Apple® IIc Plus Owner's Guide

LIMITED WARRANTY ON MEDIA AND REPLACEMENT

If you discover physical defects in the manuals distributed with an Apple product or in the media on which a software product is distributed, Apple will replace the media or manuals at no charge to you, provided you return the item to be replaced with proof of purchase to Apple or an authorized Apple dealer during the 90-day period after you purchased the software. In addition, Apple will replace damaged software media and manuals for as long as the software product is included in Apple's Media Exchange Program. While not an upgrade or update method, this program offers additional protection for up to two years or more from the date of your original purchase. See your authorized Apple dealer for program coverage and details. In some countries the replacement period may be different; check with your authorized Apple dealer.

ALL IMPLIED WARRANTIES ON THE MEDIA AND MANUALS, INCLUDING IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, ARE LIMITED IN DURATION TO NINETY (90) DAYS FROM THE DATE OF THE ORIGINAL RETAIL PURCHASE OF THIS PRODUCT.

Even though Apple has tested the software and reviewed the documentation, **APPLE MAKES NO WARRANTY OR REPRESENTATION, EITHER EXPRESS OR IMPLIED, WITH RESPECT TO SOFTWARE, ITS QUALITY, PERFORMANCE, MERCHANTABILITY, OR FITNESS FOR A PARTICULAR PURPOSE. AS A RESULT, THIS SOFTWARE IS SOLD "AS IS," AND YOU, THE PURCHASER, ARE ASSUMING THE ENTIRE RISK AS TO ITS QUALITY AND PERFORMANCE.**

IN NO EVENT WILL APPLE BE LIABLE FOR DIRECT, INDIRECT, SPECIAL, INCIDENTAL, OR CONSEQUENTIAL DAMAGES RESULTING FROM ANY DEFECT IN THE SOFTWARE OR ITS DOCUMENTATION, even if advised of the possibility of such damages. In particular, Apple shall have no liability for any programs or data stored in or used with Apple products, including the costs of recovering such programs or data.

THE WARRANTY AND REMEDIES SET FORTH ABOVE ARE EXCLUSIVE AND IN LIEU OF ALL OTHERS, ORAL OR WRITTEN, EXPRESS OR IMPLIED. No Apple dealer, agent, or employee is authorized to make any modification, extension, or addition to this warranty.

Some states do not allow the exclusion or limitation of implied warranties or liability for incidental or consequential damages, so the above limitation or exclusion may not apply to you. This warranty gives you specific legal rights, and you may also have other rights which vary from state to state.

WARNING

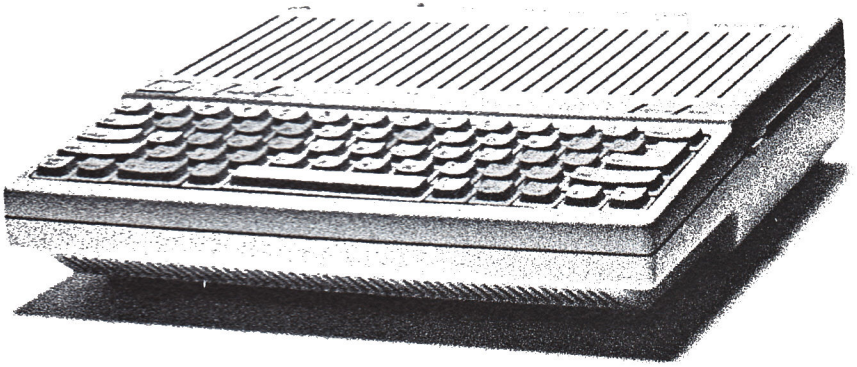
This equipment has been certified to comply with the limits for a Class B computing device in accordance with the specifications in Subpart J of Part 15 of FCC rules. Only peripheral devices (computer input/output devices, terminals, printers, and so on) certified to comply with Class B limits may be attached to this computer.

Operation with noncertified peripheral devices is likely to result in interference to radio and television reception.

DOC Class B Compliance This digital apparatus does not exceed the Class B limits for radio noise emissions from digital apparatus set out in the radio interference regulations of the Canadian Department of Communications.

Observation des normes—Classe B Le présent appareil numérique n'émet pas de bruits radioélectriques dépassant les limites applicables aux appareils numériques de la Classe B prescrites dans les règlements sur le brouillage radioélectrique édictés par le Ministère des Communications du Canada.

Apple® IIc Plus Owner's Guide



APPLE COMPUTER, INC.

Printed in Singapore.

© 1988 Apple Computer, Inc.
20525 Mariani Ave.
Cupertino, California 95014
(408) 996-1010

Simultaneously published in the United States and Canada.

Contents

Figures and tables

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 of 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 a "rabbit-ear" television antenna is used. (A rabbit-ear antenna is the telescoping-rod type usually found on television 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 or its peripheral devices. To further isolate the problem, disconnect the peripheral devices and their input/output (I/O) cables one at a time. If the interference stops, it was caused by either the peripheral device or the I/O cable. These devices require shielded I/O cables. For Apple peripheral devices, you can obtain the proper **shielded cable** from your authorized Apple dealer. For non-Apple peripheral devices, contact the manufacturer or dealer for assistance.

A **shielded cable** has a metallic wrap around the wires to reduce the potential effects of radio-frequency interference.

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 television or radio antenna until the interference stops.
- Move the computer to one side or the other of the television or radio.
- Move the computer farther away from the television or radio.
- Plug the computer into an outlet that is on a different circuit than the television 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 a coaxial cable lead-in between the antenna and television set.

If necessary, consult your authorized Apple dealer or an experienced radio/television technician for additional suggestions.

△ Important This product was FCC-certified under test conditions that included use of shielded cables and connectors between system components. It is important that you use shielded cables and connectors to reduce the possibility of causing interference to radio, television, and other electronic devices. △

Introducing the Apple IIc Plus

THE APPLE® IIC PLUS COMPUTER IS A DESCENDANT OF THE APPLE I—THE creation of an engineer who hated so much to leave his computer behind at the end of the workday that he made himself a home computer.

Steve Wozniak, the engineer, showed the machine to his friend Steve Jobs, and they showed it to other engineers and computer enthusiasts at the Homebrew Computer Club. It wasn't much to look at. It didn't have a case or a keyboard or a matching monitor, but no one saw what it wasn't. They saw what it could be, and they all wanted one.

A **program** is a set of computer instructions.

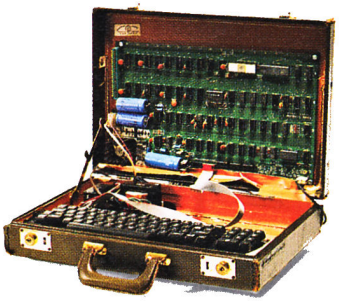


Figure P-1
The Apple I

K is how both computer **memory** size and disk storage space are measured.

A **document** is the body of information you create using a program—like a memo or a budget.

So Wozniak and Jobs started building computers for their friends. And those friends started customizing their computers by adding keyboards, extra chips, and cases for their naked circuit boards. All the while, everyone was busy writing **programs** that made their computers do wonderful things that had never been done before. The personal computer revolution was under way.

Wozniak and Jobs added sound, color, and a built-in programming language to their machine. They gave it a case and a keyboard. And they created a disk drive to use with their computer. They called the new machine the Apple II, and a family of computers was born.

Today, features that early computer enthusiasts could only dream of are standard equipment in your Apple IIc Plus. The **memory** size, for example—which determines how elaborate a program can be and how big a **document** can be—has gone from 4K on the Apple I to 128K on the Apple IIc Plus.

Along with that increase in memory size has come an increase in calculating speed—the time it takes the computer to find a particular piece of data in a database or to recalculate the bottom line in a spreadsheet model. Thanks to a built-in accelerator, programs that do a lot of sorting and calculating will run up to four times faster on the Apple IIc Plus than on earlier models of the Apple II.

Figure P-2
Making the most of your machine

Despite the considerable difference in memory size and other features, most of the programs originally designed for the first generation of Apple computers can run on the Apple IIc Plus. This is not a coincidence. It's the result of a commitment to compatibility among the computers in the Apple II family. And it's the reason you have so many programs, printers, and other Apple products to choose from today.

You'll learn how you can use those programs and products to make the most of your machine as you go through the training disk and the books that came with your Apple IIc Plus.

Unpacking your Apple IIc Plus

You're probably eager to get your Apple IIc Plus up and running. (In fact, you're demonstrating unusual restraint if your computer is still in the box.) But hold your horses. Take a quick inventory before you start setting up the computer.

Check Figure P-3 and make sure you have everything you're supposed to have. If you're missing anything, contact your authorized Apple dealer. If everything's in order, fill out the product registration card and mail it in. This registers you as an Apple owner so you can be notified of new products and special promotions. (The card asks for the Apple IIc Plus serial number; you'll find it on the bottom of the computer.)

