFile, you will see a large number in this question.

When you press RETURN, the Verify operation begins. If your volume is not damaged, you see this message:

0 bad blocks.

If the volume is damaged, you see a message like this:

Block 44 is bad
Block 45 is bad



If the volume has any bad blocks, use the Copy Files command on the File Handling menu to copy its files one-by-one to another volume. This command will not copy files with bad blocks. Then reformat the volume with bad blocks and once again verify it. If the volume still has bad blocks, its recording medium is damaged, and it's a good idea to throw the disk away.

List Devices Configured Into System

This command lists the devices and volumes *configured into*, or connected with, your system. When you type L (List) from the Device Handling menu, the Utility program reads the SOS.DRIVER file of the program disk you used to start up your system and then gives you a list of all devices the operating system can communicate with (see Figure 5-12):

```
Apple /// Utilities                               19 Oct 82  2:19:42 PM
List devices command                             Prefix is /UTILITIES

Device Name      Volume Name
.CONSOLE
.D1              / UTILITIES
.D2              (no directory)
.PRINTER
.FMTD1
.FMTD2
.FMTD3
.FMTD4

Press: RETURN to accept      ESCAPE to exit to Device menu      ? for Help.
List all devices configured into system, sending the listing to the file:
|.CONSOLE
```

Figure 5-12. List Devices Configured Into System



You may have different program disks for different purposes, each disk with its own SOS.DRIVER file. The list of configured devices may vary from one program disk to another.

The list displays the name of each device configured into your system, based on the startup SOS.DRIVER, and the volume name, if any, of each block device. An empty disk drive will have no volume name, as indicated by the message

(no directory)

and an inactive device driver will have an asterisk (*) next to its name.



For more information, see Chapter 7, section Read a Driver.

Set Time and Date

As described in Chapter 2, your Apple III has a clock/calendar that runs on batteries. Once you set the time and date, the clock/calendar runs automatically whether your computer is turned on or not. You need to change the setting only when the batteries die or to make adjustments for Daylight Savings Time, for example.

To set or change the date and time, type T (set Time) from the Device Handling menu and press RETURN. You will see the display shown in Figure 5-13.

Press: RETURN to accept ESCAPE to exit to Device menu ⌘? for Help.

Set the Date to: [19 Oct 82] date-month-year (month and year are optional)

Set the Time to: hour:minute:second xM (minute and second optional)

Figure 5-13. Set Time and Date

The program provides the current date based on the last time the clock/calendar was set. If you want to keep the same date, press RETURN. If you want to change the date, type the day first, then the month, then the year, all separated by hyphens. The day must be a number, the month is abbreviated to the first three letters of its name, and the year must be a two-digit number. You can use the → key to move the cursor over any correct part of the date the program provides. When you have the date you want, press RETURN to set the time.

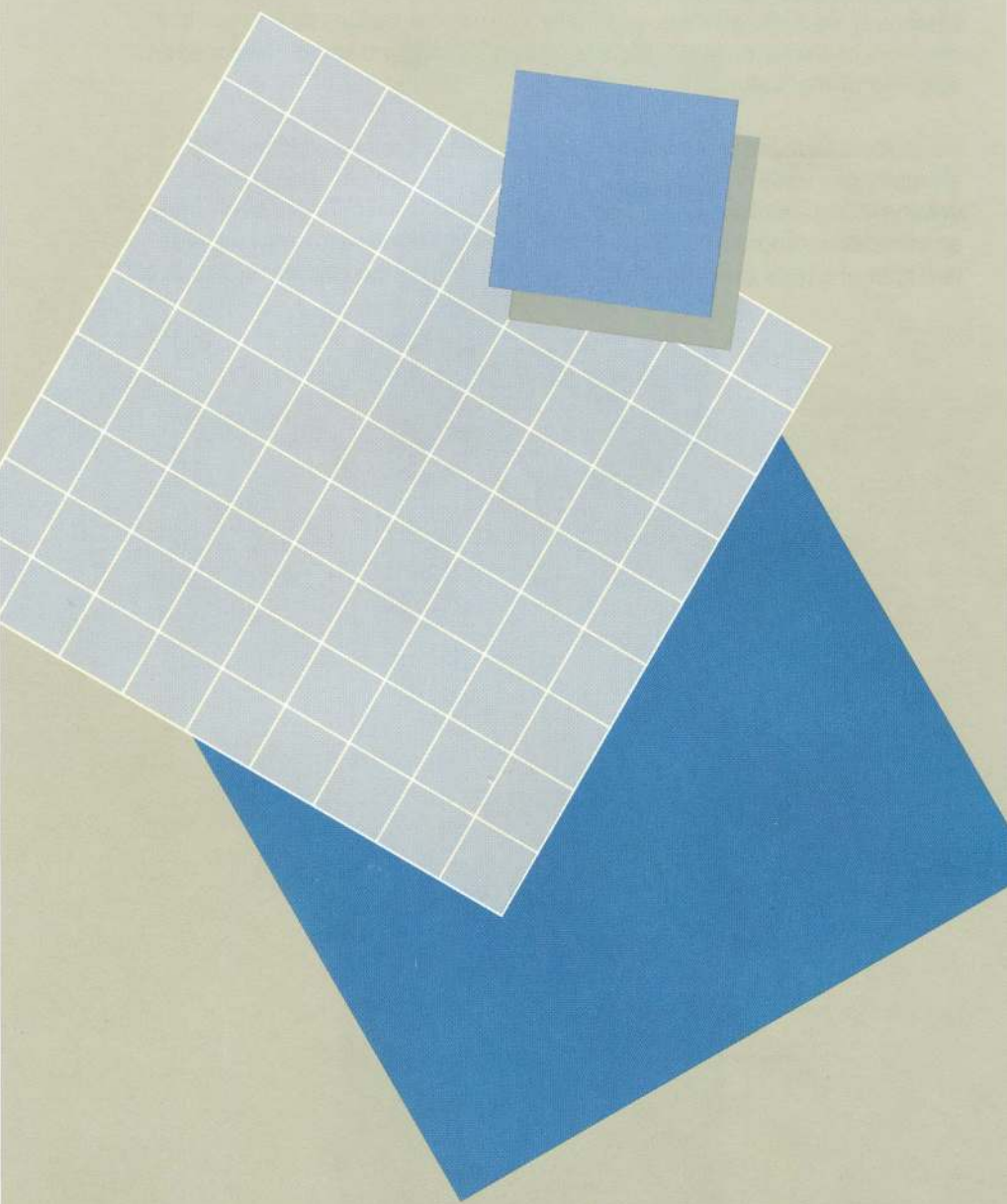
If you want to keep the same time, press SPACE and then press RETURN. To change the time, type the hour, minute, and second, separated by colons. You can use the → key to retain any correct information in the time the program provides. When you have the time you want, press RETURN.



You may use either a 12-hour or 24-hour time cycle. If you use a 12-hour cycle, include *a.m.* or *p.m.* when you type the time. If you use a 24-hour cycle, the *a.m./p.m.* distinction isn't necessary: in this case, for example, 6 *p.m.* becomes hour 18.

Every time you store information on a volume, SOS marks the file containing the information with the date and time. If you change the file's contents, the operating system notes the date and time of the new version. As described in Chapter 6, section List Files, whenever you use the Utilities disk to see the directory of a volume, you'll see the date and time you created or worked on each file of that volume.

Most application programs have a command that enables you to see the directory of a volume, but not all programs include time and date in their catalog listing. SOS, however, marks a file with the date and time even when an application program may not list it. Whenever you need to know the date and time of a file's creation or revision, you can use the Utilities disk to see it.



System Utilities:

File Handling

105	Creating a File Hierarchy
108	Operations on Files
108	List Files
111	Trying It Out
112	Copy Files
113	Trying It Out
115	Delete Files
117	Trying It Out
118	Rename Files
120	Make a Subdirectory
121	Set Write Protection
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124	Special Features
125	The Wildcard and File Patterns
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129	Editing Display Fields
130	Summary of Special Features
130	Field Editing
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132	Editing Keys
133	File-Search Keys

System Utilities:

File Handling

Chapter 5 discussed how to manipulate entire volumes. This chapter describes how to manipulate individual files by making subdirectories, renaming and deleting files, and moving them from one volume to another. You'll also learn how to use file search and field editing, two special features of the Utilities disk that make file handling quick and efficient. All the examples are based on the Widget file system described in Chapter 4.

To try out the file-handling commands, you'll need a formatted, blank volume named `/PERSONNEL`. Insert the Utilities disk into the built-in disk drive and start up your Apple III by turning on the power or by pressing `CONTROL-RESET`. Then format and name your `/PERSONNEL` disk. Remember that when you finish trying out the file-handling commands, you can reformat the disk so it will be ready to hold files of your own information.

After you prepare the `/PERSONNEL` disk, return the Utilities Main Menu to your display screen. Then type `F` to load all of the file-handling programs into your Apple III's memory and bring the File Handling menu (Figure 6-1) to your display screen.

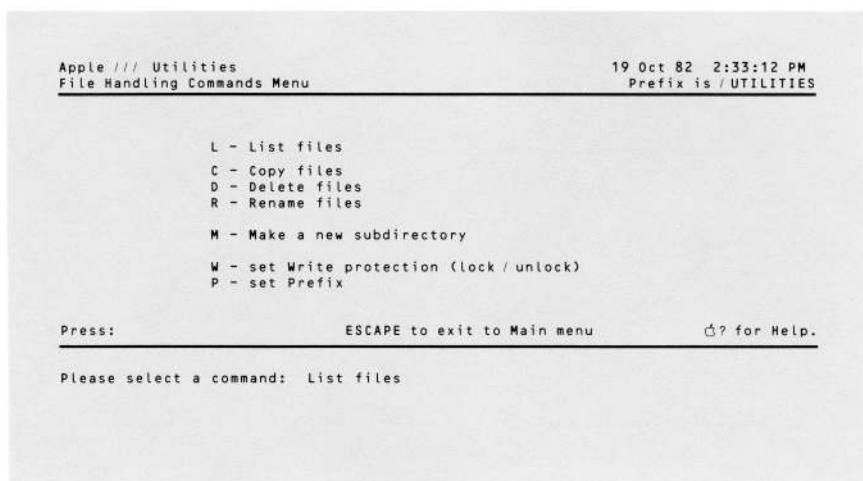


Figure 6-1. File Handling Menu

In the next section, you'll use some of the file-handling commands to begin organizing the /PERSONNEL files.

Creating a File Hierarchy

If you have only the built-in disk drive, be sure the File Handling menu appears on your screen; then remove the Utilities disk and insert /PERSONNEL . If you have an external disk drive, insert /PERSONNEL into it; you may keep the Utilities disk in the built-in disk drive.

List the directory of /PERSONNEL by first typing

L

to call up the List command. Then type the volume name

/PERSONNEL

and press RETURN three times. After the menus go away, you will see the display shown in Figure 6-2.

Apple /// Utilities
List Files Command

19 Oct 82 2:38:21 PM
Prefix is /UTILITIES

/PERSONNEL	File type	Blocks	Modified	Time	Length
0 files listed, 273 blocks available					

Press: RETURN to accept ESCAPE to exit to File menu ␣? for Help.

List the directory information of the files

[.D1
including All directory levels; sending the listing to the file:
.CONSOLE

Figure 6-2. /PERSONNEL Directory

The directory naturally shows that the disk contains no files. You're going to make some subdirectories to match the divisions in the Widget, Inc. personnel file cabinet. Remember that this file cabinet has four drawers labeled CURRENT EMPLOYEES, FORMER EMPLOYEES, INTERNAL COMMUNICATIONS, and EXTERNAL COMMUNICATIONS.



This chapter discusses the List and Make commands in greater detail later on. The instructions in this section quickly step you through these two commands so that you can prepare your /PERSONNEL volume for use in trying out other file-handling commands.

Press ESCAPE to bring back the File Handling menu; then type M, for Make a new subdirectory. You'll see the display shown in Figure 6-3.

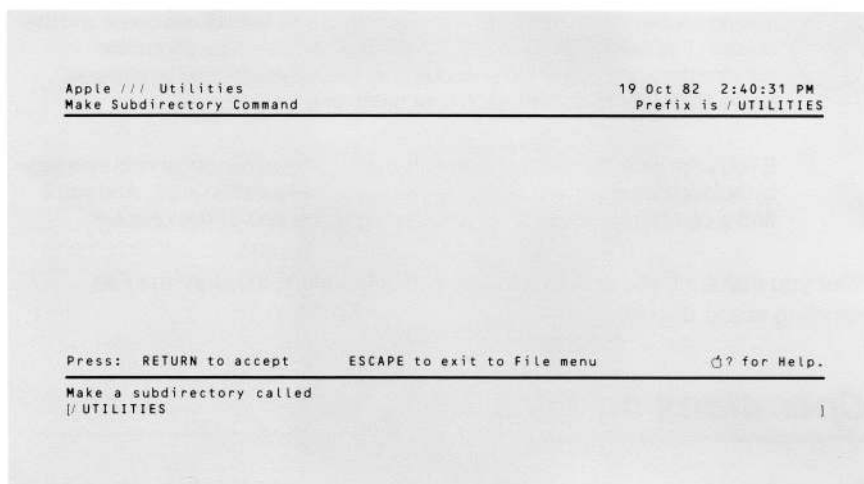


Figure 6-3. Make a Subdirectory

The display question asks for the name of the subdirectory you are making. To make a subdirectory for current employees, type the pathname

`/PERSONNEL/CURRENT`

and press RETURN. As soon as you do so, the Utilities program executes the Make command. You'll hear a whirring sound from the disk drive and see its red light. When the operation is complete, you see the message

`/PERSONNEL/CURRENT made`

in the center section of the display. Notice that your answer remains on the screen after your subdirectory is made; the cursor rests in the first character of the field.

Now create subdirectories named FORMER , COMMUNICATIONS , INTERNAL , and EXTERNAL in the same way you made the CURRENT subdirectory.



You can press the → key to move the cursor over the volume name and the slash (/) that separates each part of a pathname. Then type each new subdirectory name over the previous one. Check your typing before you press RETURN to accept each new pathname.

If you want more information about editing fields, you can see a help message by holding down the ⏏ key while you press the question mark. And you'll find a complete discussion of field editing at the end of this chapter.

After you make the five subdirectories, press ESCAPE to return the File Handling menu to your screen.

Operations on Files

This section discusses each of the file-handling commands in the order they appear on the File Handling menu. Instructions at the end of each of the first three commands tell you how to try them out with the /PERSONNEL disk you've just prepared.

List Files

Use the List command to find out about the contents of a volume: the names of files listed in a volume directory or subdirectory, the size of the files, and when you created or edited them.

To list a volume directory or any of the volume's subdirectories, type L from the File Handling menu. You see the List display shown in Figure 6-4.

Apple /// Utilities
List Files Command

19 Oct 82 2:44:52 PM
Prefix is / UTILITIES

Press: RETURN to accept ESCAPE to exit to File menu ? for Help.

List the directory information of the files:

/.D2

including All directory levels; sending the listing to the file:

Figure 6-4. List Files

The first question asks

List the directory information of the files

The program's answer is the last pathname you typed since starting up with the Utilities disk. If this answer is not correct, type the pathname of the directory whose files you want to list.

The next question asks how many directory levels you want to list. If you type 1, for example, only the directories and files immediately below the pathname you typed will be listed. If you accept the program's answer, All, the program lists all the files contained within the pathname.

The final question specifies the file to which you want to send the listing. Usually, you want to see the listing on your display screen, so press RETURN to accept the program's answer, .CONSOLE. You can get a paper copy of the listing from a letter-quality, serial printer by typing .PRINTER. You could also send the list to a disk file (for example, .D2/LIST.TEXT) if you wanted to write about the contents of a volume.

Once you fill in the last field as you wish, press RETURN. The program immediately lists the specified directory. The volume name appears across the top followed by headers. Each file is listed on a separate line, its name followed by

File type:	This can be
Sosfile:	part of the operating system.
Directory:	a subdirectory file.
Textfile:	a file of characters, with certain formatting data.
Codefile:	a machine-language program file.
Basicprog:	a BASIC program file.
Asciifile:	a file of characters, without formatting data.
Fontfile:	a character-set file.
Fotofile:	a screen-image file.
WPFile:	a file created by some word processing programs.
Unknown:	a file unknown type. See the manual for the software you used to create the file.
Badfile:	a file flagged to indicate bad blocks. See the manual for the software you used to create the file.
TypeNN:	a program-dependent file type. These files are numbered in the hexadecimal system and are defined in the manuals of the software used to create them.
Blocks:	the number of blocks the file physically occupies on the storage medium. This figure includes the number of blocks containing data plus the block containing information SOS needs to locate the file.
Modified:	the date you last changed the file.
Time:	the time you last changed the file.
Length:	the amount of space allocated for data in the file. This is shown as two numbers separated by a colon (:). The first number is the number of full blocks in the file; the second is the amount of space (in 8-bit bytes) used in the last block if it is not full.

When your display screen is full, you'll be asked whether you want to continue the listing. Type Y if you do. At the end of the listing, if you are looking at the directory of a flexible disk, the Utility will tell you the total number of files and the number of blocks still available on that volume.

You will be concerned mainly with the file name and type, the modification date and time, the actual number of blocks your file uses, and the number of unused blocks on your volume. The relationship between blocks and length is fairly complex. It is explained in detail in the *SOS Reference Manual*, available from your dealer.

Notice that your answers remain in the lower section of the List display and that the cursor rests in the first field. You may execute the List command as before by pressing RETURN to accept the values you placed in the fields during the previous execution. You can list another set of files or send the listing to another character or block file by changing the appropriate fields. You can press ESCAPE to return to the File Handling menu.

Trying It Out

Now type L to list the directory of /PERSONNEL , filling in the fields to send a listing (Figure 6-5) of all the files to the display screen.

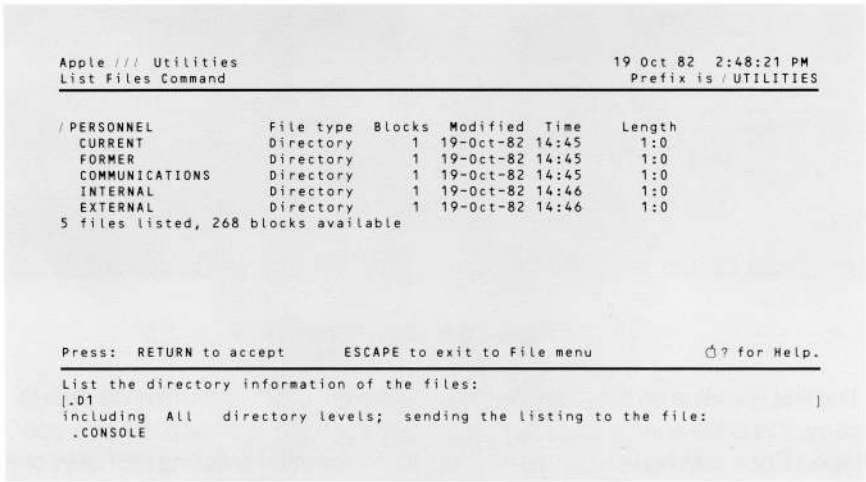


Figure 6-5. /PERSONNEL , With Subdirectory Files

But this listing doesn't yet reflect the Widget file system described in Chapter 4. In the Widget file hierarchy, INTERNAL and EXTERNAL should be subdirectories of the subdirectory COMMUNICATIONS. You'll fix that with the next command. Press ESCAPE to return the File Handling menu to your screen.

Copy Files

Use the Copy command whenever you want to make another copy of a file. You may copy a file from one volume or subdirectory to another, and you may copy more than one file in a single operation, as described in the section File Search, later in this chapter.

To copy a file, type C from the File Handling menu. This brings the Copy display shown in Figure 6-6 to your screen.