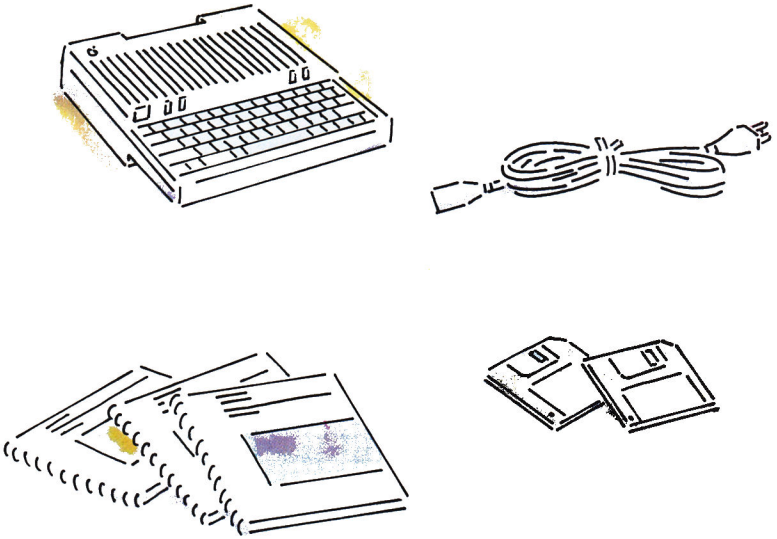


Figure P-3
The contents of the packing box

Learning by doing

The best way to get acquainted with the Apple IIc Plus is to use it; that's the purpose of *Your Tour of the Apple IIc Plus,* the interactive training disk that came packed with your Apple IIc Plus. You can either go through all the information on the training disk in one sitting or coordinate your hands-on learning with the written material in the guide. The owner's guide expands on the concepts presented on the training disk, but neither the guide nor the disk can tell you exactly in a step-by-step way how to use your computer to write reports, do financial planning, or create graphics. Step-by-step instructions come with the programs you buy for your computer. The fascinating (and initially confusing) thing about computers is that how they work depends on what you use them for.

If you have any questions that application manuals don't answer, come back to this manual for help. If you can't find the answer here, your best resource is a more experienced Apple user. If you don't know such a person, consider joining an Apple **user group** in your area. Ask your authorized Apple dealer for the address or call 1-800-538-9696 and ask for extension 500. You'll get the name and address of a user group in your area.

A **user group** is a group of computer users who get together to share programs they've written and opinions they have about commercially produced programs and other computer products.

Road map to the manuals

Your Apple IIc Plus came with three books: the *Apple IIc Plus Owner's Guide,* the *Apple II System Disk User's Guide,* and *A Touch of Applesoft BASIC.*

Read Chapter 1 of this book to learn how to set up your computer. Then consider reading the rest of this book. Not the whole thing—just enough so you feel comfortable with your new machine. What you do after that depends on whether you want to use a program (for writing, calculating, list making, drawing) or whether you want to write programs yourself.

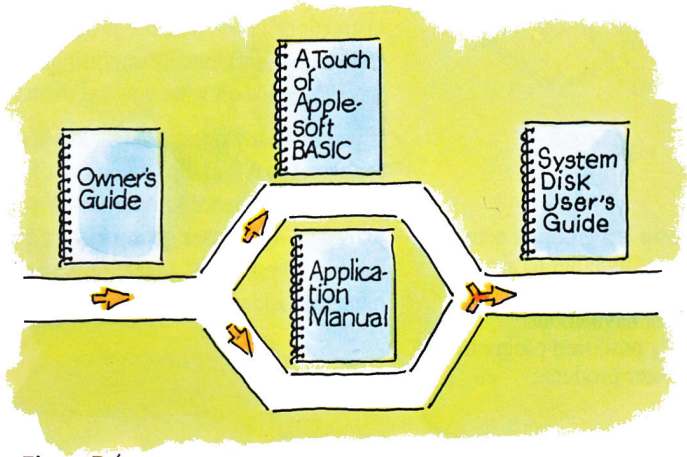


Figure P-4
Road map to the manuals

You can buy programs to accomplish almost any task you can think of (and many you can't), so you don't need to write programs unless you want to; but many people prefer writing programs to using those available. If you think you might be one of those people, read *A Touch of Applesoft BASIC*—an introduction to the programming language that's built into your computer. If you're content to leave programming to programmers for now, skip the introduction to BASIC and read the manual that came with one of the programs you got to use with your Apple IIc Plus.

The system disk guide explains how to use the *Apple II System Disk*. You'll use the programs on the system disk to prepare blank disks for storing documents, to make copies of important disks, to delete documents you don't need any more, and to help you organize the ever-growing number of documents and programs you'll accumulate as you use your Apple IIc Plus.

If you want technical information about the Apple IIc Plus, see the *Apple IIc Plus Technical Reference* manual. Apple II technical documentation is available from your authorized Apple dealer, from Addison-Wesley, or from the Apple Programmers and Developers Association (APDA™). For APDA membership information, contact

Apple Programmers and Developers Association
Apple Computer, Inc.
20525 Mariani Avenue, Mailstop 33-G
Cupertino, CA 95014-6299

1-800-282-APDA (1-800-282-2732)
Fax: 408-562-3971
Telex: 171-576
AppleLink: APDA

If you plan to develop hardware or software products for sale through retail channels, you can get valuable support from Apple Developer Programs. Write to

Apple Developer Programs
Apple Computer, Inc.
20525 Mariani Avenue, Mailstop 51-W
Cupertino, CA 95014-6299

CHAPTER 1

Learning About Your Apple IIc Plus

THIS CHAPTER INTRODUCES YOU TO YOUR APPLE® IIC PLUS AND TELLS YOU HOW to start setting up your computer system. Setting up your Apple IIc Plus is the first step toward working with your computer. Whether your tasks include preparing a major corporate budget or writing a letter home, you'll find that the Apple IIc Plus and some good computer programs make work and study easier and more productive. And you don't have to wait until you've mastered your computer to enjoy it. You can start enjoying it now, as you acquaint yourself with the computer's parts and how they work together.

If you've never used a computer before, don't worry: setup is not difficult. Just follow the step-by-step instructions in this chapter. You'll learn how to choose a good environment for your new computer and how to connect a display device, such as a monitor. Then you'll start using the training disk that came with your Apple IIc Plus.

Meet your Apple IIc Plus

If you haven't already done so, unpack your computer and make sure you have

- an Apple IIc Plus
- a power cord
- the disk *Your Tour of the Apple IIc Plus*
- the disk *Apple II System Disk*
- the book *Apple II System Disk User's Guide*
- the book *A Touch of Applesoft BASIC*
- a product registration card

If you're missing anything, contact your authorized Apple dealer.

Please fill out the product registration card and mail it in. The card registers you as an Apple owner so you can be notified of important changes to Apple products. (The card asks for the Apple IIc Plus serial number—you'll find it on the bottom of the computer.) Once you've gone through one or more chapters of this guide and the training disk, please take a moment to fill out the product evaluation card (bound in the back of this manual) and mail it in.

The Apple IIc Plus

Sit down in front of your Apple IIc Plus and take a minute to identify the major parts that make up your computer (see Figure 1-1).

Built-in disk drive: Reads information from and writes information to a disk, much the way a tape recorder plays and records music on a magnetic tape

Power light: Comes on when the computer power is on

Disk-use light: Comes on when the built-in disk drive is reading information from or writing information to a disk

Keyboard switch: Lets you alternate between the standard and Dvorak keyboard layouts

Volume control: Lets you adjust the volume of the built-in speaker

Keyboard: Your primary means of communicating with the computer

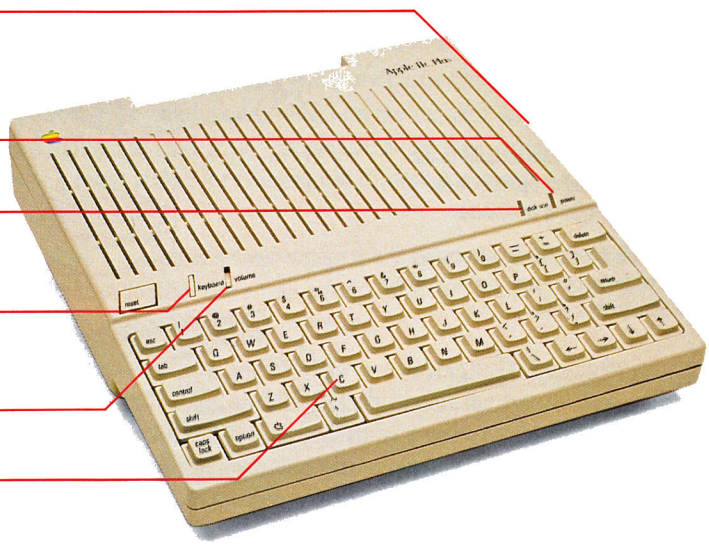


Figure 1-1
The Apple IIc Plus

You'll learn more about the lights and switches on your Apple IIc Plus, and the keyboard, as you go through this guide and the training disk.

Peripheral devices

A **peripheral device** is a device that's connected to a computer, like a printer or a disk drive. Some peripheral devices are built into the computer—like the disk drive, the speaker, and the keyboard. Other devices can be attached to the computer by cable—like the printer.

Figure 1-2 shows a variety of Apple IIc Plus accessories, known as **peripheral devices.** Peripheral devices (also called simply *peripherals* or *devices*) include monitors, disk drives, printers, modems—any piece of equipment that works directly with a computer. When connected to your Apple IIc Plus, these elements become a computer system.

While there are lots of devices you can use with your Apple IIc Plus, you need only two to get started: the disk drive that's built into the computer and a video monitor or television set to use as a display device.

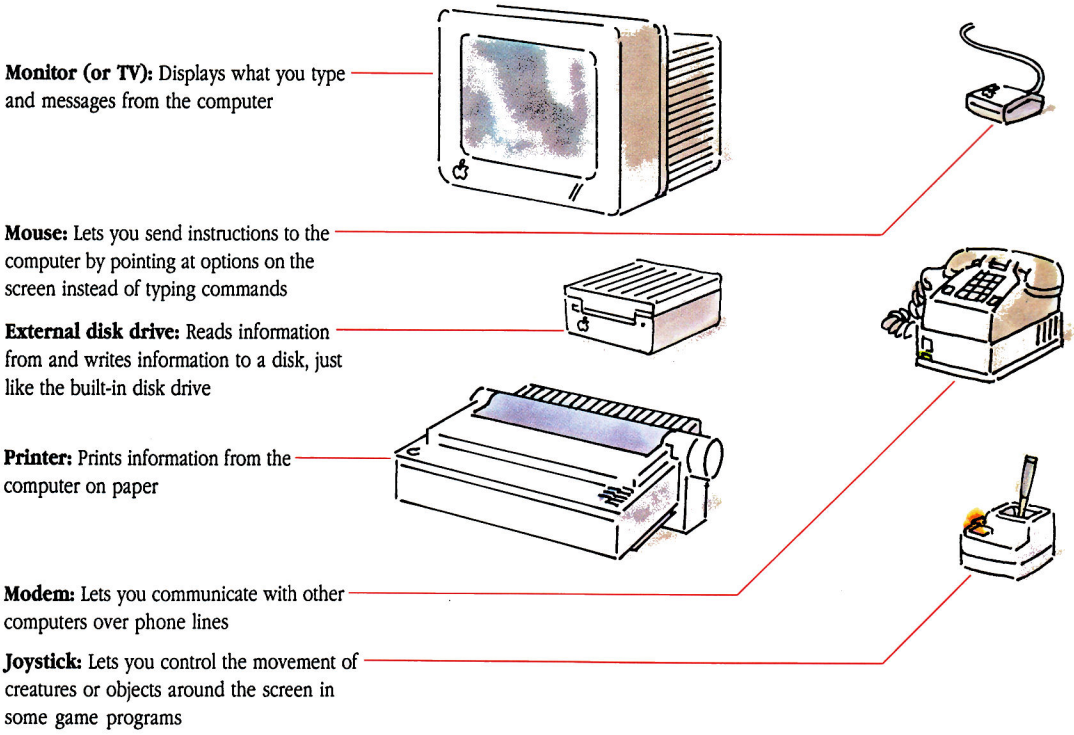


Figure 1-2
Peripheral devices

You'll learn how to connect your monitor (or TV) to the Apple IIc Plus in the next section, "Setting Up." To learn more about peripheral devices, see Chapter 6.

Setting up

This section tells you how to start setting up your computer. You'll learn how to choose a good environment for your computer, how to plug in the power cord, and how to connect a display device to your Apple IIc Plus.

Creating a good working environment

Before you assemble your system, look over your working environment. Consider things like lighting, the sturdiness of the work surface, and the availability of electrical outlets. In addition, if you plan to use your Apple IIc Plus with a modem, you'll want to be near a telephone jack.

Most people don't like having a window directly behind them, because the light through the window can reflect on the monitor screen, making the screen difficult to read. Many people like to set their monitors on monitor stands. A stand makes for efficient use of desk space and a comfortable viewing angle.

Figure 1-3
A monitor and its stand

Never place a computer system where it will be exposed to direct sunlight or any other heat source (like a wall heater) for long periods of time. Long-term exposure to heat can damage a computer.

Avoid laying power cords and cables where people walk. Passers-by can trip, damage cords and cables, and accidentally unplug the system. Also avoid plugging into an outlet that is controlled by a wall switch; someone could accidentally turn off the lights and your computer. (Any work not saved on a disk disappears when the power is turned off.)

Many people prefer to plug the computer and peripheral devices into a **power strip.** A power strip has multiple outlets and, often, its own on/off switch. Deluxe power strips include a surge protector to protect your system from severe voltage increases. See your authorized Apple dealer for accessories like power strips.

Plugging in the power cord

This section tells you how to plug in the power cord to your Apple IIc Plus. Note that you should *always* connect the power cord *before* you connect any other peripherals to the computer. This ensures that the computer is grounded and protects the chips inside it from destructive static charges.

Locate the power cord; it's the thick cord that came with your Apple IIc Plus.

▲ Warning Before you connect the power cord or any peripheral to the Apple IIc Plus, make sure the power switch is set to O for *off.* ▲

1. Plug the power cord into the back of the Apple IIc Plus.
2. Plug the other end of the power cord into a three-hole, grounded outlet.

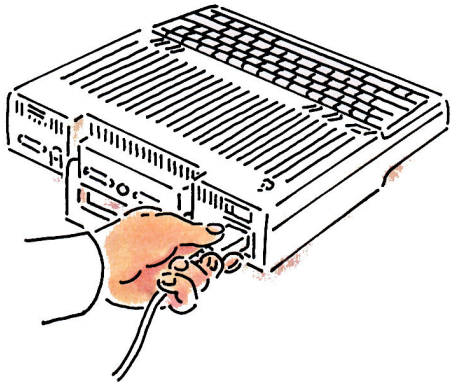


Figure 1-4
Plugging in the power cord

▲ Warning This equipment is intended to be electrically grounded. This product is equipped with a three-wire grounding plug—a plug having a third (grounding) pin. This plug will fit only a grounded AC outlet. This is a safety feature. If you are unable to insert the plug into the outlet, contact a licensed electrician to replace the outlet with a properly grounded outlet. *Do not defeat the purpose of the grounding plug.* ▲

Locking the handle in place

The handle makes it easy to carry the Apple IIc Plus, but it has two other important functions: it props the computer into a comfortable position for typing, and it raises the computer up off the desk for proper ventilation.

▲ Warning Do not use the computer without locking the handle in place. ▲

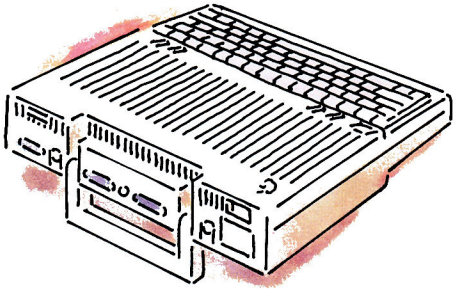


Figure 1-5
Locking the handle in place

Connecting a monitor

This section tells you how to connect a video monitor to your Apple IIc Plus. Note that you may also use a TV as your monitor (see the next section, "Using a Television Set As a Monitor").

To connect a video monitor, follow these steps:

1. Make sure the Apple IIc Plus power switch is off and that the Apple IIc Plus power cord is plugged into a grounded outlet.
2. Plug one end of the video cable into the computer, as illustrated in Figure 1-6.
3. Plug the other end of the video cable into the monitor.
4. Plug the monitor power cord into the monitor (if it's not permanently attached).
5. Plug the other end of the monitor power cord into a three-hole, grounded outlet.

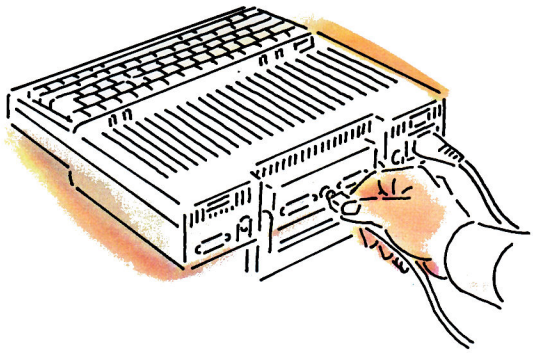


Figure 1-6
Connecting a monitor

Once you've connected the monitor, set it next to the computer. If you prefer to have your monitor at eye level, you can get an Apple IIc Plus monitor stand.

▲ Warning Do not set the monitor (or anything else) on top of the computer—it's too heavy, and it would block the vents, impairing the circulation of air through the computer. ▲

Using a television set as a monitor

You can use your television set as a display device by connecting a **radio-frequency (RF) modulator** to your Apple IIc Plus. An RF modulator modifies signals from the computer so that your TV set can display them. RF modulators are available at your local computer or electronics store. Install it according to the instructions that come packed with it.

Before you buy an RF modulator, check the back of your TV set. Some newer models have a two-position switch on the back. One position is for TV, the other for monitor input. The set should also have a jack for connecting a computer. If your set has the switch and the jack, you should be able to connect the computer and the TV set without using an RF modulator. See the TV set's manual for details on connecting and setting switches.

Do you have a video cassette recorder (VCR)? Many people have found they can connect the computer to the VCR's video input jack with a standard monitor cable and then send the computer's video output through the VCR to the TV set.