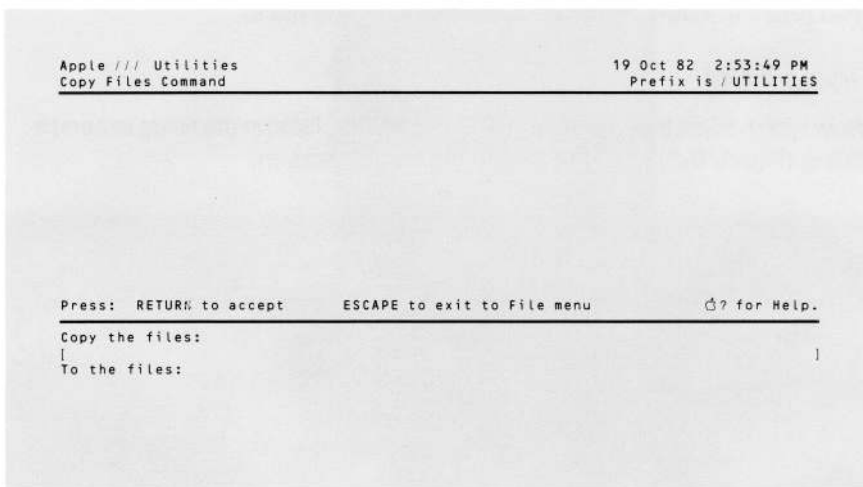


Figure 6-6. Copy Files

The first question on the Copy display asks for the name of the file you wish to copy; this is the source file. The program answers with the last pathname you typed since starting up. You may accept that answer by pressing RETURN or you may change it by typing another pathname and pressing RETURN.

The second question asks for the copy destination. In answer, the program provides another block device name; unless you have only the built-in disk drive, you will most often copy a file to another volume in another device.

You can use the Copy command to copy to a printer or other character file simply by using the file name as the destination. For example, you can get a paper copy of a file by typing .PRINTER as the destination file. In this situation, the copy program asks one more question:

Add a page of directory information before each file?
[Yes]

If you press RETURN to accept the program's answer, Yes, each source file will be printed with a header page consisting of the pathname and the date and time you last modified the file. If you don't want the header, type N.



When you call up the Copy Files command to send a text file to a printer, the information in that file is simply "dumped." That is, the characters that make up the file—the letters, numbers, punctuation, and spaces—are printed one after the other. The Copy Files command ignores any application-program commands that control the placement of text on paper. It's usually better to print a file via the print option of the software you used to create it; refer to the manuals that describe your software for the ways they print files.

Trying It Out

To make the INTERNAL and EXTERNAL subdirectories part of the subdirectory COMMUNICATIONS , you need to copy them to their correct position in the file hierarchy. Type C from the File Handling menu.

When the Copy display comes to your screen, you see that the program answers the source question with the last pathname you typed: /PERSONNEL/EXTERNAL . Since you want INTERNAL listed before EXTERNAL , you cannot accept that answer. Press the → key to move the cursor over the volume name and the second slash (/), which separates the parts of a pathname. Then type

IN

and press RETURN. Notice that the letters TERNAL remain in the field.



See the section Field Editing in this chapter for more information on quick ways you can edit the Utilities display fields.

The second question asks for the copy destination. If you accept the program's answer, the program will copy the INTERNAL subdirectory to another volume in another block device. Since you want it copied to the COMMUNICATIONS subdirectory on the same volume, type the pathname

`/PERSONNEL/COMMUNICATIONS/INTERNAL`

and press RETURN. The whirring you hear and the light on your disk drive tell you that the Apple III is making the copy.

When the copy is complete, the Copy display and your answers to its questions remain on your screen. That's good: You still need to move the EXTERNAL subdirectory to its proper place. In response to the source question, press the → to move the cursor until it is over the I of INTERNAL. Type

`EX`

and press RETURN.

The correct answer to the destination question is

`/PERSONNEL/COMMUNICATIONS/EXTERNAL`

The program provides that answer, so press RETURN to begin the Copy operation.

When the copy is made, press ESCAPE to return the File Handling menu to your screen. To see the results of copying, list the directory of /PERSONNEL (Figure 6-7).

Apple /// Utilities
List Files Command

19 Oct 82 3:14:34 PM
Prefix is / UTILITIES

	File type	Blocks	Modified	Time	Length
/ PERSONNEL					
CURRENT	Directory	1	19-Oct-82	14:45	1:0
FORMER	Directory	1	19-Oct-82	14:45	1:0
COMMUNICATIONS	Directory	1	19-Oct-82	14:45	1:0
INTERNAL	Directory	1	19-Oct-82	14:46	1:0
EXTERNAL	Directory	1	19-Oct-82	14:46	1:0
INTERNAL	Directory	1	19-Oct-82	14:46	1:0
EXTERNAL	Directory	1	19-Oct-82	14:46	1:0
7 files listed, 266 blocks available					

Press: RETURN to accept ESCAPE to exit to File menu ␣? for Help.

List the directory information of the files:

[.D1
including All directory levels; sending the listing to the file:
.CONSOLE

Figure 6-7. /PERSONNEL , After Copying

Notice that the file names INTERNAL and EXTERNAL appear as subdirectories in the volume directory /PERSONNEL and as subdirectories in the subdirectory COMMUNICATIONS . The indentation of the listing makes this clear: Each subdirectory is indented under the directory that holds it. You'll get rid of the extra subdirectory files with the Delete command. For now, press ESCAPE to return to the File Handling menu.

Delete Files

Delete one or more files from a volume by typing D (Delete) from the File Handling menu (Figure 6-8) and completing the Delete display.

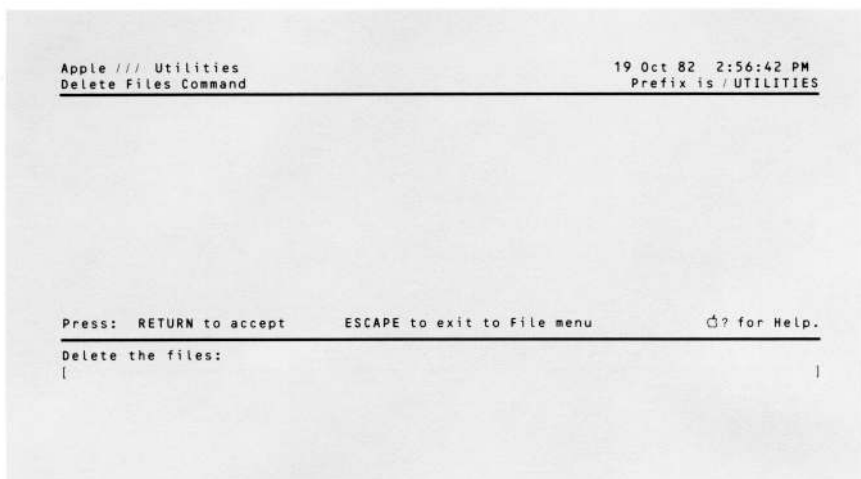


Figure 6-8. Delete Files

This display asks only for the pathname specifying the files you want to remove. The program answers this question with the last pathname you typed since starting up. Either accept that answer by pressing RETURN or type another pathname in the field and press RETURN.

After you press RETURN, look at the center of your display screen. The program requests that you confirm the deletion by asking

Update directory ? [Yes/No]

Files are deleted only when you confirm your request by asking the Utility program to update the volume directory. This removes the file name from the directory, making it inaccessible to SOS.

If you do indeed want to delete the file, type Y (Yes). If not, type N (No). Nothing will be deleted from your volume, and the Delete display will remain on your screen so that you can specify another file for deletion.



If you delete a subdirectory file, you also remove all the files contained within that subdirectory. You can insure your files against this possibility, as described in the section Set Write Protection, later in this chapter.

Trying It Out

Now it's time to get rid of the extra copies of INTERNAL and EXTERNAL. From the File Handling menu, type D to see the Delete display. The display question asks for the name of the files you wish to delete. The program's answer, /PERSONNEL/EXTERNAL, is the name of one of the files you want to remove, so press RETURN to accept it. When the program asks

Update directory ? [Yes/No]

type Y (for Yes). After you confirm the deletion, the file /PERSONNEL/EXTERNAL will be deleted, that is, removed from the directory it is in.

When the drive stops whirring, delete the extra copy of the INTERNAL subdirectory. Move the cursor over the characters /PERSONNEL/ ; then type

IN

and press RETURN. Confirm the deletion by typing Y (Yes).

Press ESCAPE to bring back the File Handling menu and then type L to list the /PERSONNEL directory (Figure 6-9) to see the results of the deletions.

```
Apple /// Utilities                               19 Oct 82  3:17:06 PM
List Files Command                               Prefix is /UTILITIES

/ PERSONNEL      File type  Blocks  Modified  Time      Length
CURRENT          Directory   1      19-Oct-82 14:45    1:0
FORMER           Directory   1      19-Oct-82 14:45    1:0
COMMUNICATIONS   Directory   1      19-Oct-82 14:45    1:0
INTERNAL         Directory   1      19-Oct-82 14:46    1:0
EXTERNAL         Directory   1      19-Oct-82 14:46    1:0
5 files listed, 268 blocks available

Press: RETURN to accept      ESCAPE to exit to File menu      ? for Help.

List the directory information of the files:
|.D1
including All directory levels; sending the listing to the file:
.CONSOLE
```

Figure 6-9. /PERSONNEL, After Deleting

Now you have the skeleton of the Widget company's personnel files. By making a subdirectory

```
/PERSONNEL/COMMUNICATIONS/INTERNAL/ATKINS
```

you can reproduce the subdirectory structure described in Chapter 4:

```
/PERSONNEL  
  CURRENT  
  FORMER  
  COMMUNICATIONS  
    INTERNAL  
      ATKINS  
    EXTERNAL
```

You can't reproduce the full file hierarchy for Widget, Inc.,

/PERSONNEL	Volume directory
CURRENT	Subdirectory
JOHNSON	Textfile
FORMER	Subdirectory
SIMPSON	Textfile
COMMUNICATIONS	Subdirectory
INTERNAL	Subdirectory
ATKINS	Subdirectory
MARCH.15	Textfile
EXTERNAL	Subdirectory

because JOHNSON , SIMPSON , and MARCH.15 are not directory files. They are text files, data files, or some other file type, and you can create them only with a programming language or an application program.

Rename Files

The Rename operation changes only the name of a file; it does not alter the file's contents or its place in the directory hierarchy. To rename a file, type R (Rename) from the File Handling menu. The Rename display is shown in Figure 6-10.

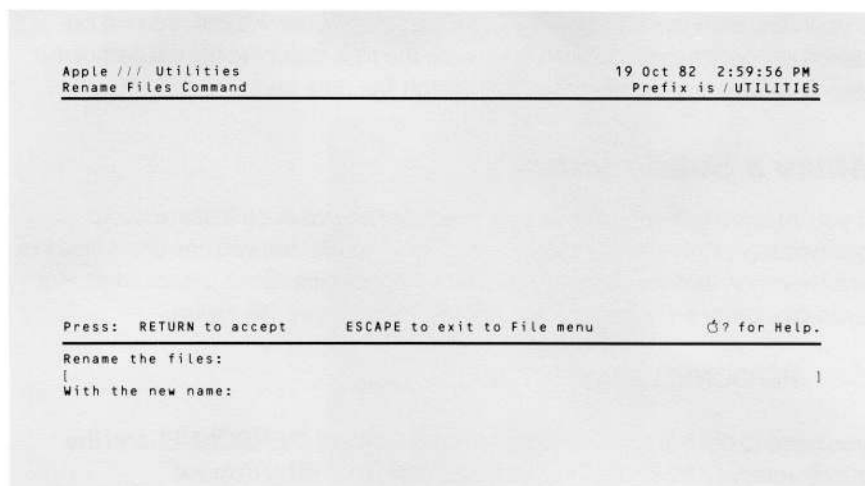


Figure 6-10. Rename Files

The first question on the display asks for the pathname of the file you wish to rename; the second asks for the new name. In response to the second question, the program provides the pathname you supplied in answer to the first question: Type a new pathname and press RETURN.



The special features of the Utilities programs, discussed later in this chapter, enable you to edit display fields quickly and with a minimum of typing.

After you type the new pathname and press RETURN, the program checks that you are changing only the last-named file in your original pathname and that the new pathname does not match any existing files on the volume. If your new pathname passes these tests, you'll see the message

OLDNAME→NEWNAME

If you are changing any part of the pathname except the last-named file, the program cancels the Rename command, and the message

OLDNAME→OLDNAME

tells you that no change has been made.

If your new pathname matches an existing one on your volume, you will be asked to confirm that you wish to rename the files matching the old pathname *and* to delete any existing files that match the new one.

Make a Subdirectory

If you've been following the Widget example, you've seen that the Make operation creates a subdirectory to put files into. Before you can store files in a subdirectory, that subdirectory and all the directories above it must exist. For example, before you can create a Widget employee file called

`/PERSONNEL/CURRENT/JONES`

you need to have first created the volume directory `/PERSONNEL` and the subdirectory `CURRENT` . If you haven't done so and try to make `/PERSONNEL/CURRENT/JONES` , you'll see a "Subdirectory not found" error message from SOS.

To create a subdirectory, type M (Make) from the File Handling menu. You see the Make display (Figure 6-11).

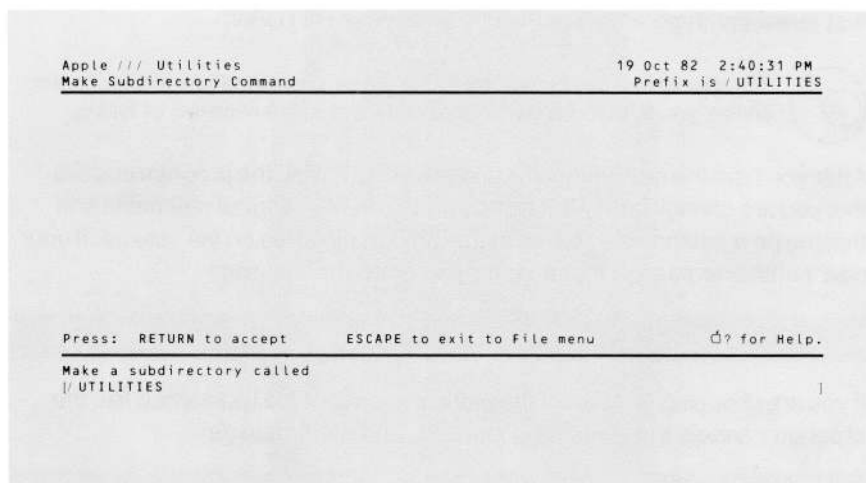


Figure 6-11. Make a Subdirectory

After you type the pathname and press RETURN, the program checks that there is no existing file with the same pathname. If there is, the program asks whether you want to delete the old one. If you tell it to go ahead, or if your pathname is unique, the program makes the subdirectory.



Programming languages and application programs may make subdirectories in slightly different ways. Refer to the manual that describes the program you are using.

Set Write Protection

You can put a write-protect tab on a flexible disk to keep the computer from writing on it or erasing it. You can also protect an individual file on any type of storage medium by using the set-Write-protection command.

Each file has a write-protect flag that tells the computer whether the file can be written to or deleted. When the flag is set, the file is protected, as indicated by an asterisk (*) preceding the file's directory listing. You can only read a write-protected file. If you try to write new information to it or if you try to delete it, you'll see a "Write protect error" message from SOS. Before you can do anything but read a write-protected file, you must remove the protection and clear the flag.

To set or clear a file's write-protect flag, type W (set Write protection) from the File Handling menu. You see the display shown in Figure 6-12.

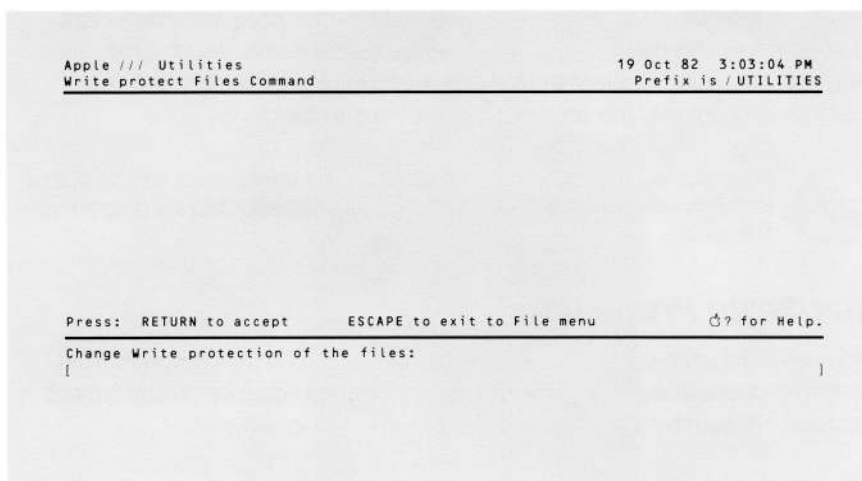


Figure 6-12. Set Write Protection

After typing the file's pathname and pressing RETURN, type Y (Yes) to protect the file or N (No) to remove its protection.



If you set Write protection for your subdirectories, you safeguard them against accidental deletion.

Set Prefix

The set-Prefix operation sets the SOS prefix, a stored pathname that specifies a directory or subdirectory. Once you set the prefix, you can refer to any file listed in the prefixed directory by its file name alone. The prefix will not be appended to pathnames that begin with a slash (/) or a period.



For an expanded discussion on how to use the prefix, see Chapter 4, section The Prefix and Partial Pathnames.

To set the prefix, type P (set Prefix) from the File Handling menu. You see the display in Figure 6-13.

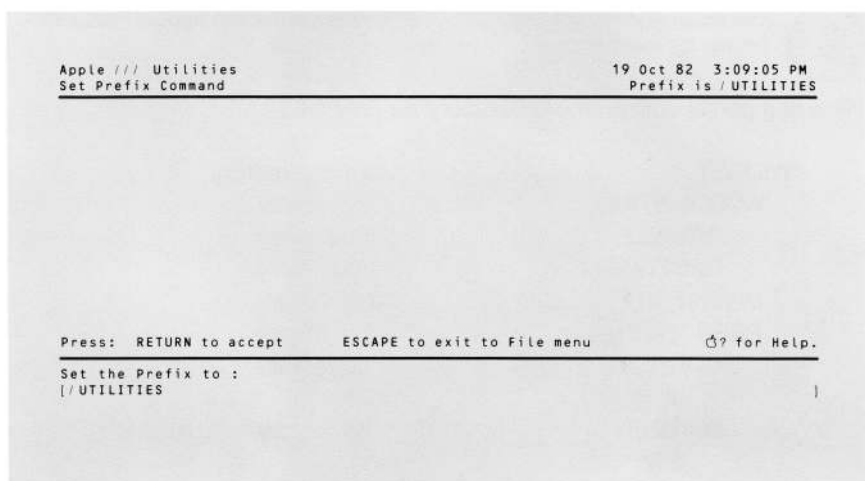


Figure 6-13. Set Prefix

One way to use the prefix is to copy the volume directory of a flexible disk onto a larger mass-storage device such as a ProFile. Doing so speeds up the file-by-file copying necessary to transfer the smaller volume's data to the larger disk.

For example, assume you have a large volume called /WIDGET with a subdirectory PERSONNEL. On this volume you want to copy the volume directory of the flexible disk /PERSONNEL. First set the prefix to /WIDGET, then select the Copy command from the File Handling menu. In the first field of the Copy display, type

/PERSONNEL/=

and in the second field, type

PERSONNEL/=

These answers will copy the volume directory /PERSONNEL to the subdirectory PERSONNEL on the volume /WIDGET.



The equal sign (=) is called the wildcard. See the section Special Features, below, for more information on this useful symbol.

Here is a partial outline of the directory for /WIDGET :

/WIDGET	Volume directory
ACCOUNTING	Subdirectory
PAYABLE	Subdirectory
RECEIVABLE	Subdirectory
INVENTORY	Subdirectory
PERSONNEL	Subdirectory
CURRENT	Subdirectory
JOHNSON	Textfile
FORMER	Subdirectory
SIMPSON	Textfile
COMMUNICATIONS	Subdirectory
INTERNAL	Subdirectory
ATKINS	Subdirectory
MARCH.15	Textfile
EXTERNAL	Subdirectory

As you can see, the directory structure under the subdirectory PERSONNEL on the large disk /WIDGET looks like the directory structure of the volume directory of the small flexible disk /PERSONNEL .

Special Features

Three special features of SOS and the Utilities disk allow you to

- copy, delete, rename, and list one or more files with a minimum of typing.
- quickly search complex file hierarchies, particularly the ones used with ProFile.
- efficiently edit the fields of the file-handling displays.

The following sections describe these powerful features and illustrate them with examples based on Widget, Inc.'s file hierarchy. You can experiment with these features with the /PERSONNEL volume you've been using.

The Wildcard and File Patterns

Almost all of the file-handling operations require you to type pathnames. These pathnames, which may be many characters long, each refer to a single file. For example, assume that you want to copy the internal-communications subdirectories for each Widget employee: Adams, Atkins, Atwood, Black, Davidson, Frank, Harrison, Johnson, Larson, Sawyer, Starr, and Steiner. It would be extremely inconvenient and time-consuming to type each individual pathname.

SOS provides an efficient means for performing operations on groups of files that share a general *file pattern* through the use of a *wildcard*, a character that indicates a portion of a file name that SOS can ignore. The wildcard character is the equals sign (=).

If you type the pathname

```
/PERSONNEL/COMMUNICATIONS/INTERNAL/=
```

the wildcard tells the Utility to copy all of the files within that pathname.

But if you want to copy only a few of the files, you can match file patterns. If, for example, you type the pathname

```
/PERSONNEL/COMMUNICATIONS/INTERNAL/AT=
```

you match the pathnames for the subdirectories for employees Atkins and Atwood. The file names share the pattern AT; the wildcard tells SOS to ignore “kins” and “wood”.

A file pattern can have only a single wildcard, so you could not make a file pattern

```
/PERSONNEL/COMMUNICATIONS/INTERNAL/=A=K
```

to match subdirectories for both Black and Frank. In addition, the wildcard can only be in the last file name of a pathname. For example,

```
/PERSONNEL/COMMUNICATIONS/=TERNAL/BLACK
```

is not a valid use of the wildcard.

To continue the Widget example, you can specify the files for Davidson, Harrison, Johnson, and Larson by using the file pattern

```
/PERSONNEL/COMMUNICATIONS/INTERNAL/=SON
```

and the files for Starr and Steiner with the file pattern

```
/PERSONNEL/COMMUNICATIONS/INTERNAL/ST=R
```

If you wanted to include the Sawyer files with Starr's and Steiner's, the file pattern should be /S=R .

The wildcard is especially convenient when copying files, since you often copy many files at one time. You will also see the wildcard on displays during file search, discussed below.

File Search

File search, as its name implies, allows you to scan through the file hierarchy of a volume to find files within directories and subdirectories. It also enables you to build pathnames for the fields on the Utility displays and to select more than one file at a time for those Utility commands that accept multiple files: copying, deleting, and setting write protection.

File search needs only a minimum amount of typing. To search and select, you'll use the arrow keys and ENTER, which is on the numeric keypad.

Assume that you have all of the Widget files on disk, including the memos and the employee records that must be made with application software. Steve Atkins' boss gives you a volume and requests copies of Atkins' latest memos for a report she's preparing. She tells you that the memos she needs are named "Big Idea" and "Mod One". You don't know how these file names are really spelled: BIG.IDEA or BIGIDEA, MOD.ONE or MOD1 . But you know you can find the memos in your master files and copy both of them onto the other disk.

Try an experiment to see how file search works. With the Copy display on your screen, insert your /PERSONNEL volume. In response to the question about source files, type

/PERSONNEL

and press the ↑ or ↓ instead of RETURN. This puts your Apple III and the Utilities into *file search mode*.

A pathname menu (Figure 6-14) appears in a window along the upper-right side of the screen. The menu lists the next lower level of files in the hierarchy specified by the name you typed in the display field. In this case, the menu lists CURRENT/ , FORMER/ , and COMMUNICATIONS/ . These file names end with a slash (/) to indicate that they are subdirectories. A highlight bar marks the first file on the list. You can move the highlight bar with the ↑ and ↓ keys.

Move the highlight bar to COMMUNICATIONS/ and press the → to select that subdirectory; notice the arrow-shaped marker that acknowledges your selection. If you change your mind about a file you've chosen, press the ← key to remove the marker and cancel the selection.

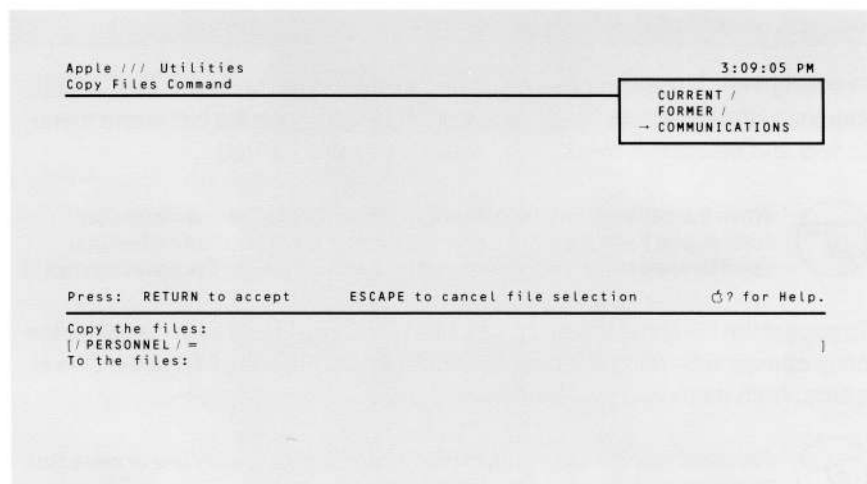


Figure 6-14. File Search

Now press the ENTER key on the numeric keypad and look at the display. The source-file field says

```
/PERSONNEL/COMMUNICATIONS
```

If you press RETURN now to accept the data in the first field of the Copy display, you would have the opportunity to copy all the files contained in the subdirectory COMMUNICATIONS . You don't want to do that, so press the ↑ or ↓ key instead of RETURN. Now the pathname menu lists INTERNAL/ and EXTERNAL/ , the two subdirectories contained in the COMMUNICATIONS subdirectory. The highlight rests on INTERNAL/ : Select it by pressing the → ; then press ENTER. The source-file field now says

```
/PERSONNEL/COMMUNICATIONS/INTERNAL
```

If you actually had the complete Widget files and you pressed the ↑ again, you'd see a pathname menu listing subdirectories for all the memo-senders in the Widget organization. You would press the ↓ key to scroll the highlight bar to the file name ATKINS/ ; then you'd select it by pressing the → and the ENTER keys. The source-file field in the Copy display would then say

```
/PERSONNEL/COMMUNICATIONS/INTERNAL/ATKINS
```

Pressing the ↑ once more would bring a listing of the names of all of Atkins' memos to the pathname menu. You would scroll through the pathname menu to find and select the two memos Steve's boss requested.



When the pathname menu contains more file names than can fit on your screen, you'll see the word *more*. Your Apple III will also beep when you scroll forward to the end or backward to the beginning of the pathname menu.

To accept the file names, you'd press RETURN. You would then complete the copy operation by filling in the destination field and pressing RETURN: One at a time, both memos would be copied.



File search can be used to build one pathname or to specify one or more files for copying, deletion, renaming, and write-protecting.

Editing Display Fields

In answer to many display questions, the program provides the last pathname you typed since starting up with the Utilities disk. For example, in the Rename display, the first question asks for the pathname of the file you want to rename and the second asks for the new name. In answer to the second question, the program displays the pathname you typed in response to the first question.

The program answers the second question with the current pathname so that you can edit the old pathname into the new. But how can you keep the program's answer from disappearing as soon as you start typing? Press the → key: Now you can move back and forth in the field, replacing any character you want. You can press RETURN to accept the new pathname or ESCAPE to restore the program's answer.

Try it: If you made a subdirectory for Atkins on your /PERSONNEL volume, select the Rename command from the File Handling menu. Then type

```
/PERSONNEL/COMMUNICATIONS/INTERNAL/ATKINS
```

into the first field and press RETURN. The same pathname will appear in the second field. Press and hold down the → key until the cursor is on the A of ATKINS . Type SMYTHE and press RETURN.

This works fine to change

```
/PERSONNEL/COMMUNICATIONS/INTERNAL/ATKINS
```

to

```
/PERSONNEL/COMMUNICATIONS/INTERNAL/SMYTHE
```

but how can you change it to a file name of a different length, for example,

```
PERSONNEL/COMMUNICATIONS/INTERNAL/BILL.ATKINS
```

without retyping a bunch of characters?

Try an experiment. Hold down the  key and type I: You are now in *insert mode*. The rectangular cursor goes away and is replaced by a vertical *insert cursor* that has a blinking underscore beneath it. While the rectangular cursor sits over a character, the insert cursor sits between two characters—any character you type will be inserted there. Once you add the characters you need, leave insert mode just as you entered it: Hold down the  key and type I.

You may need to delete characters to get the pathname you want. Normally, pressing the $\rightarrow$ and $\leftarrow$ keys moves the cursor over a character, leaving it unchanged. But if you press the $\rightarrow$ or $\leftarrow$ key while holding down the  key, the character to the right or left of the respective arrow key disappears. By pressing and releasing the  key and using the arrow keys, you can hop over a few characters, delete a few, hop a few, delete, hop.....When the new pathname is the way you want it, press RETURN.



The special features—field editing and file search—work with all of the Utilities commands.

With a little practice, the special features of the Utilities programs will become second nature. The *help messages* you can call up by pressing  -? will give you reminders. For your reference, the following section contains a summary of the special features and the keystrokes used in each feature.

Summary of Special Features

The following sections contain brief descriptions of field editing and file search as well as charts that summarize the keystrokes used in each feature.

Field Editing

If the program's answer is nearly correct, you can edit it. If you begin to type your own response, the program's answer will disappear. But if the first key you press is an editing key—an arrow key or the  key—the information in the field will not disappear, and you can modify it until it is what you want.

Correcting typing errors: Use the ← and → keys to move the cursor back and forth within a field. When the cursor highlights an incorrect character, type the correct one. After you correct any errors, press RETURN to accept the field as displayed. If you don't want to accept all the characters in the field, you must delete those you don't want.

Deleting characters: When the cursor highlights the extraneous character, press the → key while holding down the ⌘ key. This deletes the extra character and moves any remaining characters one space to the left. Similarly, pressing the ← while holding the ⌘ key deletes characters to the left of the cursor.

Adding characters: To add characters to the end of a field, press the → key to move the cursor to the space immediately following the program's answer. Then type the additional characters. To add characters within a field, use insert mode.

Insert mode: Enter and leave insert mode by pressing the I key while holding down the ⌘ key. In insert mode, the cursor changes to a vertical bar with a blinking underscore. While in insert mode, you can add as many characters as you wish between any two characters already in a field. You can also delete characters by using the ← and → keys.

During field editing, you can press ESCAPE to restore the program's guess to a display question.

File Search

In addition to the editing features described above, the Utilities program provides additional editing capabilities: file patterns, the wildcard, and file search. These features specify one or more files that are related by position within a directory hierarchy or by shared characters in their file names. File search also allows you to build a pathname with only a few keystrokes.

File patterns and the wildcard: A file pattern—a pathname with a wildcard character (=) in the last-named file—describes a group of files whose names match the pattern of shared characters. For example, the file pattern CURRENT/A= describes the files ADAMS, ATKINS, and ATWOOD in the subdirectory CURRENT. When a wildcard is the only character in the last-named file, the file pattern describes all files contained in the preceding file in the pathname. For example, CURRENT/= describes all files contained in the subdirectory CURRENT.

Entering file search: Type a partial pathname or a file pattern, then press the $\uparrow$ or $\downarrow$ key; if no wildcard appears in the field, the program adds one. A pathname menu appears in a window along the upper-right side of the display. This menu lists the next level of files that match the file pattern; a slash (/) identifies subdirectories.

Selection: Scroll the highlight bar through the pathname menu by pressing the $\uparrow$ or $\downarrow$ key. Your Apple III will beep when you reach either end of the pathname menu. Select a highlighted file name by pressing the $\rightarrow$ key. If a Utility command will accept a group of files, you may select more than one. An arrow-shaped marker appears next to each file you select. You can press the $\leftarrow$ key to remove the marker and cancel the selection.

Acceptance: Press the ENTER key on the numeric keypad to add the file name you selected to the display field. If that file is a subdirectory, you can press the $\uparrow$ or $\downarrow$ key to see the next level of files in the pathname menu. Then use any of the selection commands to further narrow down the subgroup. Press RETURN to accept the whole field.

Editing Keys

RETURN	Accepts the contents of the field and moves the cursor to the next field of the display. When the cursor is within the last field, pressing RETURN executes the command.
CONTROL-RETURN	Moves the cursor back to the previous field.
ESCAPE	First keypress in response to a default: returns to the parent menu. Any other keypress within a field: restores the default.
$\leftarrow$	Moves the cursor one character to the left.
$\rightarrow$	Moves the cursor one character to the right.
 - I	Turns insert mode on and off.



Deletes the character immediately to the left of the cursor.



Deletes the character immediately to the right of the cursor.

File-Search Keys



Wildcard character.



In field editing: enters file search.

In file search: moves the highlight up one file name.



In field editing: enters file search.

In file search: moves the highlight down one file name.



Selects the highlighted file name.



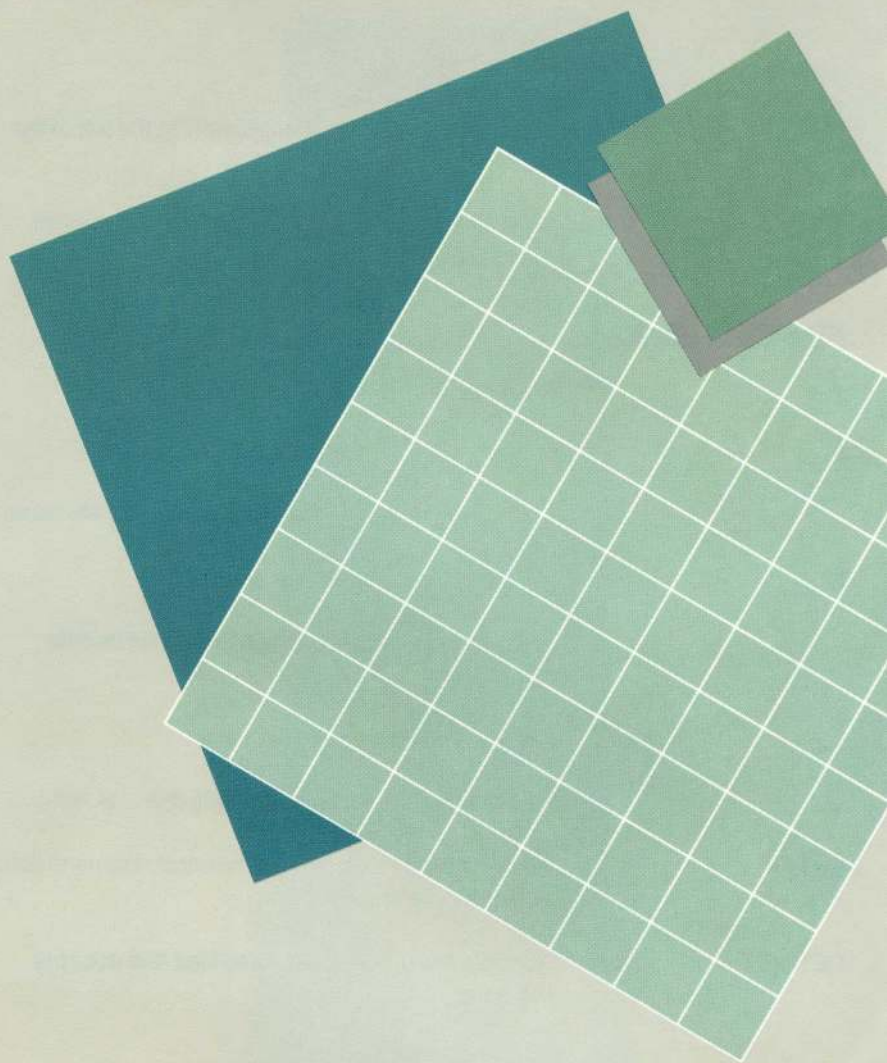
Cancels the selection made with the → key.

ENTER

Accepts the selected file names and returns to field editing or file search.

RETURN

Accepts the group of selected files and accepts the field.



***S*ystem Utilities: SCP**

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System Utilities: SCP

The third option on the Utilities Main Menu is the System Configuration Program (SCP). With the SCP you *configure*, or set, the SOS.DRIVER file on your program disks so that your Apple III can communicate with the specific number and types of devices connected to it. You can also tailor your program disks so that certain characteristics of your console suit your taste.

Every time you start up your Apple III, the computer loads a *system configuration* from the program disk. The system configuration is stored in the file named SOS.DRIVER and includes a collection of special programs called *device drivers* that enable the Apple III to communicate with the devices connected to it. Each type of device has its own driver, designed specifically for that device. If the SOS.DRIVER file on a program disk doesn't contain a driver for a particular device, the Apple III will be unable to communicate with that device.

In addition to device drivers, SOS.DRIVER also includes certain special pieces of information called *system parameters*. These include the number of Disk III flexible-disk drives connected to your Apple III, the keyboard layout, and the character set to be used for displaying text on the screen.

Standard Device Drivers

Standard device drivers control many of the devices you can connect to your Apple III. The System Utilities and System Utilities Data disk in the System Software package contain these standard drivers. Currently the standard device drivers include

- CONSOLE.DRIVER, for communicating with the Apple III keyboard and for displaying text on the screen;
- GRAFIX.DRIVER, for displaying graphics on the screen;
- QUME.DRIVER, for communicating with a printer through the Apple III's built-in serial interface port;
- AUDIO.DRIVER, for generating sounds on the Apple III's tone generator;
- RS232.DRIVER, for communicating with a serial device; and
- SILENTYP.DRIVER, for communicating with the Silentype III printer. (For complete information on the Silentype driver, see the *Silentype III User's Guide*.)

When you purchase a peripheral device for your Apple III, you also receive a disk containing that device's driver program and a manual describing the device and its driver. Before the Apple III can communicate with your new device, you need to connect it properly and then use the SCP to add the new device driver to your program disks.

The rest of this chapter introduces the options of the SCP menu. The exercises in the sections Read a Driver, Change System Parameters, and Generate New System describe how to use the SCP to set up your program disks for the correct number of disk drives connected to your Apple III. If you have one external drive, your system already operates correctly, nevertheless, you'll find it useful to go through the procedures with one of your program disks so that you can use the SCP to add any devices you may purchase later to your system.

Complete information on the SCP can be found in the chapter The System Configuration Program in the *Standard Device Drivers Manual*. There you can learn how to

- build a system with the drivers you need for your particular collection of peripheral devices.
- change a system by adding or deleting device drivers.
- change the system's standard character set or keyboard layout.

Using the System Configuration Program

To configure your system with the SCP, you first read a driver file, that is, copy the SOS.DRIVER file from one or more program disks into your Apple III's memory. You can also copy individual device drivers at this time. The next step is to use the delete, edit, and change commands on the SCP menu to define a SOS.DRIVER file that matches your array of devices. Finally, you generate a new system. Like saving a file, generating a system writes (stores) the new SOS.DRIVER back to your program disks after SOS processes the new driver information you put into memory.

To use the SCP, put your original Utilities disk (the one that came in the System Software package) into your built-in disk drive. Start up your Apple III by turning on the power or by pressing CONTROL-RESET. From the Utilities Main Menu, type the letter S to choose the option

S - System Configuration Program (SCP)

After a delay, the SCP Menu (see Figure 7-1) will appear on your display screen.

Apple /// Utilities
System Configuration Program Menu

19 Oct 82 3:26:25 PM
Version 1.2

R - Read a Driver File
D - Delete a Driver
E - Edit Driver Parameters
C - Change System Parameters
G - Generate New System
Q - Quit to Main Menu

Press:

␣? for Help.

Please select SCP Function : Read a Driver File

Figure 7-1. SCP Menu

At the bottom of the display is the message

Select SCP Function:

asking you to select an option from the SCP menu. Since the first step is to copy a configuration into memory from one of your program disks, select the option

R - Read a Driver File

from the SCP Menu by typing the letter R. A new display (Figure 7-2) will replace the SCP Menu.

```

Apple /// System Configuration Program                               19 Oct 82  3:29:14 PM
Read a Driver File
-----
Current Driver Configuration:

No Drivers are loaded.

                                     ( Available memory: Approximately 51K bytes )
Press: RETURN to accept          ESCAPE to exit to SCP menu          ␣? for Help.
-----
Read a Driver File
Enter Pathname of Driver File :
[.D1/S0S.DRIVER

```

Figure 7-2. Read a Driver File

Read a Driver

The area at the top of the screen headed

Current Driver Configuration

is used by the SCP to display a list of the device drivers in the system configuration currently in the Apple III's memory. Since you haven't yet read any drivers, this area currently contains the message

No Drivers are loaded

About halfway down the screen is a line something like this:

(Available memory: Approximately 32K bytes)

As you build a system configuration, this line tells you how much memory space you have left in which to store additional device drivers. The number you see on this line when the configuration is empty depends on the amount of memory you have in your Apple III.