❖ *Note:* Your VCR video input jack may not match the plug on your monitor cable; you may need an adapter. If you do, look for one at your local electronics shop.

Connecting disk drives

You can connect three disk drives to your Apple IIc Plus in addition to the built-in drive. The external drives can be any combination of 3.5-inch drives and 5.25-inch drives, but they must be connected in a particular order and only two of the three can be 5.25-inch drives. You'll connect the first drive to the disk drive port and any additional drives to each other in a chain. The important thing to remember about connecting disk drives is that the 3.5-inch drives must be closest to the computer in the chain.

△ **Important** If you have both a UniDisk™ 3.5 and an Apple 3.5 drive, the Apple 3.5 drive should be closer to the computer in the chain. △

Many application programs will ask you to distinguish between your disk drives by number. The built-in drive is drive 1. The first external 3.5-inch drive is drive 2. (See Table 1-1 if you have more than two 3.5-inch drives.) The numbering starts over for 5.25-inch drives. The first 5.25-inch drive is drive 1. The second 5.25-inch drive in the chain is drive 2.

Compatibility with other Apple II computers

In the Preface to this guide, you learned that the Apple IIc Plus is a descendant of the original Apple I and that it was designed to be compatible with earlier models of the Apple II. You'll have an easier time learning to use the programs in the vast Apple II library if you understand how the Apple IIc Plus differs from other models and how compatibility was achieved.

Other models of the Apple II have **slots**—long, narrow connectors—inside the computer where **peripheral cards** are plugged in to connect disk drives, printers, and other devices to the computer. The slots are numbered from 1 to 7. By convention, printers are connected to slot 1, modems to slot 2, 3.5-inch drives to slot 5, and 5.25-inch drives to slot 6.

Programs written for other Apple II computers ask for the slot number as a way of determining the location of your printer or disk drive. While there are no slots in the Apple IIc Plus, the Apple IIc Plus ports were designed to imitate slots so you can use programs that ask for slot numbers by supplying the slot number that corresponds to your printer, modem, or disk drive port. That information is summarized in Table 1-1.

Table 1-1
Apple IIc Plus port/slot assignments

Port	Slot
Printer port	Slot 1
Modem port	Slot 2
Built-in disk drive	Slot 5, drive 1
1st external 3.5-inch disk drive	Slot 5, drive 2
2nd external 3.5-inch disk drive	Slot 2, drive 1
3rd external 3.5-inch disk drive	Slot 2, drive 2
External 5.25-inch disk drives	Slot 6, drive 1 or 2
Memory expansion card (RAM disk)	Slot 4, drive 1

A **memory expansion card** is a dealer-installed card that makes 256K to 1 megabyte of additional memory available to programs designed to take advantage of it. Be sure the card you get is compatible with the Apple IIc Plus.

Notice that your built-in disk drive is described as drive 1 in slot 5. An external 3.5-inch drive is described as drive 2 in slot 5. If you have a second external 3.5-inch drive daisy-chained to your first external 3.5-inch drive, it is designated drive 1 in slot 2. You would logically expect for the third drive of the same type to be designated drive 3 in slot 5, but there's a limit of two devices per slot, so the third device is assigned to slot 2.

Thanks to a built-in accelerator, the Apple IIc Plus runs most programs four times faster than they run on the Apple IIe and Apple IIc. Most of the time, faster is better, but occasionally adding speed throws off the timing of a game program or makes the answer appear too soon after the question in an educational program. If you find that a particular program is running too fast, you can turn off the accelerator by holding down the Escape (Esc) key and pressing Command-Control-Reset. Release the Reset key, then release the Esc key when you see the word *Normal* on the screen; then release the other keys. This causes the computer to operate at 1 megahertz, the operating speed of earlier models of the Apple II. If you don't see the word *Normal,* try again. To return to fast speed, restart your computer.

Caring for your computer system

Your Apple IIc Plus is a sturdy machine, but it will serve you better and longer if you handle it with care and follow these instructions.

▲ Warning Do not attempt to open the computer case; doing so voids your warranty. Leave repairs to your authorized Apple dealer. ▲

Don't operate your computer or monitor on a soft surface (like a bed or a rug). Soft surfaces can block the air vents and cause the computer to overheat.

Keep your computer system dry. Don't water plants overhead, and keep coffee and drinks out of spilling distance.

You'll find more specific care and handling tips in the manuals packed with your peripheral devices.

❖ *Note:* If you're anxious to connect the other peripherals you purchased for your Apple IIc Plus, turn to Chapter 6 for instructions or follow the instructions that came with each peripheral. Then return to the next section, "Disks."

Disks

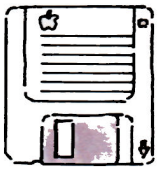


Figure 1-7
A 3.5-inch disk

What you do with your computer depends on the software you're using with it. **Software** refers to the sets of instructions, called *programs,* that tell the computer what to do. A program designed for a particular purpose, or application, is called an *application program,* or just an **application.** You can write programs yourself, or you can choose from a library of over 16,000 applications that are available for the Apple II family of computers. Applications are stored on **disks.** You start up an application by putting an application program disk in a **disk drive** and turning on the computer's power. Disk drives play back information stored on disks much the way tape players play back the information on tape cassettes.

K is how both computer memory size and disk storage space are measured. *K* is short for *kilobyte* (1024 bytes). It takes 1 byte to hold one character of information.

Your Apple IIc Plus has a built-in disk drive that you use with **3.5-disks.** Each 3.5-inch disk can hold 800**K** of information, or about 400 pages of text. You can also use 5.25-inch disks with the Apple IIc Plus, but to do so you need a 5.25-inch drive or you need to have a friend copy the information from the 5.25-inch disk to a 3.5-inch disk. You'll learn about copying files from one disk to another in the system disk guide.

Documents

Documents are also called *files.*

Besides using disks to start up applications, you'll use disks to store documents. **Document** is a generic term for anything you create with an application. It could be a memo, a budget, a graph, a picture, and so on. Initially, application program disks are more valuable than the blank disks you buy for storing documents; but once a disk has your documents on it, it becomes as valuable as the time you spent creating the documents. That's why it's important to take good care of disks. Keep these points in mind:

- Make **backup copies** of important disks. (Copying disks is explained in the system disk guide.)
- Keep disks away from hot places (like the dashboard of your car on a sunny day).

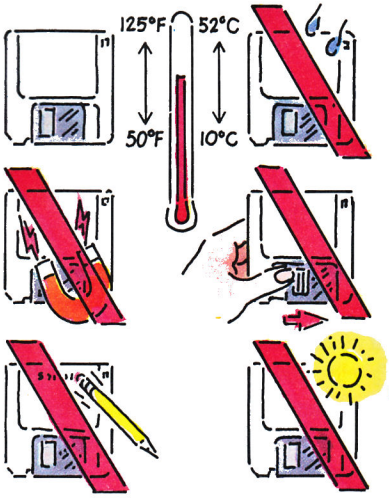


Figure 1-8
Caring for disks

- Keep disks away from magnets (and devices, like telephones, that use magnets).
- Protect disks from dust. (Store them upright and covered, either in a special disk holder or in a shoe box.)
- Keep disks dry. (Don't water plants over them or get sloppy with your coffee.)

Your disks are the most fragile part of the computer system. You'll learn more about disks and how to care for them in Chapter 5.

The training disk

The quickest way to get comfortable with your Apple IIc Plus is to start using it. That's the purpose of the Apple IIc Plus training disk. The training disk is designed to give you first-hand experience using the computer for writing, calculating, record keeping, and playing games. The programs you'll use are **simulations** of application programs. You won't be able to use them to write your own letters, create budgets, or set up inventories, but they'll give you an idea of the sorts of things you can do with your computer. And you'll get to experiment in a controlled environment where a mistake isn't a problem—just another learning opportunity.

Besides learning about all the different things you can do with your computer, you'll learn some general concepts that stay the same no matter what you're working on:

- how to control an application by using the keyboard
- how to save your work temporarily in the memory of the computer
- how to save your work permanently on disks
- how to retrieve work you've saved on a disk
- how to edit your work

And, for the adventurous, there's an introduction to programming. You'll get a chance to see what goes into writing the instructions that control the behavior of the computer—how to give the computer its personality as a writing machine, an adding machine, a game machine, and so on. There are lots of different programming languages; the training disk introduces you to the one best suited to beginners, BASIC.

Your Tour of the Apple IIc Plus works fine at the accelerated pace that is standard on the Apple IIc Plus.

Before you begin

Before you can start up the training disk, your computer must be plugged in and a monitor connected to it. Find the disk labeled *Your Tour of the Apple IIc Plus* and follow the instructions in the next few sections to start it up.

△ Important If you are using a regular television set as a display device, you won't be able to use the training disk. You can use a television set as a display device with many game and educational applications. But the picture you get with a regular television set isn't clear enough for applications, like *Your Tour of the Apple IIc Plus,* that display 80 characters per line. △

Turn on the computer's power switch. (See Figure 1-11.) If this is the first time anyone has used your Apple IIc Plus, a plastic dummy disk will be ejected from the built-in disk drive. This will take about fifteen seconds. Save this disk and insert it in the drive anytime you need to transport your computer to protect the drive's internal mechanisms. After the dummy disk has been ejected, turn off the power, wait 30 seconds, and follow the instructions in the next section.