At the bottom of the screen is the message

```
Read a Driver File
Enter Pathname of Driver File:
```

The Apple III is waiting for you to supply the name of a disk file containing one or more device drivers.

You are going to copy a system configuration from one of your program disks, in this case, the Utilities disk itself. The system configuration on a program disk is always stored in a file named `SOS.DRIVER`, so that is the file you should load: The program provides the correct response, `.D1/SOS.DRIVER`, so just press RETURN.

The disk drive will whirl for a while as the Apple III copies the contents of the file into memory. Then the names of the device drivers contained in the file will appear in a list at the top of the screen.

The drivers named `.FMTD1`, `.FMTD2`, `.FMTD3`, and `.FMTD4` are special drivers used for formatting disks. The plus signs mean that the last three of these drivers are grouped together into a *driver module*. (See the section Reading a Device Driver in the *Standard Device Drivers Manual* for more information on driver modules.)



If you were to list the devices configured into your system from the command option of that name on the Device Handling menu, you would see both the device drivers for your disk drives and the formatter module. When you read the `SOS.DRIVER` file from the Utilities disk, however, you see only the formatter module. This is because the device driver programs for the drives are special. They are stored in the `SOS.KERNEL` file and are modified only via the SCP option Change System Parameters.

Look down at the bottom of the screen display: The program is asking for another file name because you may need to copy driver files from several volumes to gather all of the ones that match your array of devices. Since you aren't going to copy another file now, press ESCAPE to display the SCP Menu again.

Delete a Driver

When you are building a system configuration, you may read two or three SOS.DRIVER files. As a result, you may copy duplicate device drivers. Since driver programs use space in memory, you use the delete option to remove any duplicate device drivers. You may also use the delete option to remove any drivers a specific application or program doesn't use.

```
Apple /// System Configuration Program                      19 Oct 82  3:31:34 PM
Delete a Driver
-----
Current Driver Configuration: ( *=Inactive )

1 .FMTD1
2 +.FMTD2
3 +.FMTD3
4 +.FMTD4
5 .SILENTYPE*
6 .PRINTER
7 .CONSOLE

Press:  RETURN to accept      ESCAPE to exit to SCP menu      ␣? for Help.
-----
Delete a Driver
Select Driver to be deleted : 1
```

Figure 7-3. Delete a Driver

The delete display (Figure 7-3) presents a numbered list of the drivers you copied in the preceding step. To delete one of them, type its number and press RETURN. As in all operations that can destroy information, you will be asked to confirm this decision.



To configure your system to reflect the number of disk drives you have, you do not need to delete drivers.

Edit Driver Parameters

Your SOS.DRIVER file contains both active and inactive driver programs. Inactive drivers have an asterisk (*) next to their device names on the Read-a-Driver display.

Only active drivers enable the Apple III to communicate with their corresponding devices; only active drivers take up space in memory. If your SOS.DRIVER contains an active program for which you have no corresponding device, you may want to make that driver program inactive. On the other hand, you may connect a device—a Silentyte, for example—and then need to activate its inactive driver. To make a driver active or inactive, select the option Edit Driver Parameters. This option also allows you to change the name of a driver.



If you need to save space in memory, you may either delete a driver or make it inactive. The latter is preferable since it leaves the driver program on your disk.

Remember that you can delete an entire module, but you can't delete any of the individual drivers within it.

For more information about this SCP option, see the section Editing Driver Parameters in Chapter 2 of the *Standard Device Drivers Manual*.

Change System Parameters

Now you are going to look at the system parameters in the configuration you have just copied and, if necessary, change them to reflect the number of disk drives connected to your Apple III. Select the option

C - Change System Parameters

from the SCP Menu by typing the letter C. A new display (Figure 7-4) will replace the SCP Menu.

```

Apple /// System Configuration Program                               19 Oct 82  3:38:54 PM
Change System Parameters
-----
CURRENT SYSTEM PARAMETERS:

  1 - Number of Disk III Drives..... 2
  2 - Peripheral Slot Assignments
  3 - Standard Character Set..... STANDARD
  4 - Keyboard Layout..... SHOLES

  5 - Invert Standard Character Set
  6 - Change All System Parameters

Press:                               ESCAPE to exit to SCP menu           ␣? for Help.
-----
Change System Parameters
Select Parameter to be Changed : Number of Disk III Drives

```

Figure 7-4. Change System Parameters

At the top of the screen is a numbered list of the system parameters with their current values, which you copied from the Utilities disk's SOS.DRIVER when you read a driver file. At the bottom of your display screen is the message

Change System Parameters

Select Parameter to be Changed : Number of Disk III Drives

Look at the second line under the heading Current System Parameters at the top of the screen. It should read

1 - Number of Disk III Drives.....2

Type the number 1: This is the number of the parameter you need to change. Now the lower section of the screen reads

Change Number of Disk III Drives

Enter Number of Disk III Drives : [2]

Type the number of disk drives connected to your Apple III. If you have only the Apple III's built-in drive, type 1 and press RETURN. You will see the value of the parameter change at the top of the screen, and SCP will again ask you for the number of a parameter to change. For now, just press ESCAPE to return to the SCP Menu. If you have one external drive, the parameter is already correct.

System parameters other than the number of disk drives are discussed in the chapter The System Configuration Program in the *Standard Device Drivers Manual*.

Generate New System

If you followed the procedures in the sections Read a Driver and Change System Parameters, you built a new system configuration with the correct value for the Number of Disk III Drives parameter. The configuration exists only in the Apple III's memory. Now you need to generate a new system, that is, have the computer process the information in memory and store the new configuration back onto the Utilities disk so it can take effect the next time you start up the Apple III from that program disk.

Choose the option

G - Generate New System

from the Configuration Menu by typing the letter G. Instead of the SCP Menu, you'll see the message

Generate New System

System Validation in progress.....

This means that SCP is checking the configuration you've built for internal consistency. If the configuration doesn't pass the system validation, you'll see warning messages describing the configuration's inconsistencies. Some of these messages are described in Appendix A. For more detailed information, see the *Standard Device Drivers Manual*.



You can generate a new configuration even if you see a warning message. For example, you might ignore a warning message and store an invalid configuration if you wanted to build up a SOS.DRIVER file a few drivers at a time.

If all is well, you will soon see the message

System Validation Completed

in the central portion of your display screen. Note that this doesn't guarantee that your Apple III will be able to start up in the configuration you created. At the bottom of the screen, you'll see

Generate New System

Enter Driver file name:

SCP is asking you for the name of the file in which the new configuration is to be stored.



The Apple III can read the new system configuration only if it is stored in a file named `SOS.DRIVER`. When you store a new `SOS.DRIVER` on one of your program disks, the new file replaces the configuration that was formerly on that disk. If, for example, the new configuration lacks an essential device driver, such as `.CONSOLE`, or the volume on which you write the new `SOS.DRIVER` file has bad recording medium, that program disk won't start up your system.



Take care to store your new system configuration onto a *backup* copy of your program disk. Then the original working copy of the program disk will be intact.

SCP is still waiting for the name of a file in which to store the new system configuration you have built. Remove the original Utilities disk from the built-in disk drive and insert the backup copy you made while you were learning about the Copy Volumes command. Then type

`.D1/SOS.DRIVER`

and press RETURN.



If you have more than one disk drive, do not leave your original disk in the built-in drive and insert the backup in one of the external drives. Remember that if you load two volumes with the same volume name at the same time, SOS may write information to one volume that belongs on the other.

When you try to store the new configuration on your backup Utilities disk, you will see the message

SOS.DRIVER already exists. Delete? [Yes/No]

You want to delete the old SOS.DRIVER file and replace it with the new one you have just made, so type Y.

Next, you may see the message

File is write protected. Delete anyway? [Yes/No]

Type Y. The disk drive will whirl for a while as it writes the new system configuration on your backup Utilities disk.

None of the changes you've just made to the SOS.DRIVER file will take effect until you restart your system with your newly configured program disk. So as soon you've finished generating, it's a good idea to try to start up your system with that disk to be sure the new configuration works.

If the new configuration doesn't work properly, start up again with your *original* Utilities disk and select the SCP from the Main Menu. Then repeat the same procedures, *this* time copying the new configuration into memory from your backup disk, modifying it, then generating the new configuration and saving it onto the *backup* disk. Then once again start up your system with that disk to see if the new configuration works. If it doesn't, you'll have to repeat the SCP procedure until it does work, starting up with your original Utilities disk, then copying the SOS.DRIVER from it, reconfiguring the file, and saving it to your backup copy.

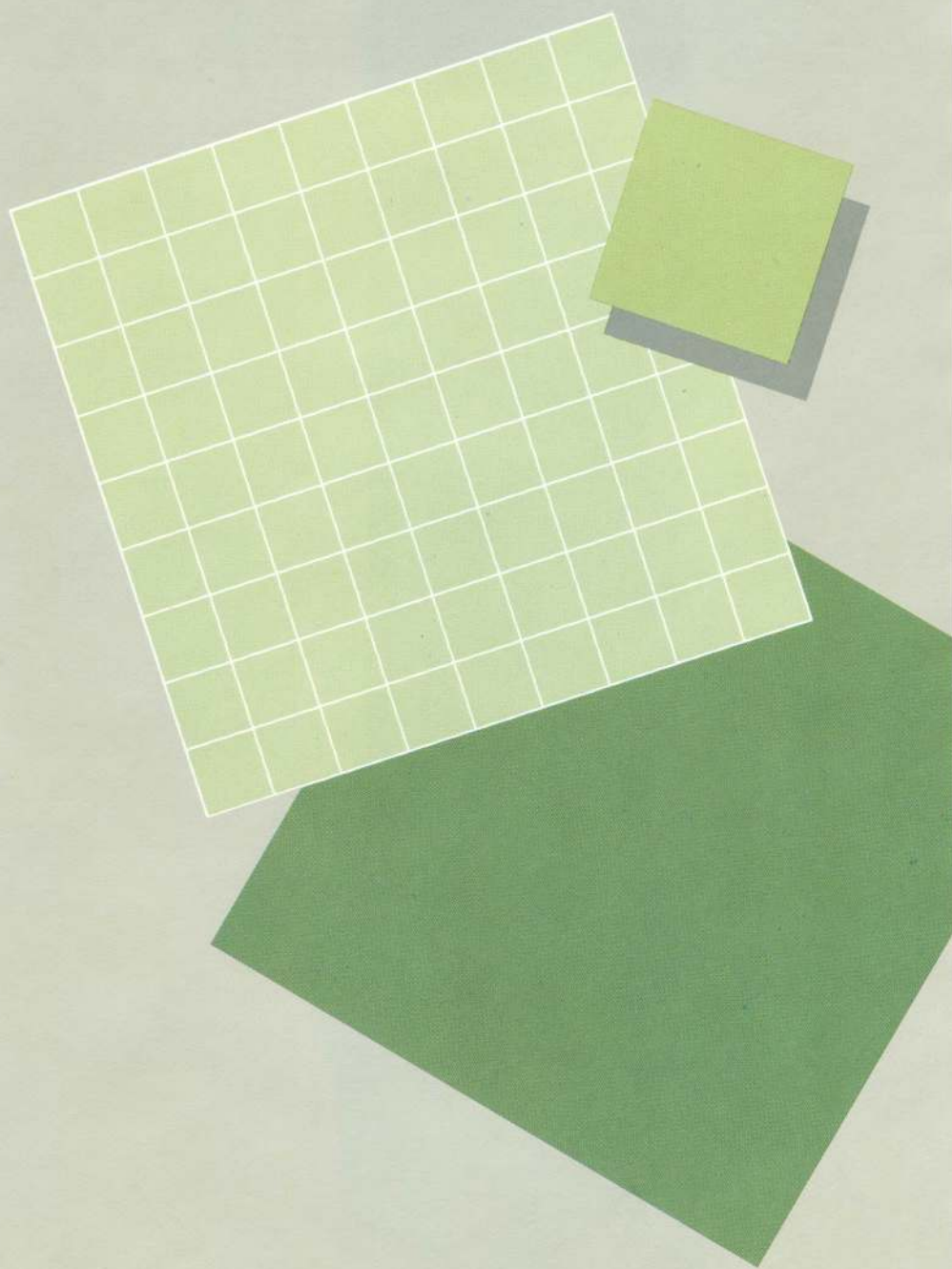
You shouldn't have this kind of problem, as you are only changing the number of disk drives the system thinks it has. Even if you set the wrong number, you should still be able to start up your system, although you may not be able to use all your drives.

If you have only the built-in disk drive and you're sure that you have built a correct configuration with the procedures described above, load the SOS.DRIVER file from any other program disk you have. Then use the same procedures to check, modify, verify, and save the new system configuration. Repeat the process for every program disk you have. When you've finished configuring all of them, choose option Q (Quit) from the SCP Menu to return to the Main menu.

The System Configuration Program has other capabilities besides the ones discussed here. The *Standard Device Drivers Manual* and the manuals for Apple Computer, Inc. products that use the SCP contain instructions on using those capabilities.

A Helpful Hint

If you have several devices, it's a good idea to make one master disk with copies of all your device drivers. When you want to add a new driver, insert your master disk and use the file-search feature to find and specify the driver you need. This makes it easy to build system configurations as you require them.



Error and Warning Messages

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Error and Warning Messages

This appendix has two sections. The first section is an alphabetical listing of error and warning messages. They are shown as they appear on the display screen; that is, some come up in uppercase letters and others in upper- and lowercase. Below each message is information referring you to the second section.

The second section explains the error and warning messages and often describes possible remedies.

Alphabetical Listing of Errors and Warnings

ACIA.

See Diagnostic Messages

A/D.

See Diagnostic Messages

Bad disk medium/drive.

See Device- and File-Handling Messages

Badly formatted driver file.

See Warnings While Reading Driver Files

Blocked volume name expected.

See Device- and File-Handling Messages

Cannot read source disk.

See Device- and File-Handling Messages

Character set not loaded.

See Warnings While Generating System

Characters in volume name must be alphanumeric or period.

See Device- and File-Handling Messages

Command requires SOS format disk.

See Device- and File-Handling Messages

Device dependent error #N.

See Device- and File-Handling Messages

Device not configured into the system.

See Device- and File-Handling Messages

Device not on line.

See Device- and File-Handling Messages

Directory already exists.

See Device- and File-Handling Messages

Directory full.

See Device- and File-Handling Messages

Disk drive not present/not configured.

See Device- and File-Handling Messages

Disk sizes must be same for device copy.

See Device- and File-Handling Messages

DRIVER FILE NOT FOUND.

See SOS Errors

DRIVER FILE TOO LARGE.

See SOS Errors

Duplicate driver names.

See Warnings While Generating System.

EMPTY DRIVER FILE.

See SOS Errors

File already exists.

See Device- and File-Handling Messages

File contents incorrect.

See Warnings While Editing System Parameters.

File expected.

See Device- and File-Handling Messages

File not found.

See Device- and File-Handling Messages

File open; access not permitted.

See Device- and File-Handling Messages

File or blocked volume expected.

See Device- and File-Handling Messages

File or unblocked volume expected.

See Device- and File-Handling Messages

Format error #N.

See Device- and File-Handling Messages

Format failed. Device too fast.

Format failed. Device too slow.

See Device- and File-Handling Messages

Formatter device driver not present in system.

See Device- and File-Handling Messages

Illegal character in volume name.

See Device- and File-Handling Messages

Illegal device name.

See Device- and File-Handling Messages

Illegal disk format for this operation.

See Device- and File-Handling Messages

Illegal volume name length.

See Device- and File-Handling Messages

Illegal wildcard.

See Warnings While Reading Driver Files
See also Device- and File Handling Messages

INCOMPATIBLE INTERPRETER.

See SOS Errors

Insufficient memory to read the file.

See Warnings While Reading Driver Files

INTERPRETER FILE NOT FOUND.

See SOS Errors

Invalid copy.

See Device- and File-Handling Messages

INVALID DRIVER FILE.

See SOS Errors

Invalid number.

See Device- and File-Handling Messages

Invalid pathname.

See Warnings While Reading Driver Files

Invalid SOS pathname.

See Device- and File-Handling Messages

I/O ERROR.

See SOS Errors
See also Device- and File-Handling Message

I/O error during format operation.

See Device- and File-Handling Messages

I/O Error #N.

See Device- and File-Handling Messages

KERNEL FILE NOT FOUND.

See SOS Errors

Keyboard layout not loaded.

See Warnings While Generating System.

Medium is write-protected or not connected.

See Device- and File-Handling Messages

No active .CONSOLE driver.

See Warnings While Generating System

No drivers have been read.

See SCP Errors and Warnings

No room on volume.

See Device- and File-Handling Messages

Not enough memory (too many files at once).

See Device- and File-Handling Messages

Not enough memory to do copy.

See Device- and File-Handling Messages

One or more drivers require slot assignments.

See Warnings While Generating System

Only one file expected here.

See Device- and File-Handling Messages

Pathname too long.

See Warnings While Reading Driver Files
See also Device- and File-Handling Messages

RAM.

See Diagnostic Messages

RETRY.

See SOS Errors

ROM.

See Diagnostic Messages

ROM ERROR; PLEASE NOTIFY YOUR DEALER.

See SOS Errors

Root directory expected.

See Device- and File-Handling Messages

Slot number may not be altered for this driver.

See Warnings While Editing System Parameters

Subdirectory expected.

See Device- and File-Handling Messages

Subdirectory not found.

See Device- and File-Handling Messages

System parameters are not set.

See Warnings While Generating System

TOO MANY BLOCK DEVICES.

See SOS Errors

Two volumes with same name on-line.

See Device- and File-Handling Messages

Unable to read file or directory.

See Device- and File-Handling Messages

VIA.

See Diagnostic Messages

Volume not found.

See Device- and File-Handling Messages

Warning—Directory structure is damaged on this volume.

See Device- and File-Handling Messages

Warning: The following Drivers form a Module. All will be deleted.

See Warnings While Deleting Driver Files

Warning: You are about to format a large disk. Please make sure this is appropriate.

See Device- and File-Handling Messages

Wildcard not used correctly.

See Device- and File-Handling Messages

Write-protect error.

See Device- and File-Handling Messages

ZP.

See Diagnostic Messages

Definition of Errors and Warnings

Error and warning messages usually refer to a specific function. For example, RETRY may come up when the Apple III is loading SOS from a program disk. This section lists messages by function, explains them, and often describes possible remedies.

Diagnostic Startup Messages

When you turn on your Apple III, it performs a number of diagnostic checks on its hardware. If any of these tests fail, you will see one of the diagnostic messages briefly described below.



If you see a diagnostic message, contact your dealer. Do not use the computer: A defective computer could erase data from your disk.

ACIA

The test of the Asynchronous Communications Interface Adapter (ACIA) failed. The ACIA controls the RS-232-C serial port. This message is important only if you are using the serial port.

A/D

The test of the Analog-to-Digital converter failed. The Analog-to-Digital converter controls the joysticks. This message is important only if you are using joysticks.

RAM

The test of the Apple III's random-access memory failed. The pattern on the screen tells repair people which component is faulty.

ROM

The test of the Apple III's read-only memory failed.

VIA

The test of the Versatile Interface Adapters (VIAs) failed. VIAs control various internal functions in the Apple III.

ZP

The Zero Page test failed. This test determines whether the Apple III's memory-addressing circuitry is operational.

SOS Messages During Startup

After the Apple III passes the diagnostic tests, it begins to read SOS from the program disk in the built-in drive. If an error occurs during this part of the startup process, the computer beeps, displays a message in inverse video (dark characters on light background), and then waits for you to start up again. If you see one of the startup error messages described below, insert a different program disk into the built-in disk drive and press CONTROL-RESET.

If you see a blank display screen, the disk in the built-in drive is not a program disk. Insert a proper program disk into the internal drive and press CONTROL-RESET.

DRIVER FILE NOT FOUND.

There is no file named SOS.DRIVER listed in the volume directory of the program disk. SOS cannot operate without device drivers: The drivers must be stored in a file named SOS.DRIVER, and the file must be listed in the volume directory of the disk.

If you're sure there's a driver file on your program disk, name it `SOS.DRIVER` . If your program disk doesn't have a driver file, add one to the disk according to the directions in the *Standard Device Drivers Manual*.

DRIVER FILE TOO LARGE.

The `SOS.DRIVER` file is too large to fit into the system's memory along with the interpreter. Use the SCP to remove or inactivate one or more drivers from this file. For more information on deleting drivers, see Chapter 7 of this manual and Chapter 2 of the *Standard Device Drivers Manual*.

EMPTY DRIVER FILE.

The `SOS.DRIVER` file is listed in the volume directory of your program disk but the file contains no device drivers. SOS requires at least one device driver, usually `.CONSOLE`.

INCOMPATIBLE INTERPRETER.

The interpreter is either too large or specifies a loading location that conflicts with SOS. This error usually occurs when trying to load an older interpreter with a newer version of SOS.

INTERPRETER FILE NOT FOUND.

There is no file named `SOS.INTERP` listed in the volume directory of the program disk. SOS cannot operate without an interpreter: The interpreter must be stored in a file named `SOS.INTERP` , and this file must be listed in the volume directory of program disk.

If you're sure there's an interpreter on your program disk, name it `SOS.INTERP` . If your program disk doesn't have an interpreter, add one to the disk according to the directions in the *Standard Device Drivers Manual*.

INVALID DRIVER FILE.

The `SOS.DRIVER` file is not in the proper format for a driver file. Make sure that the file was either created by the SCP or obtained from a valid Apple III program disk.

INVALID INTERPRETER FILE.

The SOS.INTERP file is not in the proper format for an interpreter file. This error occurs when a file that is not a proper interpreter has the name SOS.INTERP

I/O ERROR.

An error occurred while the Apple III was reading the kernel, interpreter, or driver file from the program disk. Make sure the disk is a valid program disk and is correctly inserted in the drive. If the error occurs with several program disks, see your dealer.

KERNEL FILE NOT FOUND.

There is no file named SOS.KERNEL listed in the volume directory of the program disk. You can copy a SOS.KERNEL file from any program disk that starts up your system.

RETRY.

The startup failed. There may be no disk in the built-in disk drive, the disk may not be formatted, the data on the disk may have been destroyed, or the disk may be improperly inserted. Remove and reinsert the disk, making sure it's in straight. If the error occurs repeatedly, insert a known good program disk in the built-in drive, close the door, and press CONTROL-RESET. If the error occurs with several program disks, see your dealer.

ROM ERROR: PLEASE NOTIFY YOUR DEALER.

Your Apple III contains an older version of the bootstrap ROM, which is not supported by this version of SOS. Your Apple dealer can replace the ROM at no cost. If you receive this message, please contact your dealer or the nearest Apple Service Center.

TOO MANY BLOCK DEVICES.

The SOS.DRIVER file contains more than twelve block device drivers, including .D1 , .D2 , .D3 , and .D4 . Use the SCP to remove or inactivate one or more of the block device drivers from this file, as described in Chapter 7 of this manual and in Chapter 2 of the *Standard Device Drivers Manual*.

General SCP Messages and Warnings

While operating the System Configuration Program, you may see the messages described below. Refer to the *Standard Device Drivers Manual* should any of these messages appear on your screen.

No drivers have been read.

To use the SCP, you must first read at least one driver. To do so, select the first option on the SCP Menu.

SCP Messages While Reading Driver Files

Badly formatted driver file.

The file you are trying to read is not stored as a driver file. Try to read a driver file from another program disk that starts up your system.

Illegal wildcard.

Either (a) two wildcards were used where only one is allowed, or (b) a wildcard was used when only a single file is allowed (for example, you tried to send a directory listing to multiple files).

Insufficient memory to read the file.

To make more space in memory, first use the option Delete a Driver to remove any duplicate device drivers, or use the option Edit Driver Parameters to inactivate one or more drivers. Then generate a new SOS.DRIVER. Finally, restart the SCP with this new SOS.DRIVER. Now you'll have room to read the driver file you want to add.

Invalid pathname.

The specified pathname violates the syntax rules for pathnames. A common error is having more than 15 characters in one of the constituent file names.

Pathname too long.

The specified pathname has more than 80 characters.

SCP Messages While Deleting Driver Files

Warning: The following Drivers form a Module. All will be deleted.

You can delete only an entire module. You cannot delete any of the individual drivers grouped as a module.

SCP Messages While Editing System Parameters

File contents incorrect.

The character set or keyboard set contains invalid data. See the *Standard Devices Drivers Manual* for more information.

Slot number may not be altered for this driver.

This driver works only if the peripheral interface card for its device is in a specific expansion slot. Refer to the operating manual for that device.

SCP Messages While Generating System

These error messages will not prevent SCP from generating the system configuration, but they indicate that the new configuration may not work. You may want to generate a nonfunctional or incomplete SOS.DRIVER if, for example, you are building a new configuration in stages.

Character set not loaded.

Use Edit System Parameters to load a character set, as described in the *Standard Device Drivers Manual*. Character sets are contained in files on the System Utilities Data disk.

Duplicate driver names.

Use Edit Driver Parameters to change the name of one of the two drivers.

Keyboard layout not loaded.

Use Edit System Parameters to select and load a keyboard layout. Keyboard layouts are contained in files on the System Utilities Data disk.

No active .CONSOLE driver.

Every program disk needs a .CONSOLE driver to start up the Apple III.

One or more drivers require slot assignments.

Refer to the operating manuals for your devices to be sure that you installed the interface cards in the proper expansion slots. Then use Edit System Parameters to assign the proper slot number to the drivers that correspond to the devices.

System parameters are not set.

Use Edit System Parameters to set the required items. Refer to the operating manual for your device and to the *Standard Device Drivers Manual*.

Device- and File-Handling Messages

Bad disk medium/drive.

The disk has been physically damaged and is unusable, or the disk drive is malfunctioning. You may suspect your disk drive if this message appears with several disks; see your dealer.

Blocked volume name expected.

You specified a character device name when a block device name was expected.

Cannot read source disk.

The disk that you are trying to copy is unreadable. Make sure you have specified the proper source and destination drives, and be sure that the source disk is correctly inserted in its drive.

Characters in volume name must be alphanumeric or period.

Be sure the volume name begins with a slash (/) followed by a letter. Then it may have 14 more characters in any combination of letters, numbers, and periods.

Command requires SOS format disk.

This command (for example, **Make a subdirectory**) works only on SOS disks, not on UCSD-format disks.

Device dependent error #N.

See the documentation supplied with the device. The specified device is not connected to the system or is turned off.

Device not configured into the system.

The driver for the specified device is not in the system configuration.

Device not on line.

The specified device is not connected or not turned on. If the device is a block device, it has an open door or it contains no volume or an unformatted volume.

Directory already exists.

The specified operation will create a directory with the same name as one that already exists. As this operation will delete the old directory, you must confirm your intention.

Directory full.

The specified operation would put more files into a directory than it can hold. One solution is to **Make another subdirectory** and copy some of the files to it.

Disk drive not present/not configured.

You specified a disk drive that you either have not physically installed in your system or have not configured your Utilities disk to recognize. Make sure that your disk-drive cables are connected securely, then follow the instructions in the chapter **System Utilities: SCP** to configure your program disks for the proper number of disk drives.

Disk sizes must be same for device copy.

To copy one volume onto another, both the destination and source volumes must be the same size. If they are not, you must copy the volumes file by file.

File already exists.

SOS does not allow two files to use the same pathname. The specified operation will create a file with the pathname of a file that is already online, or will change the pathname of one online file to that of another. If this happens, you will be asked for confirmation, and if you give it, the old file of that pathname will be deleted so that the new file can use the pathname.

File expected.

This operation works only on files, and you specified something that was not a file.

File not found.

Be sure you have specified the correct disk drive and that the drive contains the correct volume.

File open; access not permitted.

This error usually occurs when you have tried to delete a file that is open for access, such as a program that is executing. If you tried to delete `SYSTEM.STARTUP` from a program disk while that file's program was running, you would get this error.

File or blocked volume expected.

This operation works only on files or block devices, and you specified a character device.

File or unblocked volume expected.

This operation works only on files or character devices, and you have specified a block device.

Format error #N.

This messages appears because of a problem with a peripheral device. See the documentation supplied by the manufacturer.

Format failed. Device too fast.

The disk drive you used for formatting is running off-speed. See your dealer.

Format failed. Device too slow.

The disk drive you used for formatting is running off-speed. See your dealer.

Formatter device driver not present in system.

The formatter device driver (FMTDn, where n is the number of the drive, for example, FMTD1) for a drive must be configured into the system before a drive can be used for formatting or copying volumes. These drivers can be found in the SOS.DRIVER file on the Utilities disk.

Illegal disk format for this operation.

Either (a) you tried to do something to a SOS disk that can only be done to UCSD disks, or (b) you tried to do something to a UCSD disk that can only be done to SOS disks.

Illegal character in volume name.

The volume name must contain only letters, numbers, and periods; the first character must be a letter.

Illegal device name.

A device name must start with a period, followed by a letter, followed by no more than 13 letters and numbers.

Illegal volume name length.

A volume name must not exceed 15 characters.

Illegal wildcard.

Either (a) two wildcards were used where only one is allowed, or (b) a wildcard was used when only a single file is allowed (for example, you can't send a directory listing to multiple files).

Invalid copy.

The specified copy operation is impossible (for example, copying a subdirectory to itself).

Invalid number.

The number violates a syntax rule, usually because it contains a space or a comma.

Invalid SOS pathname.

The specified pathname violates the syntax rules for pathnames. A common error is to have more than 15 characters in any constituent file name.

I/O error during format operation.

Unidentified input/output error, such as an open drive door, no disk, an unformatted disk, or a disk with damaged medium.

I/O error.

Unidentified input/output error, such as an open drive door, no disk, an unformatted disk, or bad medium on a disk.

I/O Error #N.

Internal program error. The number N is returned by the language interpreter: See the manual for the programming language you are using.

Medium is write-protected or not connected.

This message may occur during formatting or copying. If you wish to destroy the information on a write-protected disk, remove the disk from the drive, peel off the write-protect tab that covers the notch, and reinsert the disk. If the disk is not write-protected, this error message may indicate a drive that is not connected properly.

Not enough memory (too many files at once).

The specified directory is too large to load into memory.

Not enough memory to do copy.

The volume directory has filled all available memory, leaving no room for storing information to be copied to another volume. The usual causes are (a) too many device drivers configured into the system, and (b) too large a directory to fit into memory. Try deactivating or removing some drivers from SOS.DRIVER ; see the *Standard Device Drivers Manual* for details.

No room on volume.

The specified operation would try to put more information on a volume than it can hold.

Only one file expected here.

You have specified multiples files for a file-handling command that only works on one file at a time.

Pathname too long.

The specified pathname has more than 128 characters.

Root directory expected.

This operation works only on a volume (root) directory, and you specified something else. For example, the Verify command works only on volumes, not files.

Subdirectory expected.

This operation works only on subdirectories, and you have specified something else.

Subdirectory not found.

The specified subdirectory is not on the specified volume or device.

Two volumes with same name on-line.

The specified volume has the same name as another volume already in the system. If you copy the Utilities disk to a volume in another drive, then try to read the directory of the copy, you will get this error.

Unable to read file or directory.

The file or directory you specified contains invalid data.

Volume not found.

- (a) The specified volume was not in any of the devices known to the system, or
- (b) the specified device has no volume in it.

Warning—Directory structure is damaged on this volume.

Use the Verify option on the Utilities disk to find out which blocks are damaged. Then use the Copy Files option to copy the undamaged information to a new disk.

In some cases, this error comes up because a disk drive is spinning a disk at the wrong speed. Check the speed of the drive with the Diagnostic Program disk. If the drive speed is off, see your dealer.

Warning: You are about to format a large disk. Please make sure this is appropriate.

You have specified the ProFile for a format operation.

Wildcard not used correctly.

Be sure the wildcard is in the last file name of a pathname.

Write-protect error.

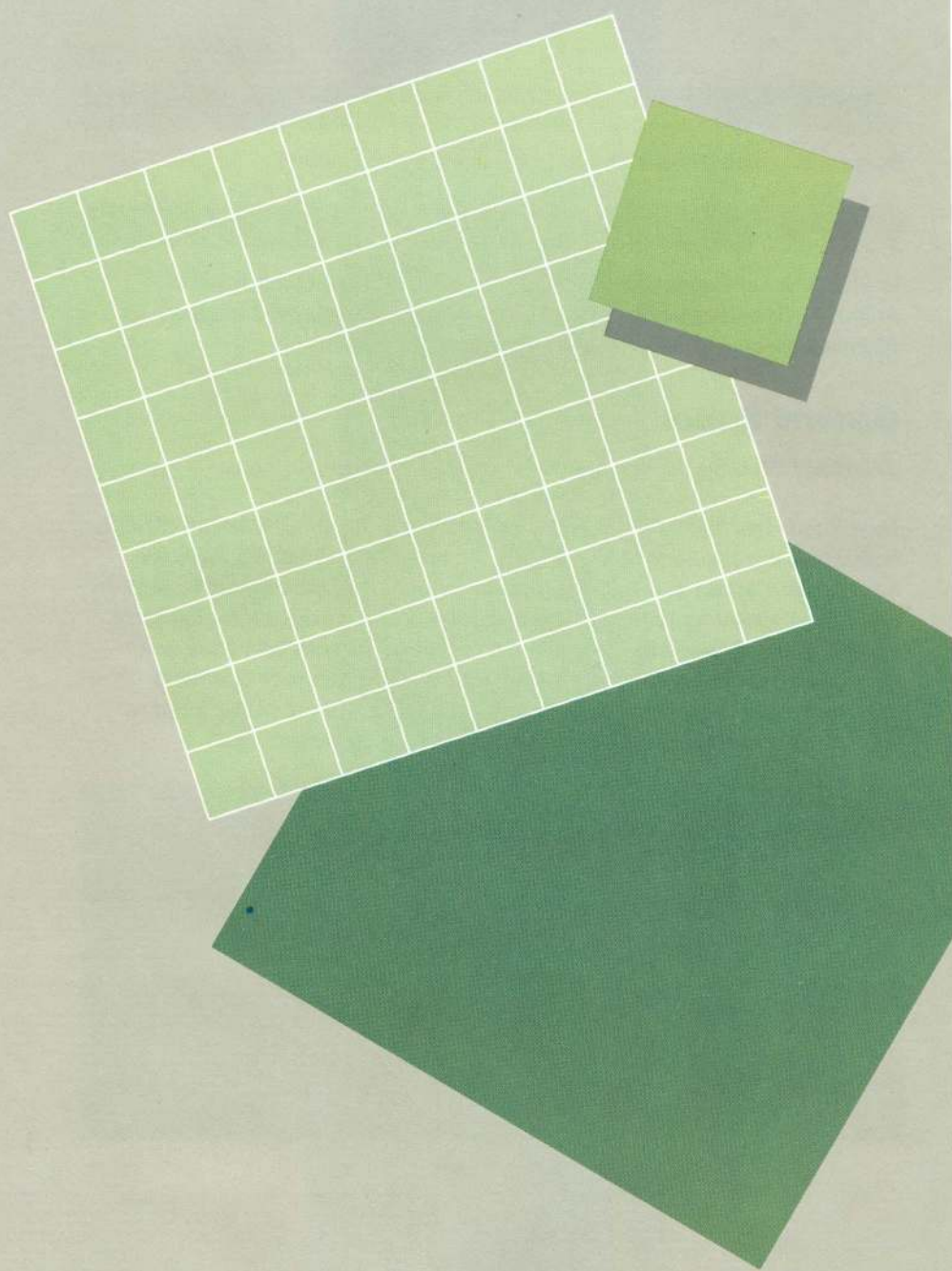
The file or volume specified is write-protected and cannot be deleted or written to. See Chapter 5 for information about write-protected volumes; for information about write-protected files, see Chapter 6.

General Errors

SYSTEM FAILURE

The coded error messages listed below indicate a catastrophic failure of SOS, from which the only recovery is to restart your system. System failures are rare and usually can be attributed to sudden hardware failure or to an unknown error in the operating system or language interpreter. If you receive the same system failure at the same place in the same program more than once, your program has probably encountered an error in the language or operating system. Please report such errors to your dealer, and fill out a User Input Report, so that they can be corrected in a future release of SOS.

\$01: Reentrant system call
\$02: Interrupt not found
\$03: Too many nested interrupts
\$05: Event queue overflow
\$06: Stack overflow
\$07: Invalid request code
\$09: Memory size less than 64K bytes
\$0A: Invalid volume control block
\$0B: Invalid file control block
\$0C: Invalid allocation blocks
\$0D: Pathname buffer overflow
\$0F: Invalid buffer number
\$10: Invalid buffer request



Input/Output Port Specifications

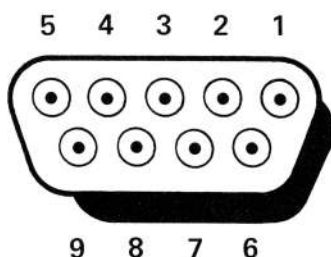
- 176 Port A: Joystick Input
- 177 Port B: Joystick Input
- 179 Port C: RS-232-C Serial Interface
- 180 The Color Video Port
- 183 The B/W Video Port
- 183 The Audio Port

Input/Output Port Specifications

This appendix provides the information you need to connect devices to Apple III ports. Each port is described pin-by-pin.

Port A: Joystick Input

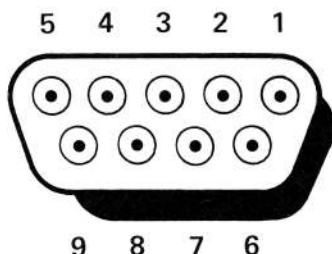
This port contains circuitry for two analog devices (usually potentiometers) and two digital devices (usually switches). The analog inputs accept input voltage in the range of 0 to +2.2 volts and sink $3\mu\text{A}$ of input current. The digital inputs are TTL.



Pin	Name	Description
1	GND	Shield ground
2	+5	+5 volt power supply. A device may draw up to 25 mA.
3	GND	Power and signal ground
4	JS1-X	Horizontal analog input, read by PDL(2); in Emulation mode, equivalent to Apple II Paddle 0 (GC0) input, read by PDL(0).
5	JS1-B	Joystick pushbutton input, read by button(2); in Emulation mode, equivalent to Apple II Paddle 0 button (PB1) input, read by PEEK(-16287).
6	+12	+12 volt power supply. A device may draw up to 25 mA.
7	GND	Power and signal ground
8	JS1-Y	Vertical analog input, read by PDL(3); in Emulation mode, equivalent to Apple II Paddle 2 (GC2) input, read by PDL(2).
9	JS1-Sw	Joystick switch input, read by button(3); in Emulation mode, equivalent to Apple II Paddle 2 button (PB3) input, read by PEEK(-16285).

Port B: Joystick Input

This port contains circuitry for two analog devices (usually potentiometers) and two digital devices (usually switches). The analog inputs accept input voltage in the range of 0 to +2.2 volts and sink $3\mu\text{A}$ of input current. The digital inputs are TTL.



Pin	Name	Description
1	GND	Shield ground
2	+5	+5 volt power supply. A device may draw up to 25 mA.
3	GND	Power and signal ground
4	JS0-X	Horizontal analog input, read by PDL(0); in Emulation mode, equivalent to Apple II Paddle 1 (GC1) input, read by PDL(1).
5	JS0-B	Joystick pushbutton input, read by button(0); in Emulation mode, equivalent to Apple II Paddle 1 button (PB2) input, read by PEEK(-16286).
6	+12	+12 volt power supply. A device may draw up to 25 mA.
7	GND	Power and signal ground
8	JS0-Y	Vertical analog input, read by PDL(1); in Emulation mode, equivalent to Apple II Paddle 3 (GC3) input, read by PDL(3).
9	JS0-Sw	Joystick switch input, read by button(1); not used in Emulation mode.