If someone has used the Apple IIc Plus before you and has left a disk in the built-in drive, wait until the drive's **disk-use light** is off, press the eject button next to the disk drive opening, turn off the power, wait 30 seconds, and continue with the instructions in the next section.

Starting Up

Follow these steps to start up the training disk:

1. Put *Your Tour of the Apple IIc Plus* into the built-in drive (see Figure 1-9).

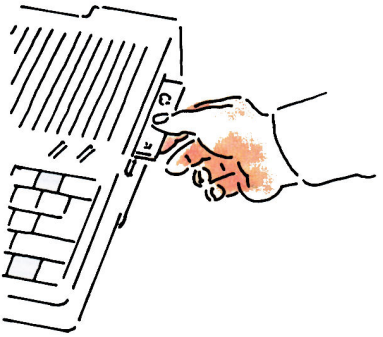


Figure 1-9
Putting a disk in the drive

△ **Important** If there is a disk in the built-in drive, follow the instructions in "Before You Begin." △

2. Turn on your monitor (see Figure 1-10).

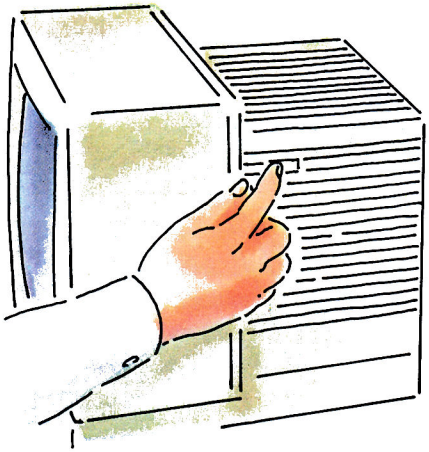


Figure 1-10
Turning the monitor on

3. Reach around the left side of the computer, find the **power switch** on the left side of the back panel, and turn it on (see Figure 1-11).

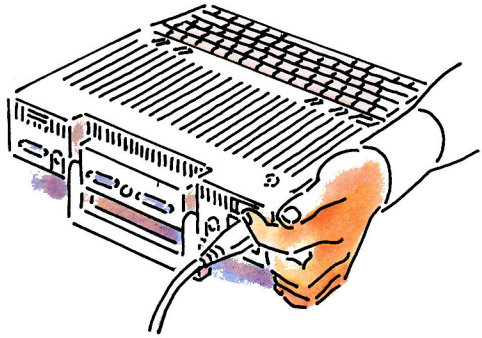


Figure 1-11
Turning the computer on

If everything is plugged in and turned on, you'll hear a beep and in a few seconds you should see the opening display of the training disk.

Put the book aside now and enjoy the hands-on introduction to your Apple IIc Plus. Anything you need to know to use the disk will be explained right on the screen.

- *Relax:* You can't break your Apple IIc Plus by pressing the wrong key or by typing too vigorously.

Problems starting up

If you don't see the opening display, go through the following checklist to see if you can identify the problem.

△ Important If the problem seems to involve a loose connection, turn off the power and wait at least 30 seconds before you reconnect the cables. △

Figure 1-12
Trouble?

- Is the computer plugged into a power source?
- Is the monitor plugged into a power source?
- If the computer and the monitor are plugged into a power strip, is the power strip turned on?
- Is the monitor plugged into the computer?
- Is the monitor power switch turned on?
- Is the computer power switch turned on?
- Did you put the training disk in the computer's built-in drive?
- Is the training disk unlocked? The tab should be covering the rectangular hole in the upper right corner of the disk.
- If you've added an external drive, be sure it is empty before you turn on the power.
- Are you using the right disk? Eject the disk in the built-in drive (following the instructions in the next section) and make sure it's labeled *Your Tour of the Apple IIc Plus*.
- Are the monitor's contrast and brightness adjusted correctly?

The **Command key** is the key that has the Apple symbol on it.

- If you think there's a more serious problem with your computer, you can run a diagnostic test. To run the test when the power is on, hold down the Option key, the **Command key,** and the Control key while you press Reset. Then release all four keys, *starting with Reset.* If the power is off, hold down the Option key and the Command key while you turn on the power.

  The test lasts about 20 seconds. During that time, moving patterns appear on the screen, indicating that the test is running. When the test is over, you hear a series of beeps and see a message. The message System OK means your computer is healthy. If you see any other message, contact your authorized Apple dealer.

  When the test is over, restart the computer.

If you can't identify the problem yourself, get help from a more experienced Apple II user or from your authorized Apple dealer.

Figure 1-13
Ejecting a disk

Stopping

The Apple IIc Plus uses less power than a 100-watt light bulb, so you don't need to turn it off between work sessions. When you're ready to stop for the day, do this:

1. Choose the Quit option from the main menu.
2. Push the disk drive eject button (see Figure 1-13).
3. Take the training disk out of the drive.
4. Turn off the monitor's power switch.
5. Turn off the computer's power switch.

The ideal way to leave the training disk and any application program is to choose the Quit option from the main menu. Choosing Quit gives the application a chance to remind you to save your document, and it keeps you from quitting when the application is in the middle of doing something. (This isn't an issue with the training disk, but it's a very important issue if you're using an application for writing or budgeting.)

If an application doesn't give you a Quit option, you can always quit by turning off the power. Just be sure to save your work before you touch the power switch. And don't turn off the power while the disk-use light is on; you could damage the information stored on the disk.

You'll learn more about saving documents in Chapter 5.

△ **Important** If you turn off the computer when the disk drive is reading from or writing to a disk, you could damage the disk and lose the information recorded on it. Wait until the disk-use light goes off before you turn off the power. If something goes wrong and the disk drive light stays on longer than 45 seconds, you can stop the disk drive by holding down Control while you press and release Reset. △

Starting up applications

A **startup disk** has an application on it that can start up the computer.

You already know how to start up the Apple IIc Plus using a **startup disk** and the built-in disk drive:

1. Put a startup disk in the built-in disk drive.
2. Turn on the monitor.
3. Turn on the power.

However, you may want to start up your Apple IIc Plus using a disk that's in an external drive, such as a 5.25-inch drive that you've connected to your computer. Here's how you do that:

1. Make sure that the built-in drive is empty.

   Push the disk drive eject button to eject a disk that's in the built-in drive.

   - *Ejecting a disk when the computer is off:* If the computer is off, straighten a paper clip and insert one end of the clip into the little hole to the right of the slot. Press the wire in only until the disk is ejected.

2. Put a startup disk in the external disk drive that you want to use as your startup drive.
3. Turn on the monitor.
4. Turn on the computer.

The Apple IIc Plus first looks for a startup disk in its built-in disk drive. Then it looks for a startup disk in the first external drive. After that, it checks the second external drive, and so on, until it finds a startup disk that it can use.

△ **Important** Remember, the Apple IIc Plus runs programs up to four times faster than they run on the Apple IIe or Apple IIc. If the faster pace is a problem for the program you're using, you can turn off the accelerator by holding down the Esc key and pressing Command-Control-Reset. Release the Reset key, then release the Esc key when you see the word *Normal* on the screen; then release the other keys. △

Switching applications

As you learned, when the power is off, you can start up an application by putting the application program disk in the built-in drive and turning on the power. This is what you did when you started up the training disk. But you don't have to turn off the computer's power to start each new application. There's a better way (better for the power switch and for the circuitry inside the computer). Instead of exchanging the program disks and turning off the power switch, do this:

1. Choose the application's Quit option, but don't turn off the computer's power.
2. Push in on the disk drive eject button, remove the last application program disk you were using, and insert the one you want to use next.
3. Hold down the **Command key** and Control while you press Reset (see Figure 1-14). Then release all three keys, *starting with Reset.* Release Reset, wait a few seconds, then release the other keys.

The **Command key** is the key that has the Apple symbol on it.

△ **Important** Whenever you press a Reset key combination, always release the Reset key first. (If the command doesn't work the first time, try again, making sure to release Reset a few seconds before releasing the other keys.) △

Figure 1-14
Restarting the computer

If it seems awkward, you're doing it right! If it were more convenient, you might press the keys by accident and restart your application, losing everything stored in memory up to that point.

From now on, when a procedure calls for you to hold down one or two keys while you press another, the keys will be shown joined with a hyphen (for example, Command-Control-Reset).

If you want to restart in normal speed instead of accelerated speed, hold down the Esc key before you press Command-Control-Reset. Release the Reset key, then release the Esc key when you see the word *Normal* on the screen; then release the other keys.

What you do now

How you continue to learn about your Apple IIc Plus is up to you. You can read more of this guide (and learn more about applications, disks, and so on), or continue using the training disk, or do both! In addition, you can learn about applications you have by reading the guides that came with them. It's up to you. Read the system disk guide when you're ready to start saving documents on disks.

If you have other peripherals, this is a good time to finish setting up your computer system if you haven't already done so. You'll find general installation instructions in Chapter 6 and specific installation instructions in the guides that came packed with your peripherals.