Here is a sample circuit for a joystick with two potentiometers, one pushbutton, and one switch. The value of the potentiometers can range from 1K ohm to 700K ohm, although with the higher value, only 20% of the potentiometer's range will be used.

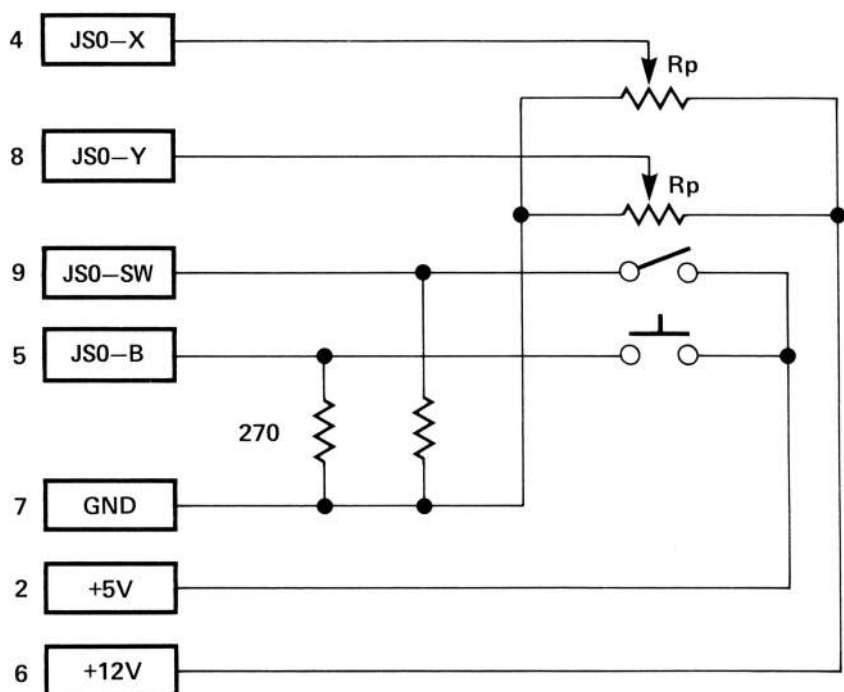


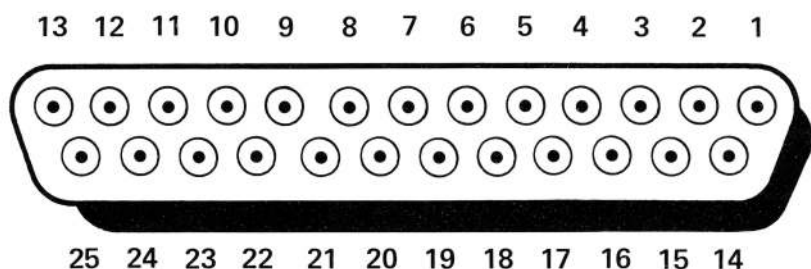
Figure B-1. Sample Circuit for a Joystick

Port C: RS-232-C Serial Interface

The Apple III is classified as Data Terminal Equipment (DTE) under the Electrical Industries Association (EIA) RS-232-C communications protocol. It can be directly connected to a piece of Data Communications Equipment (DCE), such as a modem. To connect the Apple III to another piece of Data Terminal Equipment (such as a printer), you must use a modem eliminator cable, Apple Product #A3M0019.

All output levels are minimum +6 volts when active and maximum -6 volts when inactive measured into a 3K ohm load.

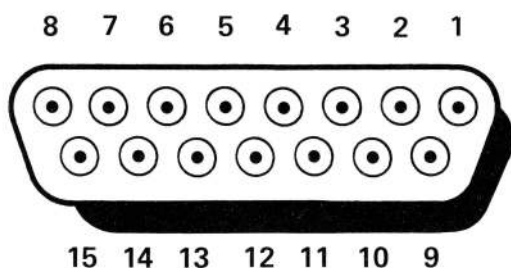
All inputs have a turn-on threshold of +1.25 volts and a turn-off threshold of +.8 volts typical. All inputs sink 10mA current.



Pin	Name	Description
1	SGND	Shield ground
2	TXD	Transmitted data; serial data output from the Apple III.
3	RCD	Received data; serial data input to the Apple III.
4	RTS	Request to Send output; this indicates that the Apple III is ready to transmit data.
5	CTS	Clear To Send input; this acknowledges that the Apple III may begin transmission.
6	DSR	Data Set Ready input; this acknowledges that the remote device is on and operational.
7	GND	Signal ground
8	DCD	Data Carrier Detect input; this acknowledges that the remote device is ready to transmit data.
9-19	No connect	
20	DTR	Data Terminal Ready output; this indicates that the Apple III is on and operational.

The Color Video Port

This 15-pin, D-type connector supplies seven different video signals and four power supply voltages. It carries National Television Standards Committee (NTSC) compatible, positive composite synchronization, color and black-and-white video signals. With an additional circuit, shown below, you can hook up the Apple III to a studio-quality RGB-compatible color monitor.



Pin	Name	Description
1	SG	Shield ground
2	XRGB4	One of four RGB outputs. This (and pins 5, 9, and 10) is a TTL output with instantaneous color information. A linear-weighted sum of these four signals will form a true 16-color RGB video signal (see the circuit below).
3	SYNCH	Composite synchronization signal with negative-going sync
4	PDI	Not used
5	XRGB1	See pin 2
6	GND	Power and signal ground
7	-5V	- 5 volt power supply. A device may draw up to 50 mA through this pin.
8	+12V	+ 12 volt power supply. A device may draw up to 100 mA through this pin.
9	XRGB2	See pin 2
10	XRGB8	See pin 2
11	BWVID	Black-and-white composite video. This is an NTSC-compatible video signal with negative-going sync, 1 volt peak-to-peak into a 75 ohm load. Color information generates a linear grey scale.
12	NTSC	Composite color video. This is an NTSC-compatible video signal with negative-going sync, 1 volt peak-to-peak into a 75 ohm load. Color information is encoded in standard Apple II format.
13	GND	Power and signal ground
14	-12V	- 12 volt power supply. A device may draw up to 50 mA through this pin.
15	+5V	+ 5 volt power supply. A device may draw up to 100 mA through this pin.

All power supply current ratings assume that no peripheral cards are installed in the system. If there are cards in the system, the current drawn by those cards counts as part of the total current available from each supply.

The four XRGB signals should be fed to the network shown below. The input signals are buffered through emitter-follower circuits, then go into a resistor-weighting network, which adds the input signals to generate the standard color set. The output signals from the resistor-weighting network are buffered through emitter-follower circuits. The resulting RGB-compatible signals can be connected to an RGB monitor. The SYNCH signal (pin 3) may also need to be connected to the RGB monitor.

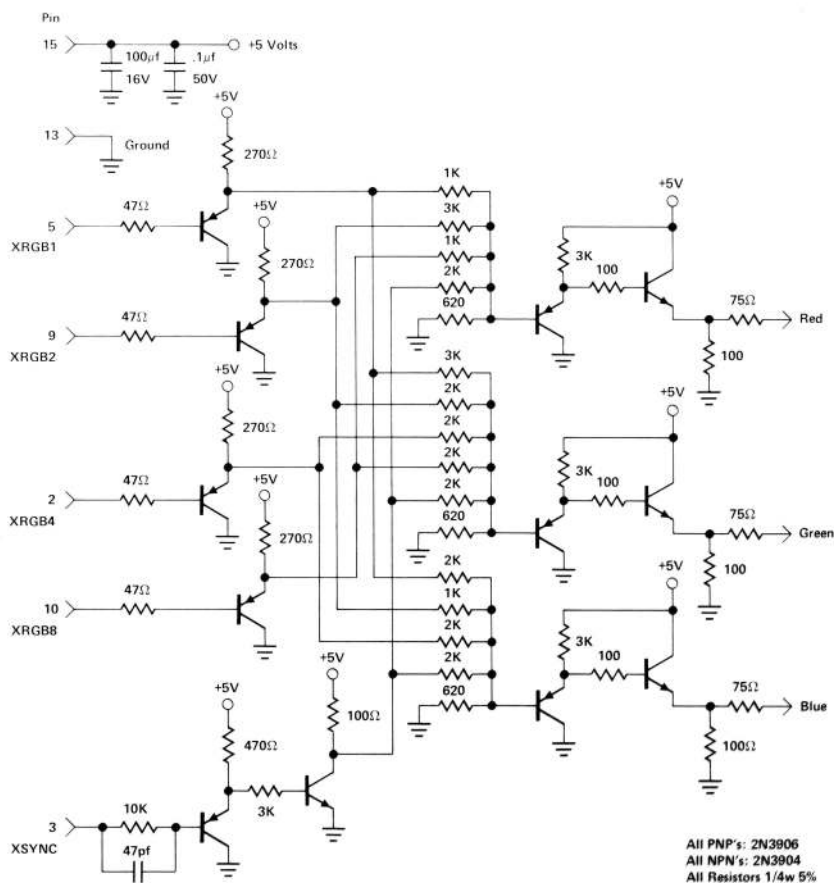


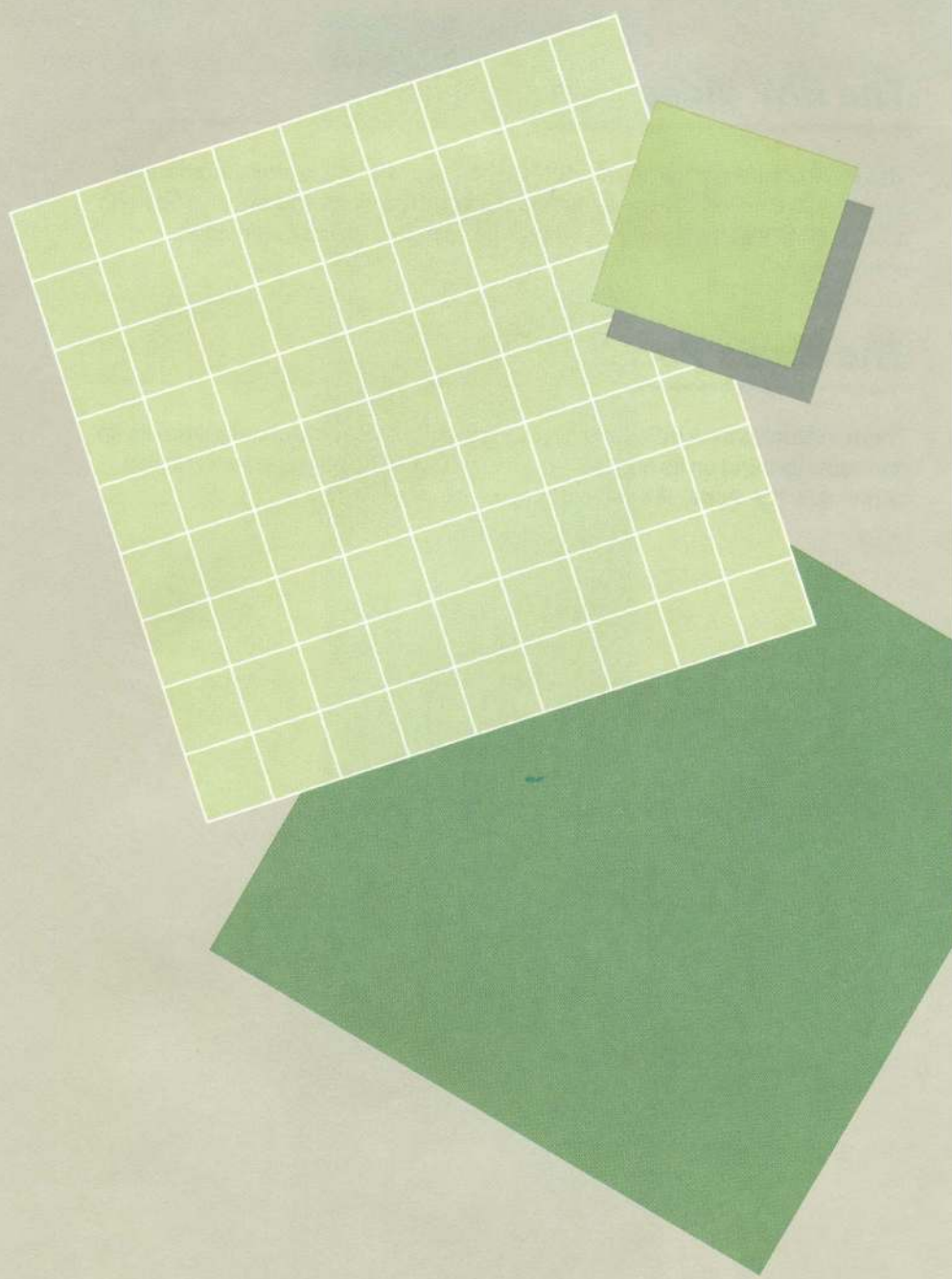
Figure B-2. RGB-Compatible Output Network for Apple III

The B/W Video Port

This RCA connector carries the BWVID black-and-white, positive composite synchronization, NTSC-compatible video signal on its tip and signal ground on its ring. Note that the tip signal is the same as pin 11 on the color-video connector.

The Audio Port

This miniature phone jack carries a 0.5 volt peak-to-peak audio signal on its tip and signal ground on its ring. When a miniature phone plug is inserted in this connector, the Apple III's internal speaker is disabled.



The Apple II Emulation Disk

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The Apple II Emulation Disk

The disk named APPLE II EMULATION, which is part of the System Software package, lets you run many of the programs for the Apple II Plus or the Apple II. The software on the Emulation disk causes the Apple III to imitate the behavior of these Apple II computers. While you are using the Emulation disk and Apple II programs, your Apple III is in *emulation mode*, and none of the advanced features of the Apple III are available to you. You can use only Apple II functions while in emulation mode.

The Emulation disk is write-protected. In order to fully use its capabilities, you should make a copy of it using the Copy Volume command on the Utilities disk. Do not write-protect your copy and be sure to store the original Emulation disk according to the instructions in Chapter 1.

When you use the Emulation disk for the first time, your Apple III acts like a 48K Apple II Plus with Applesoft II BASIC, a 16-sector Disk II controller card, and a Serial card. You can also change, or *configure*, the disk so that the Apple III emulates an Apple II with Integer BASIC, or either type of Apple II with a Communications card.



You cannot configure the Apple III to emulate an Apple II with a Language Card, an Applesoft Card, or an Integer BASIC card. Run-Time Pascal programs will run in emulation mode; programs that require the Language Card will not. The section Limitations in this appendix tells what types of Apple II programs will run in emulation mode.

Emulation mode assigns the Apple III's built-in disk drive to be the equivalent of an Apple II's slot 6, drive 1; it assigns the first additional disk drive to be the equivalent of slot 6, drive 2. Emulation mode makes the Apple III's built-in RS-232-C serial port act like an Apple II Serial card or, optionally, an Apple II Communications card plugged into slot 7 or slot 5.

Using Applesoft

Start up the Emulation disk the same way you start up any Apple III program disk: Insert it into the built-in drive and turn on the power or, if the power is already on, press CONTROL-RESET. You'll see the Startup menu, Figure C-1.

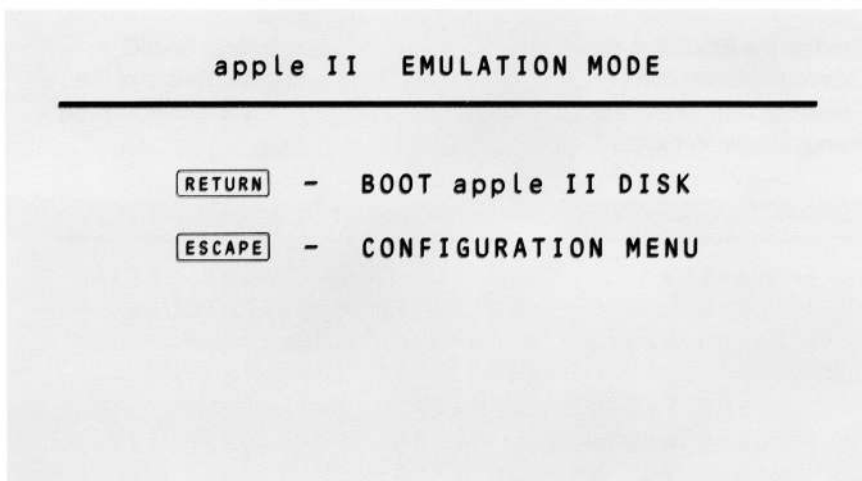


Figure C-1. The Emulation Startup Menu

Initially, the Apple II Emulation disk is set up to be used with disks for an Apple II Plus with Applesoft BASIC and a Serial card. To start up an Apple II Plus disk that uses Applesoft, remove the Emulation disk from the built-in drive, insert the Apple II Plus disk, and press RETURN. You can start up most software for the Apple II Plus in this way.



Sometimes, Apple III's that have a peripheral card for a ProFile require a slightly different startup procedure for emulation mode. If you have installed a ProFile and your system "hangs" (does nothing) or you see random characters when you start up your Apple II disk, you may need to follow a special startup procedure: Before starting up your Emulation disk, first start up with a SOS disk. Be sure the disk's SOS.DRIVER file has a ProFile device driver and that you have correctly indicated the ProFile's slot assignment. Then start up the Emulation disk by pressing CONTROL-RESET.

If your Apple II disk uses Integer BASIC, or if your Apple II program expects to send information to a Communications card, read on.

The Emulation Options

Start up the Emulation disk. If your Apple II disk needs Integer BASIC, a Communications card, or some other change in the standard setup of the Emulation disk, press ESCAPE to see the Apple II Emulation Configuration menu, shown in Figure C-2.

apple II EMULATION MODE	
→ LANGUAGE:	APPLESOFT INTEGER BASIC
CARD:	SERIAL COMMUNICATIONS
BAUD RATE:	110 300 600 1200 2400 4800 9600 19200
LINE FEED:	ENABLED DISABLED
LINE WIDTH:	40 72 80 132 CHARACTERS
CARRIAGE RETURN DELAY:	ON OFF
RETURN	- BOOT apple II DISK
ESCAPE	- RESTORE DEFAULTS
⌘ & RETURN	- SAVE CONFIGURATION TO EMULATION DISK
↑ , ↓ , ← , →	- SELECTION KEYS

Figure C-2. The Apple II Emulation Configuration Menu

Below the title is a menu listing six characteristics, each followed by its options. The lower section of the menu shows all the ways to control the selection and use of the options. Active options are displayed in inverse video (dark characters on light background).

Edit this menu with the four arrow keys. Do you see the arrow-shaped pointer before the word LANGUAGE? This pointer indicates the characteristic whose options you can change. Move the pointer to the characteristic you need to change with the ↑ and ↓ keys. Then use the ← and → keys to move the highlight bar across the screen to the option you need. Once you have chosen the options you want, you can start up an Apple II disk with the new configuration or store the configuration on the Emulation disk.

These are the six different characteristics and their meanings.

LANGUAGE: APPLESOFT INTEGER BASIC

Integer and Applesoft BASIC are both emulated as if you are using an Apple II with an Autostart ROM. Integer BASIC includes Programmer's Aid #1. Only one language can be in memory at a time. To change from one language to the other, you must start up the Emulation disk and change the Language characteristic.

CARD: SERIAL COMMUNICATIONS

A *Serial card* only sends data, usually to a printer; a *Communications card* sends and receives data through a modem.

BAUD RATE: 110 300 600 1200
 2400 4800 9600 19200

This characteristic sets the rate at which the computer sends and receives data. Usually, you'll use 1200 baud (baud means bits per second), for compatibility with an Apple letter-quality printer.

If the *card* is a *Serial* card, you can change these additional characteristics:

LINE FEED: ENABLED DISABLED

ENABLED adds a line feed after a carriage return, needed by some printers; DISABLED does not.

LINE WIDTH: 40 72 80 132 ∞ CHARACTERS

When the LINE WIDTH is set to 40 characters, no line longer than 40 characters can be printed by a program. If the program prints 40 characters past the last carriage return, the Apple III sends out a carriage return to end the line. The options 72 , 80 , and 132 act similarly; the infinity option adds no carriage returns to the program output, no matter how long the line gets.

CARRIAGE RETURN DELAY: ON OFF

Some printers need extra time to return the carriage to the left margin. ON provides this delay.

To return to the standard values for all the characteristics, press ESCAPE. The standard values are the options that were displayed in inverse video the first time you saw the Configuration menu. They make the Apple III emulate an Apple II Plus with Applesoft BASIC and a Serial card.

To start up a disk after selecting options from the Configuration menu, place your Apple II disk into the built-in drive and press RETURN. The values you set will be valid only for that Apple II disk; they will not be saved.

If you want to save the values you selected, press RETURN while holding down the  key. The Emulation disk must be in the built-in drive. You may now start up an Apple II disk by inserting it in the built-in drive and pressing RETURN again.



If you try to store a configuration on the original Emulation disk, you will receive a write-protect error message.

If you do not wish to use DOS, you can press the RESET button immediately after pressing RETURN. The system will then run in the language you choose, without a disk operating system.

To leave emulation mode, insert a SOS program disk into the built-in disk drive and press CONTROL-RESET.

Limitations

Emulation mode cannot duplicate the exact behavior of an Apple II. These are the known limitations:

Software

You cannot have both Applesoft and Integer BASIC in memory simultaneously. To change from one BASIC language to the other, you must change the Language characteristic on the Emulation disk.



A number of disks have menus written in one BASIC that call programs written in another BASIC. If you can read the CATALOG of the disk, find out the name of the program you want to run and which BASIC it's written in; then you can set the appropriate BASIC on the Emulation disk and RUN the individual program. This may not be possible with some copy-protected disks.

In emulation mode, you cannot run any Pascal programs that require the Language Card when run in the Apple II. However, while the Apple III is in emulation mode, the Pascal Run-Time System lets you run programs like the *Dow Jones News & Quotes Reporter*.



The Pascal System on the Apple III runs only in Apple III mode; however, Apple II Pascal programs can be recompiled to run on the Apple III. Refer to the Apple III Pascal manuals.

Emulation mode is designed to use Apple II DOS 3.3. In order to use DOS 3.2 disks with the Apple II Emulation feature, you should first update them using the MUFFIN program on your DOS 3.3 program disk. See your DOS 3.3 manual (or your dealer) for more information. If some of your 3.2 disks are copy-protected and you can't update them to 3.3, you can start up the DOS 3.3 BASICS disk, then your protected disks. This alternative requires disk swapping, so update disks if you can.

Peripheral Devices

You cannot use an Apple II Language System or the Applesoft II and Integer BASIC Firmware cards with your Apple III.

Some Apple II programs require a Serial or Communications card in a particular slot. If the Apple II slot is not 7 or 5, these programs will not run in emulation mode unless you put an Apple II Serial or Communications card into the required slot of the Apple III.

The Apple III does not have a cassette interface, so the BASIC LOAD and SAVE commands, as well as all other commands that use the cassette interface, do not work.

The Emulation feature has no annunciator outputs. The memory locations the Apple II uses for the annunciator outputs are used by the Apple III for reading the joystick outputs. For this reason, any program that uses the annunciators at the same time as it reads the joysticks gets erroneous joystick readings.

Game Inputs

The Apple III uses Port A and Port B as input from a Cursor III or similar device. On these inputs, the Apple III uses an analog-to-digital converter. This implementation is different from and not at all compatible with the Apple II. You should not expect all Apple II games that use paddles or joysticks to work on the Apple III in emulation mode. Those games that use the keyboard for control are likely to work on the Apple III. The table below shows the relationships between the Apple III joystick inputs and the Apple II hand control inputs.

Emulation mode uses a modified form of the Autostart ROM's paddle-reading routines, PDL(0) through PDL(3) in BASIC, to read the joysticks. Any Apple II program that uses its own routines for these functions will not run in emulation mode.

Analog Inputs (Potentiometers)

Apple III				Apple II		
Port/ Pin	Direction	SOS Name	A III BASIC	Paddle	A II Name	Applesoft BASIC
B/4	Horiz	JS0-X	pdl(0)	1	GC1	PDL(1)
B/8	Vert	JS0-Y	pdl(1)	3	GC3	PDL(3)
A/4	Horiz	JS1-X	pdl(2)	0	GC0	PDL(0)
A/8	Vert	JS1-Y	pdl(3)	2	GC2	PDL(2)

Digital Inputs (Pushbutton and Toggle Switches)

Apple III				Apple II			
Port/ Pin	Type	SOS Name	A III BASIC	Paddle	A II Name	A II BASIC	Location
B/5	Button	JS0-B	button(0)	1	PB2	PEEK(-16286)	\$C062
B/9	Switch	JS0-SW	button(1)	3*	PB0*	PEEK(-16288)*	\$C060*
A/5	Button	JS1-B	button(2)	0	PB1	PEEK(-16287)	\$C061
A/9	Switch	JS1-SW	button(3)	2	PB3	PEEK(-16285)	\$C063

Table C-1. Relationship Between Emulation Mode Joysticks
and Apple II Hand Controls

* Note that on an Apple II, Paddle 3 cannot have a pushbutton, as memory location \$C060 is used for cassette input. Any program that reads this location as a pushbutton input works with the Emulation feature, but not on an Apple II.

Video

The Apple III's RGB color video outputs do not generate a color signal for high-resolution graphics in emulation mode. Apple II High-Resolution images are available only on the NTSC black-and-white and color video outputs.

Dots on the left border of the high-resolution graphics screen flicker uncontrollably.

Firmware and Hardware

The subroutines in the Apple II's monitor ROM that handle Non-Maskable Interrupts (NMIs), annunciators, cassette input and output, and paddle input have been altered. The NMI vector in emulation mode is the same as the Reset vector. Cassette input and output have been removed and are inoperable.

In emulation mode, the RESET button on an Apple III does not operate the same as the Apple II RESET button in that it generates a Non-Maskable Interrupt, not a true reset. Holding down CONTROL while pressing RESET causes the Apple III to try to start up a disk.

Keyboard

The symbols

@ ^ & (*) : + = - " ' ,

in the Apple II character set have been relocated on the Apple III keyboard. Although these symbols can still be generated by the keyboard, different keystrokes are required to generate them.

Several keys on the Apple III keyboard produce characters the Apple II keyboard cannot produce. When they are sent to the screen in emulation mode, different characters are displayed. The table below shows the characters normally produced by these keys, followed by the characters displayed in emulation mode, for all combinations of the SHIFT and CONTROL keys. Some of these characters are not displayed at all (the cursor does not move): These are denoted (ND). Others display as spaces (the cursor moves one space): These are denoted (SP). The two- and three-letter abbreviations are the ASCII symbols for control characters.

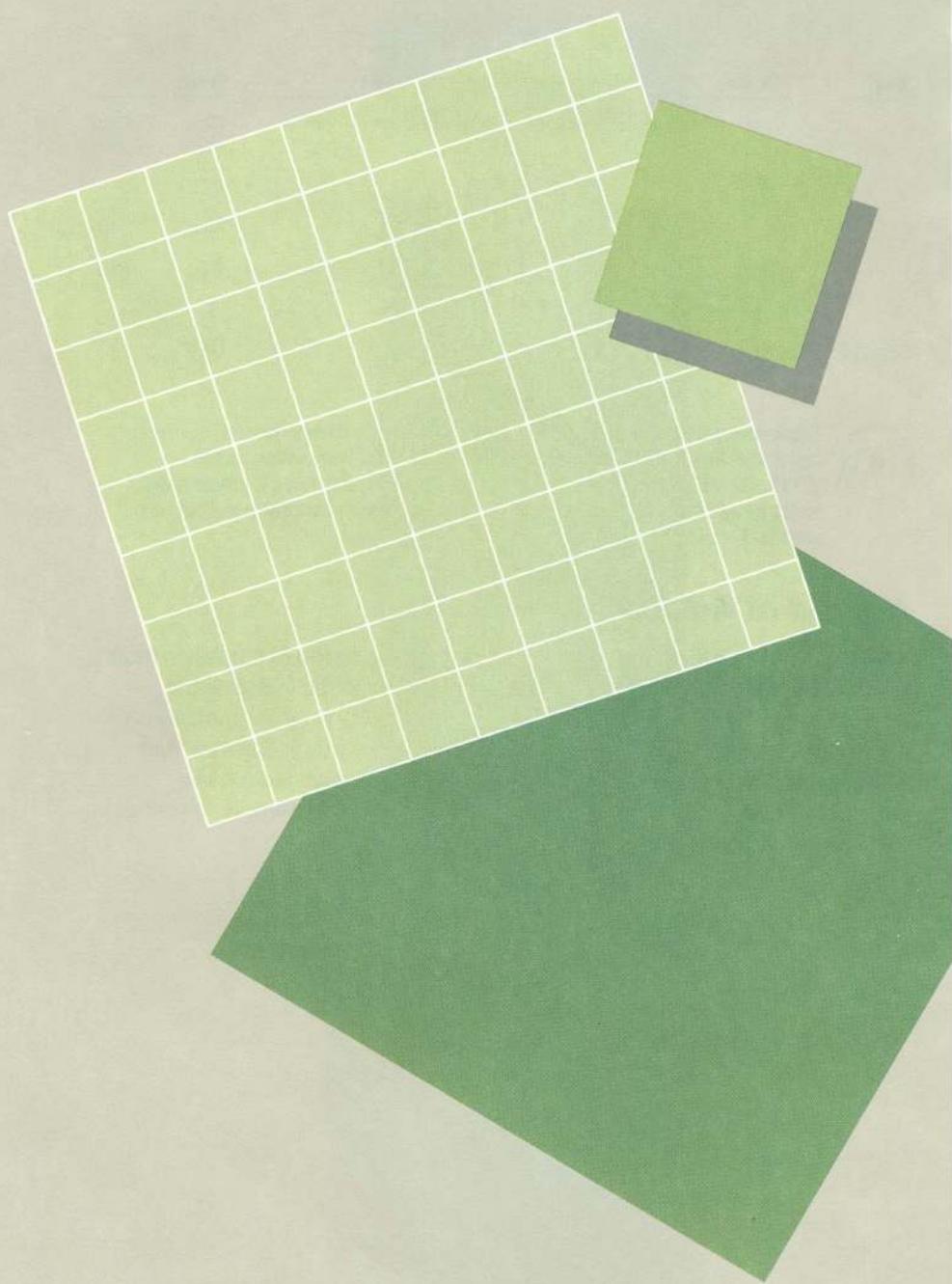
Key	Alone		CONTROL		SHIFT		Both	
	Char	Disp	Char	Disp	Char	Disp	Char	Disp
_	_	_	_	_	_	_	Char US	Disp (ND)
\ 	\	\	FS	(ND)	 	<	DEL	?
[	[	[	ESC	(ND)		;	ESC	(ND)
]	]	]	GS	(ND)		=	GS	(ND)
~		(SP)		(SP)	~	>	~	>
DELETE	DEL	?	DEL	?	DEL	?	DEL	?



Some programs may give unexpected responses if they receive characters not in the Apple II character set. CTRL-SHIFT-2 in emulation mode (CTRL-SHIFT-P on the Apple II) produces ASCII NUL (\$00), which halts many programs. CTRL-S on both machines suspends screen output until pressed a second time.

A Word of Advice

It's not a good idea to write programs that exploit the quirks of emulation mode, such as the Paddle 3 button input: These quirks cannot be found on the Apple II or the Apple II Plus. If you want to write a program that runs only on the Apple III, Apple III Business BASIC will probably serve you better than Applesoft or Integer BASIC. If you want to write a program that runs in emulation mode, it will be more useful if you write it so that it will run on either the Apple II or Apple II Plus.



***S*ystem Specifications**

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***S*ystem Specifications**

Operating System

Version: SOS 1.2

Classification:

Single-task, configurable, interrupt-driven operating system.
File system—hierarchical, tree file structure.
Device-Independent I/O.

CPU Architecture:

Address enhanced 6502 instruction set.
Supports both bank-switched and enhanced indirect addressing.
Separate execution environments for user and SOS including private
zero and stack pages.

System Calls:

Based on 6502 BRK instruction, pointer, and value parameter types.
Error codes returned via A register.
All other CPU registers preserved upon return.
Optional parameter lists for future expansion.

File Management System:

Hierarchical file structure.

Pathname prefix facility.

Byte-oriented file access to both directory/user files and device files.

Dynamic, noncontiguous file allocation on block devices.

Automatic buffering (current index block and data block).

Dynamic memory allocation of file buffers.

Block size (512 bytes).

File protection: rename/destroy/read/write access attributes.

File-level assignment on Open.

Automatic date/time stamping of files.

Automatic volume logging/swapping, supported by system message center.

Multiple volumes per block device can be "open" simultaneously.

Sparse file capability.

maximum number of active volumes = 8

maximum disk size = 32 Mbytes

maximum user file size = 16 Mbytes

maximum file entries in volume directory = 51

maximum file entries in a subdirectory = 1663

file names - maximum 15 characters, including periods and suffixes

pathnames - SOS maximum 128, including slashes, which are

separators. (Programs such as System Utilities may limit to 80 or fewer characters, but may go to 128 via the prefix.)

File system calls:

CREATE	READ
DESTROY	WRITE
RENAME	CLOSE
SET_FILE_INFO	FLUSH
GET_FILE_INFO	SET_MARK
VOLUME	GET_MARK
SET_PREFIX	SET_EOF
GET_PREFIX	GET_EOF
OPEN	SET_LEVEL
NEWLINE	GET_LEVEL

Device Management System:

Block and character device classes.

Standardized interface for block and for character devices.

All devices are named and configurable.

Support for synchronous, interrupt, and DMA-based I/O.

Maximum number of active devices = 24

Maximum active block devices = 12

Maximum active character devices = 24 minus actual number of
active block devices

Device system calls:

GET_DEV_NUM	D_STATUS
D_INFO	D_CONTROL

Memory/Buffer Management System:

All memory allocated as segments.

Supports maximum of 512 Kbytes RAM.

System buffers allocated and released dynamically.

System buffer checksum routine for data integrity.

Memory system calls:

REQUEST_SEG	GET_SEG_INFO
FIND_SEG	GET_SEG_NUM
CHANGE_SEG	REL_SEG

Additional System Functions:

System clock/calendar

(year/month/day/weekday/hour/minute/second/ms).

GET_ANALOG: reads joystick X and Y axes, pushbutton, and switch.

TERMINATE call provides clean program termination and clears memory.

System calls:

SET_TIME

TERMINATE

GET_TIME

GET_ANALOG

Interrupt Management System:

Receives hardware interrupts (IRQ, NMI) and system calls (BRK).

Hardware resource allocation and deallocation.

Dispatches to driver interrupt handlers.

Event Management System:

Priority-based event signaling.

Event handlers preempted by higher priority events.

Events with equal priorities process FIFO.

Event fence delays events with priority less than fence.

Event system calls:

SET_FENCE

GET_FENCE

System Configuration:

Menu-driven system-configuration editor (System Configuration Program).

Can add, remove, and modify drivers and can select the keyboard-layout and system-character-set tables.

Standard Device Drivers:

Flexible disk (.D1, .D2, .D3, .D4)

143,360 bytes, or 280 blocks, per formatted volume.
Automatically reports mounting of a new volume.
Built into SOS kernel.

Console (.CONSOLE)

Interrupt-driven keyboard (supports type-ahead).
Configurable keyboard-layout table (via SCP).
Raw-keystroke and no-wait input modes.
Event handler supports anykey and attention character.
Optional screen echoing.
Console control modes:

- video on/off
- flush type-ahead buffer
- suspend screen output
- display control characters
- flush screen output

Cursor positioning commands.
Viewport set, clear, save, and restore commands.
Horizontal and vertical scrolling.
Text modes: 24x80 and 24x40 B&W and 24x40 color (normal and inverse).
Text Interlace mode: 560x384; green phosphor monitor required.
Configurable system character set table (via SCP).
Character set can be changed under program control at any time.
Screen read command.

Graphics (.GRAFIX)

Displays graphical and textual information simultaneously.

Graphics modes: 560x192 and 280x192 in B&W video.

280x192 and 140x192 in 16 colors.

Point-plotting and line-drawing commands using graphics viewport and pen.

Raster block picture operations.

Color operator table, controls color overwrite.

Transfer modes allow binary operations on the drawing color and the current screen color.

Allows use of either the system character set or an alternate character set to display ASCII text on the screen.

Single or dual graphics screens.

General purpose communications (.RS232)

RS-232-C interface.

Configurable data rates from 110 to 9600 baud.

Configurable protocols, including XON/XOFF, ETX/ACK, and ENQ/ACK.

Interrupt-driven, buffered, bi-directional data transfer.

Hardware handshaking option.

Serial printer (.PRINTER)

RS-232-C interface.

Configurable data rates from 110 to 9600 baud.

Interrupt-driven and buffered (output only).

Hardware handshaking option.

Audio (.AUDIO)

64 volume levels.

Produces tones from 31 to 5090 Hz (over 7 octaves).

Duration range from 0 to 5 sec (increments of 1/60 sec).

Hardware

Size:	17.5 inches wide (44.45 cm) 18.2 inches deep (46.23 cm) 4.8 inches tall (12.19 cm) Cast aluminum base with molded plastic cover
Weight:	26 pounds (11.8 kg)
Processor:	Based on the 6502B microprocessor, with extended addressing capability
Clock speed:	2 MHz peak, 1.4 MHz average
Main memory:	Minimum 128K (131,072) eight-bit bytes Dynamic Random Access Memory
ROM memory:	4K (4,096) eight-bit bytes initialization and diagnostics
Power supply:	High-voltage switching type +5, -5, +12, -12 volts 1 amp UL/CSA approved
Power req:	100 watts maximum, 107 to 132 volts, 60 Hz.
Ambient temp:	0° to 45° centigrade (32° to 113° F). Critical factor is the temperature at which disk case can warp.
Mass storage:	One 5-1/4 inch (13.33 cm) built-in, flexible-disk drive, 140K (143,360) bytes per disk Up to 3 additional drives can be connected by <i>daisy chain</i> cables Built-in controller

- Keyboard: 75 keys (62 on main keyboard, 13 on numeric pad)
Full 128 character ASCII represented
All keys have automatic repeat except modifier keys
Five modifier keys: SHIFT, CONTROL, ALPHA LOCK,
and two program-definable keys:  and 
Four directional arrow keys with two-speed repeat
Five other special keys: TAB, ESCAPE, RETURN,
ENTER, and DELETE
All keys redefinable
Keyboard is fully interrupt-driven
- Screen: Three text modes:
40x24, black-and-white, normal and inverse
80x24, black-and-white, normal and inverse
560x384 dots with text interlace, 560x192
without text interlace
40x24, 16 color, foreground and background
All text modes have a software-definable
128-character set
- Four graphics modes:
280x192, black-and-white
280x192, 16 color, foreground and background
140x192, full 16 color
560x192, black-and-white
- Video output: RCA phono connector for NTSC black-and-white
composite video
DB-15 type connector for:
NTSC black-and-white composite video
NTSC color composite video
RGB pure video
Composite sync signal
+5, -5, +12, -12 volt power supplies
Color signals appear as 16-level grey scale on black-
and-white video outputs

Audio output:	Built-in 2-inch speaker Miniature phone-tip jack on back of Apple III Three different audio generators: 64-level audio port (6-bit DAC) One-bit square-wave generator Fixed-frequency "beep" generator
Disk I/O:	One DB-25 connector supporting up to 3 daisy-chained Disk III drives
Serial I/O:	RS-232-C compatible, DB-25 female connector Software-selectable baud rate and duplex mode
Joysticks:	Two DB-9 connectors for two joysticks, each with two pushbuttons
Printer:	One DB-9 connector (shared with first joystick) for Silentype III printer
Expansion:	Four 50-pin expansion slots inside the case

Glossary

alphanumeric characters A combination of letters and numbers.

analog Represented in terms of a physical quantity, such as a voltage, frequency, length, or position, that can vary smoothly and continuously over a range of values. For example, a conventional 12-hour clock face is an analog device that represents the time of day in terms of the angles of the clock's hands. Compare digital.

application program Software that applies the system's resources and capabilities to some particular useful task, such as text processing or database management.