C H A P T E R 2

Application Programs

THIS CHAPTER INTRODUCES SOME OF THE APPLICATIONS YOU CAN GET FOR THE Apple IIc Plus. Decide on the types of applications you need; then choose the specific product based on recommendations of friends, reviews in computer magazines, reviews in software catalogs, and the advice of your authorized Apple dealer. Friends are best because if you take their recommendations, they may be able to answer questions that come up as you're learning to use the application.

You can get a couple of general-purpose applications like a database application and a spreadsheet application and adapt them for dozens of different purposes. Or you can get very specialized applications: a database that's already set up as a running log, a recipe file, a coin collector's journal; a spreadsheet already set up for preparing a home budget, calculating your income taxes, balancing your checkbook, or analyzing different mortgage options.

Figure 2-1
Lots of applications

The advantage of general-purpose applications is their flexibility. You can use one application for dozens of different tasks, and you can decide how to set up the "form" you use for filling in your information. The advantage of specialized applications is that they're usually easy to use. All you may need to do is fill in the blanks.

The following sections describe some general-purpose applications, followed by a list of some of the types of specialty applications available for the Apple II family of computers. You can find out about specific applications by looking through computer magazines or software catalogs.

Choosing an application

Here are some things to think about when you're evaluating an application:

- Is it easy to use? Try it out and see. Glance through the manual. A good manual makes an application easier to learn. As important as it is, don't make simplicity your only criterion. Sometimes an application is easy to learn because it really doesn't do much. If you find a simple application, make sure it also has the features you want.
- Is it compatible with other applications you have? Can you insert a list created with your database into a letter written with your word processing application? Applications designed to work together and share information are sometimes called **integrated software.**
- Does it work automatically with your printer? The key word here is *automatically.* Some people can make all sorts of different devices talk to each other, but if **troubleshooting** isn't your idea of a good time, look for software that's already **configured** for your printer.
- Does it do exactly what you want it to do? Sometimes it's worth sacrificing some ease of use to get an application that does exactly what you need to do.
- If the application is complicated, are there classes you can take to learn how to use it?
- Is there a hot line you can call for answers to your questions?
- How much does it cost? Cost is a factor in choosing applications, but it's the last thing on this list because you won't save money by getting a cheap application that takes four months to learn or has **bugs** that destroy a document it took you three hours to type.

Word processing

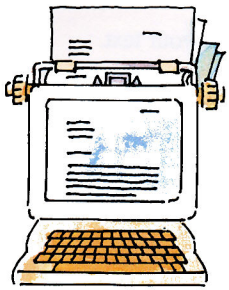


Figure 2-2
Computer as word processor

Word processing applications are for writing things—from short things like memos to longer things like this book. They don't do the writing for you or even the typing; they just make it very, very easy to add, move, delete, and change your text and correct mistakes.

Besides improving your writing by making it easy to rewrite, a word processing application can improve the way your writing *looks*. Using the formatting features of most word processing applications, you can change the width of margins, underline and center headings, put words in bold for special emphasis, and much more.

Not all editing and formatting features are available in every word processing application. Think about what's important to you and make sure the application you get meets your needs.

Here are some of the things you can do with word processing applications:

- Insert characters, words, and paragraphs—and the application rearranges surrounding text to make room for your additions.
- Wrap words automatically. When the cursor reaches the end of the line, it and any word that won't fit on the current line go to the start of the next line automatically; you don't have to press Return.
- Delete characters or whole sentences with a few keystrokes.
- Replace one word or phrase with another. Type the old word, type the new word, and the application will replace the old with the new throughout the document; this feature is called **search and replace.**
- Move text from one part of the document to another—also called **cut and paste.**
- Copy text from one document to another or to another part of the same document.
- Set margins and tabs.
- Choose from a variety of type sizes and type styles.
- Indent lists.
- Single, double, or triple space.

- Number pages automatically.
- Insert running **headers** and **footers**—text that is printed at the top and bottom of each page.
- Left-justify, center, right-justify, or proportionally space your text.

Companion applications

Here are applications designed to work with some word processing applications:

- *Spelling checker:* an application that reads through your document and finds any words that aren't in its dictionary.
- *Form-letter maker:* an application that inserts names and addresses from a database into documents created with your word processing application (also known as a **mail-merge application**).

Figure 2-3
Computer as record keeper

Database

Database applications are for keeping track of information about people, places, and things. You don't have to be the owner of an auto-parts store to use a database. You could be an angler keeping a record of the location, time of day, weather, and lure used to catch each trophy fish. You could be a home owner keeping a record of your valuables for insurance purposes. You could be a head-hunter keeping a record of clients, their current jobs, and their job skills.

The information about each person, place, or thing is called a **record.** If you have a client database that lists the names, addresses, and phone numbers of all your clients and you have 42 clients, there are 42 records in your client database. Each category of information you keep track of is called a **field.** If your address-book database includes the name, address, phone number, and birthday of each friend, you have 4 fields in that database.

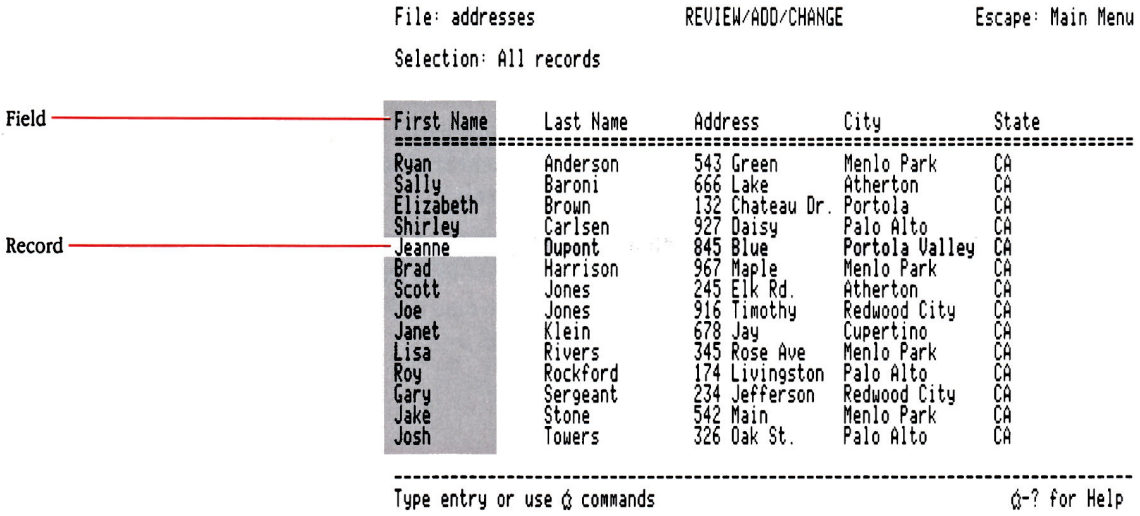


Figure 2-4
Records and fields

The tedious part of using a database application is typing in all the information when you set up a new database. The fun part is using the application to search for a particular piece of information or to rearrange the information according to criteria you specify.

Sometimes it's useful to know every detail about everything in your database, but most of the time you want a subset of the information—a list of clients with birthdays in December, of students who scored more than 650 on their SATs, of customers who spent more than $2000 on shoes last year—and you don't care about the other information that's in the database. These subsets are called **reports.** You can generate hundreds of different reports from one database without affecting the information in the database as a whole.

Different database applications have different limits on matters like the number of records you can keep, the number of fields, and the length of each field. Figure out what you want to do with the database application and make sure the application lets you do it. Here are some things you can do with database applications:

- Sort records alphabetically (*A* to *Z* or *Z* to *A*).
- Sort records numerically (high to low or low to high).

- Perform calculations on numerical fields (so you can figure out, for example, your area's total sales or your class's average score on the last test).
- Check for errors automatically. (If one of the fields is the social security number, for example, some applications can check to be sure you've entered a nine-digit number.)

If the information you want to keep track of doesn't fall into neat categories, you can get a free-form database. With a **free-form database,** you enter data in paragraph form and designate certain words as **keywords** that you can search for later.

Spreadsheet

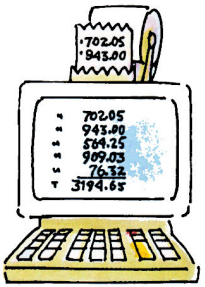


Figure 2-5
Computer as number cruncher

Spreadsheet applications are for working with numbers; for example, working a budget or balance sheet, keeping track of units sold or still in inventory, storing students' grades, or calculating average test scores. The traditional spreadsheet application starts off with a blank screen laid out in **rows** and **columns** like a ledger. The rows in a spreadsheet are numbered; the columns are lettered. The intersection of a row and a column is called a **cell.** You describe different locations on the spreadsheet the way you describe locations on a map—for example, A1 is the intersection of column A and row 1; B12 is the intersection of column B and row 12.

With a paper ledger, you fill in your assets and liabilities in pencil and then you add, subtract, and otherwise manipulate the numbers to arrive at a total—the bottom line. If any of the numbers change or if you want to change one of the numbers to see how a different pricing strategy would affect the bottom line, you have to recalculate all the numbers "by hand."

With an electronic spreadsheet, you still have to fill in the assets and liabilities, but you can write **formulas** that define the relationships between the various cells. Instead of just adding up the numbers in cells C5, C6, and C7 and putting that total in C9, you define cell C9 as the sum of C5 + C6 + C7. Once you've defined the relationships between your numbers in this way, you can change a few numbers (to try out a potential investment or a change in salary) and the application will recalculate all the related values for you.

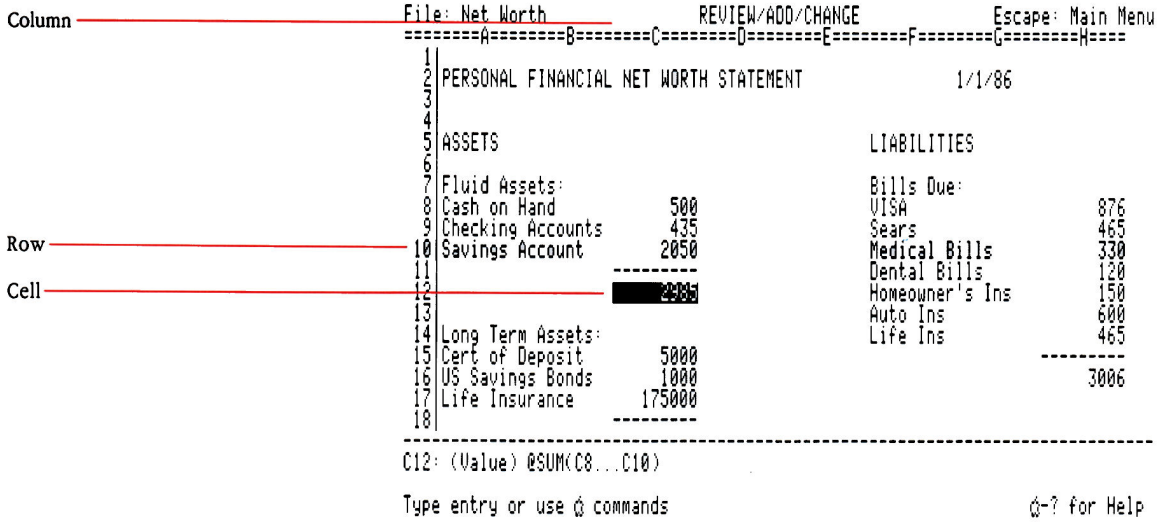


Figure 2-6
A typical spreadsheet

In the hands of a numbers person—accustomed to formulas for figuring out depreciation, amortization, and such—a spreadsheet is a formidable tool. For the average person, it's just formidable. So for the average person, intimidated by the thought of setting up formulas on a blank spreadsheet, there are **templates**—prefab spreadsheets that come with the formulas already filled in for activities like comparing real estate investments, preparing a home budget, and evaluating loan options.

Here are some things you can do with some spreadsheet applications:

- Use built-in **functions** to calculate the average, sum, count (number of items), maximum value, or minimum value in a column or row of numbers and the absolute, integer, and rounded-off value of a number, logarithm, or square root.
- Adjust column widths.
- Cut, copy, and paste numbers and formulas from one cell to another.
- Designate number format (for example, dollars or scientific notation).
- Hide a column (to protect confidential information like the salaries or ages of employees).

A **macro** is a user-defined command that tells the application to carry out a series of commands when the user types the macro.

- Display all or part of the spreadsheet's data in a graph.
- Define **macros** so you can type one command that represents many steps in a routine procedure. Macros are shortcuts for experienced users and aids for inexperienced users. An experienced user can define the macro and a less-experienced user can enter data without knowing much about how the application works.

If most of your number crunching involves home finances, you may be better off getting an application specially designed for that purpose. Read the section "Home Finance," later in this chapter.

Communications

Figure 2-7
Computer as switchboard

With **communications software** and a modem, you can exchange information with other computers and with computerized **information services** over telephone lines. Communications software puts the resources of a well-stocked library and post office on your desktop.

With communications software and a modem, you can do the following:

- Subscribe to a commercial information service and get the latest stock quotes and news.
- Send **E-mail** (electronic mail) to friends and business associates directly or through an information service.
- Post and read notices on computerized bulletin boards (anything from software reviews to résumés).
- Download copies of uncopyrighted (public domain) software from bulletin boards.
- Access your computer at work from your computer at home.
- Order clothes and other items through electronic shopping catalogs (a service sometimes described as E-mall).
- Bank from home (if your bank offers electronic banking).

The obvious advantages of **telecommunicating** are speed and convenience. You can send and receive mail in minutes instead of relying on the postal service. You can get news stories and stock quotes before they're published, and you can go straight to the news that interests you instead of wading through all the other news in a newspaper or TV program. You can research court cases and topics for books, articles, or homework assignments without going to a library.

A less obvious advantage of exchanging information over phone lines is that it circumvents the incompatibility that otherwise exists between different brands of computers. You can't take an IBM disk, put it in an Apple II disk drive, load the document into the Apple II, and work with that document. But you can send a document from an IBM computer to an Apple II computer over phone lines and save it on an Apple II disk.

Before you establish contact with a particular computer or information service for the first time, you need to tell your communications application how to talk to that other computer. You do this by giving your communications application certain information about that computer (information like baud, number of data bits, number of stop bits, and type of parity).

You don't need to know what the specifications mean, but you do need to find out what they are for the other computer (also called the **remote computer**). If the other computer is an information service, it's easy. The information is spelled out in the documentation that is provided when you subscribe to the service. If it's another personal computer, how you send the information depends on the configuration of the other computer's modem port or modem interface card. Read "Working With Your Modem and Printer Ports" in the system disk guide for information on how the Apple IIc Plus modem port is set up to receive information and for an explanation of what the various specifications mean.

Information services

There are two kinds of information services: general-purpose services, like the Dow Jones News/Retrieval Service, AppleLink®, The Source, CompuServe, Dialog, and GEnie; and specialized services for lawyers, journalists, stock brokers, teachers, doctors, and others.

General-purpose information services let you check the latest news, sports, weather, and movie reviews; exchange messages and mail with other subscribers; make airline reservations; and **download** uncopyrighted software.

Services like Dialog give you access to vast libraries of books and articles. You pick the database you want to access, type a few keywords, and the service searches for all the articles that contain your keywords. It's a fast, efficient way to do research.

If you're interested in one of these information services, ask your authorized Apple dealer how you can get a subscription. Your dealer can tell you how to get your **user ID,** your **password,** and the local phone number of the service.

Bulletin boards

A computerized **bulletin board system** (BBS) is usually a personal computer equipped with a modem, a few disk drives, and special communications software. It is used as a clearinghouse for information, gossip, and uncopyrighted software. Anyone who knows the phone number can call the bulletin board, leave messages, read messages, and download software.

Bulletin boards came into being in 1978 as a way for members of local user groups to exchange messages and share programs by phone. Today there are hundreds of computerized bulletin boards in the United States, and you don't have to belong to a user group to use one. All you need is a computer, a modem, communications software, and the phone number of your local bulletin board system. You can get that from your authorized Apple dealer (in some cases, the dealer will be a SYSOP, the **system operator** of a bulletin board), from a user group, or from one of the BBS articles that frequently appear in computer magazines.

Bulletin boards are popular for three reasons:

- They're usually free. You don't have to subscribe or pay for connect time the way you do with an information service.
- They're a source of free software.
- They're a good way to meet people.

The communications application is your gateway to information services, bulletin boards, and other personal computers. It simplifies the procedure for **logging on** to information services (by letting you store on the application disk the phone number and other critical information about how to communicate with the other computer). The application also makes it possible to prepare messages in advance (which saves you money) and to save and print information you receive over the phone lines.

Education

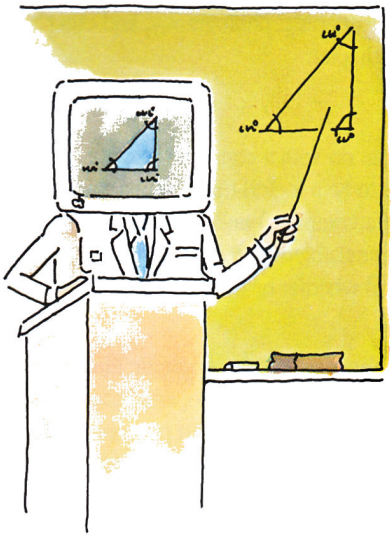


Figure 2-8
Computer as teacher

Educational software is, obviously, for learning—and there are many ways to learn, aimed at many different age groups. There are interactive nursery rhymes, in which preschoolers try to keep Humpty Dumpty from falling off his wall; applications that teach teenagers how to dissect frogs by using electronic scissors in a simulated science lab; applications that coach business people on negotiating strategies; and lots more.

At one extreme on the creativity scale are the **drill-and-practice applications.** They present information (on spelling, math, music, history, geography, Spanish, French, SAT questions—you name it) and then test how well you learned it. Drill-and-practice applications for kids are often disguised as arcade games, in which the object is to answer a question before something catastrophic occurs—before the meteor containing the question crashes into their spaceship, for example.