ASCII American Standard Code for Information Interchange; a code in which the numbers from 0 to 127 stand for text and control characters. ASCII code is used for representing text inside a computer and for transmitting text between computers or between a computer and a peripheral device.

audio driver The device driver that enables a program to produce sounds using the Apple III's built-in speaker.

back panel The strip of switches and connectors along the lower edge of the back of the Apple III's case.

back up To make a copy of a disk for safekeeping. A backup copy can save you much time and grief in the event of a power failure, errors in writing the information to a disk, or a careless mistake that destroys information on a disk.

backspace To move the cursor one character to the left. There are two types of backspaces: destructive, which removes backed-over characters from the screen; and nondestructive, which leaves the backed-over characters intact.

baud Bits per second. A measure of data transmission speed used in telecommunications.

binary The representation of numbers in terms of powers of two, using the digits 0 and 1. Commonly used in computers, since the values 0 and 1 can easily be represented in physical form in a variety of ways, such as positive or negative voltage, the presence or absence of current, or a white or black dot on the display screen.

bit A Binary digIT (0 or 1); the smallest possible unit of information, consisting of a simple two-way choice, such as yes or no, on or off, positive or negative, true or false, something or nothing.

block A unit of information 512 bytes long. The Utilities List command reports the sizes of disks and files in blocks.

block device A device that uses one block (512 bytes) of information as its basic unit of communication.

block file Any file in a block device.

boot or **bootstrap** To start up the system, a program, or a programming language. When you turn on the system, you need a program disk to get it running.

boot disk See program disk.

buffer An area of the computer's memory reserved for a specific purpose, such as to hold graphical information to be displayed on the screen or text characters being read from the keyboard. See type-ahead.

built-in Within the Apple III's case. The Apple III has a built-in speaker, disk drive, serial interface, and so on.

byte A unit of information consisting of a fixed number of bits, usually eight.

catalog A list of the contents of a directory, typically a list of file names.

character Any symbol that has a widely-understood meaning. The Apple III has 128 different symbols in its character set. Some, such as letters, numbers, and punctuation, can be shown on the display screen and printed on a printer. Others are used to control various functions of programs or the Apple III. See control characters.

character device A device that uses one character (1 byte) as its basic unit of communication. The console is a character device.

character file When using SOS, an abstraction used to represent a character device and the information it contains.

chip The small piece of semiconducting material (usually silicon) on which an integrated circuit is fabricated. The *word* chip properly refers only to the piece of silicon itself, but is often used for an integrated circuit and its package.

command 1. An order you type at the keyboard to make the computer do something. For example, List in the Utilities file-handling program is a command, called up by typing L. 2. In the context of programming, a character (usually a control character), embedded in the stream of characters sent from a program to a device driver to instruct the device to perform some function.

configuration The hardware and software arrangement of a system. Specifically, the configuration of SOS consists of its active drivers and their parameters, and determines how the Apple III communicates with the console, disk drives, and other devices. You control the configuration of your system with the SCP.

configure As used in this manual, to change the parameters of a driver with the SCP to adapt SOS to some device.

connector The physical joining place for electrical or electronic devices. The back of the Apple III has connectors for a Silentype printer, a joystick, a serial interface, two video connectors, and audio equipment; these connectors are sometimes called ports. Inside the Apple III are four connectors for peripheral interface cards; these connectors are called expansion slots.

console The Apple III's video display and keyboard together make up the console. This is the part of the Apple III you communicate with directly.

console control keys You can use the 5, 6, 7, 8, and 9 keys on the numeric keypad while holding down the CONTROL key to control the console. For more information, see the chapter The Console Driver in the *Standard Device Drivers Manual*.

console driver The program that allows the operating system of the Apple III to communicate with the console. It controls the reading of characters from the keyboard, type-ahead, cursor motion, and the display of text on the monitor screen. This driver's name is .CONSOLE .

control character A symbol you create by pressing one of the Apple III's keys while holding down the key labeled CONTROL. Control characters generally control or modify the way information is printed or displayed. They can also be generated and transmitted by programs. Normally, these symbols do not appear on the display screen or via a printer.

cursor The symbol, typically a white rectangle, that moves across the screen and indicates where the next character will appear.

cursor-move mode See escape mode.

default A value, action, or setting automatically used by a computer system or a program when the user can, but does not, provide other explicit information.

device A piece of computer hardware other than the computer itself. Devices may be built-in, for example, the keyboard; or they may be external, for example, a printer. External devices are also called peripheral devices.

device driver The program that acts as a communications link between a device and the operating system. Before you can use a new device with your Apple III, you must use the System Configuration Program (SCP) on the Utilities disk to install and configure the driver for that device. The use of device drivers is described in the *Standard Device Drivers Manual*.

device name The name used in SOS pathnames to refer to a particular device, without regard to the files associated with the device. Device names begin with a period and a letter, followed by up to 13 alphanumeric characters. For example, the device name of the Apple III's built-in disk drive is .D1 , regardless of what disk is in that drive. The name of a device is also the name of its driver program.

digital Represented in noncontinuous form, such as numerical digits. For example, digital clocks display the time in numerical form instead of using the positions of a pair of hands on a clock face. Compare analog.

directory A file that contains the names and locations of other files. These other files may themselves be directories, in which case they are called subdirectories. See catalog and volume directory.

disk An information-storage medium consisting of a plastic disk coated with metal oxide that works the way metal oxide on recording tape works. Disks may be rigid or flexible ("floppy") and come in a variety of sizes. You must format a disk with the Format program on the Utilities disk before the Apple III can write to or read from it. Remember not to touch the magnetic surface of a flexible disk; handle it only by its plastic cover.

disk drive The machinery and electronics that turn and read a disk, and receive and transmit files in a manner intelligible to a computer (to a device driver in the case of an Apple III).

disk envelope A removable protective paper sleeve into which you should place a disk while handling or storing it. Before inserting the disk into a drive, you need to remove it from the envelope. Compare disk jacket.

diskette Another term for a 5-1/4 inch flexible disk.

disk jacket A permanent protective covering for a disk, usually made of black paper or plastic. Never remove the disk from its jacket, even while the disk is inserted in a drive. Compare disk envelope.

display To show information visually, especially on the screen of a display device. Also, the information shown.

display device A device that exhibits information visually, such as a video monitor or a television receiver. The display device is part of the console, and the Apple III communicates with it via the .CONSOLE device driver.

echoing Characters typed on the keyboard are sent first to the operating system, and then the operating system displays the characters on the monitor screen. When the operating system echoes your keypresses, the characters you type immediately appear on the screen.

error message A message that appears on the display screen to indicate a problem with the system or with the program you are using. Error messages often indicate a problem with the syntax of the commands you type.

escape mode A state of the Apple III available while using the BASIC programming language. In escape mode, certain keys take on special meanings for positioning the cursor and for controlling the display of text on the screen. You enter and leave escape mode by pressing the ESCAPE key. See cursor-move mode.

expansion slot Any of four connectors located inside the Apple III. Expansion slots hold peripheral interface cards.

external Not within the Apple III's case. Usually used to refer to devices that are not built-in. The Apple III can have as many as three external disk drives, in addition to ProFile. Synonym: peripheral.

field An area on the screen (and within a program) reserved for your response.

file An orderly, named collection of information. The information you work with on your Apple III is stored in files named and organized by SOS. SOS files are usually stored on a disk. Each file on a disk is identified by a pathname unique to that disk. SOS organizes names and locations of files into a special type of file called a directory. The files in a directory may include subdirectories of other files on the disk.

file name The name of a file, or of a directory or subdirectory. SOS file names may contain up to 15 alphanumeric characters; they must begin with a letter and they must not contain a space or an apostrophe. See pathname.

file pattern A pathname or partial pathname that refers to a group of files through the use of a wildcard.

flexible disk A disk made of metal-coated flexible plastic sealed in a protective envelope. Flexible disks are sometimes called floppy disks; they are typically slower in response and smaller in storage, but cheaper and more portable than rigid disks.

format To prepare a disk for use. When you format a disk by using the Format program on the Utilities disk, the Apple III puts a magnetic outline of blocks onto the surface of the disk. Information is stored in these blocks. You must format a disk before the Apple can write on it. Note: When you format a disk, any existing information on the disk is destroyed.

graphics (1) Information presented in the form of pictures or images.
(2) The display of pictures or images on a display screen. Compare text.

graphics driver A program that enables the Apple III's operating system to communicate with the portions of memory designated as the storage areas for graphics (the graphics screens). The graphics driver is named .GRAFIX, and it allows you to plot points, draw lines, display characters, and place blocks of predefined shapes on any of the four graphics screens. It also allows you to read the setting of any dot on any graphics screen.

graphics modes The formats, in terms of color and resolution, of Apple III graphics.

hard disk See rigid disk.

hertz The unit of frequency of vibration or oscillation, also called "cycles per second"; named for the physicist Heinrich Hertz and abbreviated Hz. The current provided by a standard power outlet alternates at a rate of 60 Hz; that is, it changes polarity 60 times per second. The Apple III operates at about 1.4 million Hz, or 1.4 megahertz (MHz).

hexadecimal The representation of numbers in terms of powers of sixteen, using the sixteen digits 0 to 9 and A to F.

high-level language A programming language that is relatively easy for people to understand. High-level languages you can use on the Apple III include BASIC, COBOL, and Pascal.

Hz See hertz.

initialization The preparation of a disk for use. See format.

input Information transferred from a device such as the keyboard to the Apple III.

input/output (I/O) 1. A general term referring to the transfer of information between the Apple III and any device. 2. The information transferred between the Apple III and any device.

integrated circuit An electronic component consisting of many circuit elements fabricated on a single piece of semiconducting material such as silicon. See chip.

interface The devices, rules, or conventions by which one component of a system communicates with another.

interface card See peripheral card.

interpreter A program that translates each step in a high-level language (such as BASIC) into a series of low-level machine-language operations and then carries out those operations before proceeding to the next step.

inverse video The display of black characters on a light background. Some programs, such as System Utilities, use inverse video to signal the order in which you supply command information.

I/O See input/output.

joystick A stick or lever whose motion controls the direction of movement of cursors as well as other computer functions.

K Two to the tenth power, or 1024 (from the Greek root *kilo*, meaning one thousand); for example, 64K equals 64 times 1024, or 65,536.

Kernel In the Apple III, the part of SOS that directs the flow of information within the Apple III and among its devices.

keyboard The set of keys built into the Apple III, similar to a typewriter keyboard, for typing information to the computer. The keyboard is a part of the console, and communication with it and the Apple III is handled by the .CONSOLE device driver.

keyboard layout The arrangement of characters on the keyboard. Several layouts are available: the standard layout (the way your Apple III comes from the factory), the American Simplified (Dvorak), and a number of foreign keyboards. You can change from the standard to any of the other layouts; see the *Standard Device Drivers Manual*.

kilobyte A unit of information consisting of 1 K (1024) bytes, or 8K bits. See bits, bytes, and K.

language translator The part of SOS that reads a program written in a particular programming language and either executes it directly or converts it into some other language. On the Apple III, language translators are stored in the SOS.INTERP file.

letter-quality printer A printer that produces results comparable in quality to those produced by an electric typewriter.

list A verb in computer jargon, meaning to display the contents of the computer memory or a file on a monitor or to print it on a printer.

load To bring into memory. When you start up the Apple III, an operating system is loaded from the program disk. You can also load alternate character sets, device drivers, and files.

lock See write-protect.

machine language The form in which instructions to a computer are stored in memory for direct execution by the computer's processor.

memory The storage for programs and information that is inside the Apple III's case. Your Apple III has 4K bytes of permanent memory that contains initialization and diagnostic programs. There is a much larger memory, specified for each machine, for general use as a work space. Information in this larger memory disappears when the Apple III is turned off; to save this information, write it to a volume.

menu A list of choices. A program typically displays a menu on the display screen and then waits for you to choose one of the items by name or number, or by moving a highlight bar.

MHz Megahertz; one million hertz. See hertz.

microcomputer A computer, such as the Apple III, with a microprocessor.

microprocessor A computer processor contained in a single integrated circuit.

mode A state of a computer or system that determines its behavior.

modem Modulator/demodulator; a peripheral device that enables the computer to transmit and receive information over a telephone line.

monitor See video monitor.

NTSC (1) National Television Standards Committee; the committee that defined the standard format used for transmitting broadcast video signals in the United States. (2) The standard video format defined by the NTSC.

numeric keypad The thirteen keys on the right side of the keyboard. The symbols generated by these keys are normally the same as the symbols generated by the corresponding keys on the main keyboard (the ENTER key usually functions the same way RETURN does); however there is a way to tell if the key pressed is on the numeric keypad. Refer to the *Standard Device Drivers Manual* for more details.

off-line A device that SOS could communicate with but presently cannot is said to be off-line. A device is off-line if it is not connected to the Apple III or if it is connected and not turned on. A disk drive, for example, is off-line if it has no disk in it or if its door is open. Compare on-line.

on-line A device that SOS can communicate with: The device is physically connected to the Apple III; its driver is part of the SOS.DRIVER file and is activated. A volume in an on-line disk drive is also on-line.

operating system A program that supplies mediating services between computer hardware and a program. The operating system is the computer's traffic controller, managing the flow in information into, out of, and within the computer. The Apple III's operating system is called SOS.

output Information transferred from a computer to some external destination such as the display screen, a disk drive, a printer, or a modem.

parallel interface Electronics in the Apple III that allow it to send and receive information to any device that understands parallel information. Parallel information is many bits, typically eight bits or one byte, transmitted simultaneously over different wires or channels. Compare serial interface.

partial pathname A pathname that begins with a file name rather than with a volume name or a device name. A partial pathname begins with a letter; a full pathname begins with a slash or a period.

Pascal A high-level programming language.

pathname The full name by which SOS identifies a file. A pathname is a sequence of file names, each preceded by a slash, that specify the path you take from directory to directory to get to a certain file. A pathname always begins with a volume or (block) device name and ends with the name of a specific file. The pathname /ACCOUNTING/PAYABLE/QUIGLEY identifies QUIGLEY as a file on the volume (usually a disk) ACCOUNTING, in the directory PAYABLE.

peripheral device An external device; a device that is not within the Apple III's case.

peripheral interface card A small printed-circuit board, installed in an expansion slot inside the Apple III. The card enables the computer to communicate with a peripheral device attached to the card.

port A point of physical connection between a computer and a peripheral device or another computer.

power supply The hardware component of a computer that draws electrical power from a power outlet and converts it to the forms needed by other hardware components.

prefix A pathname that specifies all or part of a pathname. A prefix always specifies either a volume directory file or a subdirectory file. You can get at all files within the directory named by the prefix simply by mentioning their specific file names; to specify a file in a directory not named by the prefix, you must use that file's entire pathname or change the prefix. Device names do not require a prefix. Until you change it, the prefix is always set to the volume directory of the program disk you used to start up the system.

printed-circuit board A hardware component of a computer, consisting of a flat, rectangular piece of rigid material, usually fiberglass, to which integrated circuits and other electronic components are connected.

printer driver A device driver that enables the Apple III's operating system to communicate with a printer.

processor The hardware component of a computer that performs the actual computation by directly executing instructions represented in machine language and stored in main memory.

program (1) A set of instructions describing actions for a computer to perform in order to accomplish some task. (2) To write a program.

program disk A disk containing all the programs and data that the Apple III needs to use a language and to communicate with at least some of its devices. To be a program disk, a disk must contain the files SOS.KERNEL , SOS.DRIVER , and SOS.INTERP . When you start up your system with a program disk in the built-in drive, the Apple III automatically uses the language on that disk.

radio-frequency modulator A device for converting the video signals produced by a computer to a form that can be accepted by a television receiver.

read To retrieve information stored on a disk.

resolution The size and density of the small dots that form characters and other images on the screen.

RF modulator See radio-frequency modulator.

rigid disk A disk made of hard metal and sealed into a drive. Hard disks are typically faster in response and larger in storage, but higher in price and less portable than flexible disks.

root directory Another term for volume directory.

save To transfer information from main memory to a peripheral storage medium.

SCP The SCP (System Configuration Program) is a program that allows you to add and delete device drivers, change their parameters, and create SOS.DRIVER files. For information on using the SCP see Chapter 7 of this manual. The *Standard Device Driver's Manual* describes the SCP in detail.

screen See display screen.

scroll To move all the information on the display screen to create room for additional information. When the cursor is on the bottom line of the display screen, and you press RETURN to enter a new line of text, the existing text scrolls upward one line, and the cursor moves to the head of the new bottom line.

serial interface Electronics in the Apple III that allow the Apple III to send and receive information to any device that understands serial information. Serial information travels through wires sequentially, one bit at a time. Compare parallel interface.

silicon A non-metallic, semiconducting chemical element from which integrated circuits are made.

software A generic term for programs. System software provides access to basic resources and capabilities of the system, often for use by other programs, for example, the information contained on the disks in the System Software package.

SOS (pronounced "sauce") The Apple III's Sophisticated Operating System. It provides the means for programs to use the hardware of the Apple III and its peripheral devices. A version of SOS is included on every program disk for the Apple III. With the SCP, you can configure, or change, SOS to accommodate various devices for use with your Apple III. See operating system.

start up To turn on the Apple III.

subdirectory A file that contains the names and locations of other files and that is not the volume directory. Every subdirectory has its name listed in a volume directory or in another subdirectory.

system character set A set of characters of a particular shape and style displayed by the console and graphics drivers. You can change sets with the Standard Character Set Option of the System Parameters display of SCP, as described in the *Standard Device Drivers Manual*.

system configuration See configuration.

System Configuration Program See SCP.

system parameters Special information that is stored on every program disk, such as the number of disk drives that the system is configured to use. System parameters can be changed using the SCP on the Utilities disk.

telecommunications The transmission of information across long distances, usually over telephone lines.

television receiver A display device capable of receiving broadcast video signals, such as commercial television, by means of an antenna. A black-and-white or color television can be a display device for the Apple III if it is connected via a radio-frequency modulator.

text Information, in the form of alphanumeric characters, that a person types or will read. Text can appear on the display screen or be printed. Compare graphics.

text interlace A feature of the Apple III console that, when activated, increases the resolution of text characters on the display screen.

text mode The size and format of the text screen.

turnkey disks Disks that execute a specific program when you start them up. For example, the Demonstration disk that comes with the Apple III is a turnkey disk.

type-ahead A feature by which the Apple III remembers all of the keys you press, even if it is busy doing something else (such as writing to a disk). If the Apple III is busy, the characters you press may not immediately appear on the display screen. They will be stored in the type-ahead buffer until the computer is free to display them.

UCSD disk A volume formatted by the UCSD Pascal programming language used on the Apple II family of computers. UCSD disks will work on the Apple III, although certain features of the Apple III, such as subdirectories, are not available.

UCSD Pascal A Pascal language developed by UCSD (University of California, San Diego). Apple III Pascal is an adaptation by Apple Computer, Inc. of UCSD Pascal that uses the features of the Apple III.

video monitor A display device that receives video signals by direct connection only. It cannot receive broadcast signals such as commercial television. Compare television receiver.

volume A formatted mass-storage medium. The volume most commonly used with the Apple III is the disk. A volume has a name and a volume directory with the same name, and its information is organized into files. Each volume the Apple III is using at any one time must have a different volume name.

volume directory The main directory of a volume. The volume directory is identified by the name of that volume. For example, the volume directory of the disk called ACCOUNTING is /ACCOUNTING .

volume name The name of a volume, usually a disk. This name is also the name of the disk's volume directory.

wildcard character The equal sign (=), which may represent the files within a directory or subdirectory or those files that share a file pattern.

wraparound The feature that causes the cursor to jump automatically to the beginning of the next line whenever it reaches the right edge of the screen.

write To save, or store, information to a disk.

write-enable notch The square cutout in one edge of a disk's jacket that permits the computer to write information to the disk. If the disk doesn't have a write-enable notch, or the notch is covered with a write-protect tab, the computer cannot write to the disk or delete information from it.

write-protect To protect the information on a disk by covering the write-enable notch with a write-protect tab, preventing the computer from writing any new information to the disk or removing existing information from it.

write-protection A feature of the System Utilities that enables you to lock a file so that the Apple III cannot write new information to it or delete existing information from it.

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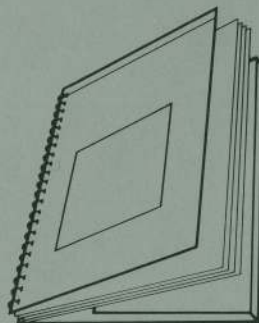
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20525 Mariani Avenue
Cupertino, California 95014

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