At the other extreme are simulations and construction sets. **Simulation** applications give you the chance to run a nuclear power plant, study an erupting volcano, see what happens when you mix explosive chemicals, mingle with dinosaurs, and have all sorts of other learning experiences that would be impractical, impossible, dangerous, or too expensive in real life. **Construction sets** let you design and build a game, a machine, a song, a space station, or a movie out of tools provided by the application.

When computers first made their appearance in schools, they were used almost exclusively for drill and practice. As more computers are becoming available in the classroom, the trend is toward using the computer as a tool—for writing, calculating, and keeping records and statistics (the way it's used in a business office). Instead of just using applications that teach grammar or spelling, English students are also using word processing applications to improve their writing. Instead of just using applications that teach algebra, calculus, or quadratic equations, math students are also learning to use formulas and functions in spreadsheet applications. Instead of just using applications that drill them on historical dates and the symbols on the periodic table, students in history and science classes are also learning to access information services and create their own databases to help them research term papers.

Adult education

Educational applications for adults fall into two categories: business and leisure. On the business side are applications that promise to improve your negotiating, sales, management, or communication skills. On the leisure side are applications to help you improve your gardening, photography, and other leisure skills. See the list at the end of this chapter.

Learning by programming

One of the most educational things you can do with a computer is write programs for it. Programming teaches you to be a logical thinker (because that's the only way to communicate with a computer) and a persistent troubleshooter (because mistakes are an inevitable by-product of writing programs). Developing these skills is useful whether or not you make programming a lifetime career or a hobby.

There are several different programming languages for the Apple IIc Plus. The most popular for beginning programmers are BASIC, Logo, and Pascal. Vocabulary and syntax vary from one language to another, but programming principles stay the same. Once you learn one language, it's relatively easy to learn others. Here's a short description of BASIC, Logo, and Pascal.

There are several "dialects" of BASIC. The Apple IIc Plus dialect is called **Applesoft BASIC.**

- **BASIC:** BASIC is an acronym for *Beginners All-purpose Symbolic Instruction Code.* This language is easy to learn because it allows you to write instructions for the computer in English-like words and phrases. A version called **Applesoft BASIC** is built into your computer, so there are no special disks to buy. Because BASIC was the first language built into personal computers, you'll find hundreds of books on the subject and many people who "speak" the same language.

- **Logo:** This is a good first programming language because you can learn the fundamentals of programming by creating graphics. You start by learning to move a **turtle** (a cursor shaped like a triangle) around the screen. The turtle knows a few words like FORWARD, BACK, LEFT, and RIGHT. You tell the turtle how many steps to go and how many degrees to turn. As the turtle moves, it leaves a trail on the screen. Ideally, you aren't just taught how many steps to take or how many degrees to turn to draw a square, a circle, or a triangle. The motivation for learning how many degrees make a right angle, a circle, and so on comes from your desire to draw a house, a ball, or a tree.
- **Pascal:** The biggest incentive for students to learn Pascal is that it is the language used by the Educational Testing Service for the college advanced-placement test in computer science. Besides that practical consideration, learning Pascal teaches you good programming habits. It's a **structured language,** which means that you have to plan your program before you start writing it, and you build your program out of smaller subprograms. Programs with a structure are easier to **debug** and easier for other programmers to understand than the convoluted programs that can result from languages that let you design as you go along.

If you'd like some first-hand experience with programming, go through *A Touch of Applesoft BASIC.* This book starts from square one. By the time you finish, you'll know enough to write a simple program for balancing your checkbook, and you'll know whether programming is something you want to pursue further.

See Appendix D for a list of other programming languages available for the Apple IIc Plus.

Graphics

There are all sorts of graphics applications: business graphics for converting numbers into graphs; clip art applications for making personalized greeting cards and the like; art applications for creating original drawings; and more.

For business

Business graphics applications take numbers from spreadsheet applications (or numbers you type at the keyboard) and turn them into graphs and charts. Obviously, it's a lot more convenient if your graphics application works with your spreadsheet application.

You can use the charts and graphs you create to illustrate reports and presentations or just to clarify statistics in your own mind. If you're going to be using your graphs for presentations, it's handy if your graphics application has a **slide-show option,** which lets you arrange several graphics in order and changes slides for you after a prearranged number of seconds or with a keystroke. For a large audience, you'll probably want to print your graphs onto sheets of acetate for use with an overhead projector.

For fun

If you like to make your own greeting cards or garage-sale posters, or illustrate your correspondence, but don't think you have an artistic bone in your body, clip art is for you. **Clip art** disks come with a library of illustrations: animals, musical instruments, sports equipment, seasonal symbols (a turkey, a firecracker), and so on. You combine the pictures with a personalized message printed in your choice of type style to create greeting cards, stationery letter-head, banners, posters, flyers, birth or wedding announcements, party invitations, or anything else that lends itself to illustration.

For art

Figure 2-9
Computer as canvas

Art applications are for drawing free-hand pictures, designing floor plans, making maps, or just plain doodling.

The nice thing about electronic drawing is that you can edit your work. You can correct mistakes, try out an idea and undo it if it doesn't work, enlarge a portion of your drawing for detail work, and fill in background colors and textures with just a keystroke. Best of all, when you finish "painting" for the day, you don't have to clean your brushes!

Children can use many of the simpler drawing and clip art applications, but very young children may have more fun with coloring-book applications, in which the kids color pictures by using electronic crayons.

Home finance

Home finance applications help you make decisions about personal investments. You can use a home finance application to

- Prepare a home budget and then compare your actual income and expenses to the income and expenses you projected.
- Flag deductible expenses to simplify the preparation of your tax return.
- Determine net worth (the current value of your assets minus your liabilities).
- Keep track of the appreciation and depreciation of your property.
- Find out when you have enough cash on hand to pay bills or make investments.
- Evaluate different investment options.
- Evaluate loan options. (Can you afford to pay off your home in 15 years or do you need a 30-year loan?)

The only hard part of using a home finance application is finding all your financial papers—loan forms, mortgage papers, bank books, check registers, last year's tax return, salary records, freelance income records, certificates of deposit, stock certificates, phone bills, utility bills, credit card bills, and anything else that affects your finances.

Don't shy away from a home finance application because words like *amortization* and *depreciation* are foreign to you. Most home finance applications assume ignorance of financial jargon and teach what you need to know as you go along. Even if you have an accountant do your taxes and a stock broker or financial adviser plan your investments, a home finance application gives you more control over your finances by keeping you better informed and organized.

In addition to general-purpose home finance applications, there are very specialized applications for balancing your checkbook, tracking your stock portfolio, managing your real estate, preparing your income taxes, and more.

Accounting

Accounting software performs the same functions a manual accounting system does (general ledger, accounts receivable, accounts payable, payroll, inventory), but with much greater speed, accuracy, and control. The increased speed and accuracy allow you to get up-to-date reports about your financial position as you need them, instead of waiting for monthly or quarterly reports from your accountant.

A good accounting application can help you improve your cash-flow management, boost your collection rate of receivables, plan payments to take advantage of vendor discounts, maintain inventory levels that minimize cash investment, and improve customer service.

Most accounting software packages are designed around a general ledger. The other modules (accounts receivable, for example) share information with the general ledger to allow automated posting. This modular approach allows smaller businesses to start with a general-ledger package and add additional modules as they are needed.

If you have modest accounting needs, you should investigate home finance applications. Some of them are sophisticated enough for small-business accounting, and they're usually easier to learn and use than full-blown accounting packages.

Recreation

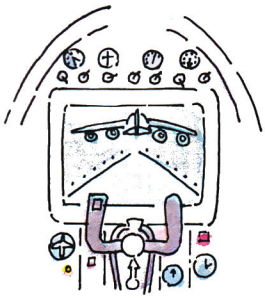


Figure 2-10
Computer as entertainer

OK, games. There are several kinds of computer games, including shoot-'em-ups, eat-'em-ups, adventure games, simulations, board games, sports games, and some that are harder to classify. You may find that computer games improve your concentration and reflexes, teach you to be a more persistent problem-solver, help you relax after a hard day at the office, distract you during a hard day at the office—but it's OK if all they do is entertain you.

Shoot-'em-ups are modeled after the video games in arcades. They test your hand-eye coordination and your reflexes against invading aliens, enemy missiles, and falling meteors.

Eat-'em-ups, also called *maze games,* are modeled after Pacman. The object of an eat-'em-up is to eat your adversaries before they can eat you.

Adventure games—also called *fantasy games, role-playing games,* or *interactive fiction*—transport you to a fantasy land where you try to accumulate the right combination of weapons, tools, keys, and companions to conquer whatever monsters stand between you and the treasure. You communicate with the application by using one- or two-word commands like GO WEST or OPEN DOOR. Unlike shoot-'em-ups and eat-'em-ups, adventure games don't require fast reflexes. These games can last for hours or even days. Fortunately, there's usually a way to save your game-in-progress so you can take a break and pick up where you left off.

Simulations are like adventure games except that you are transported to the simulation of a real-life situation: a nuclear power plant, the Lewis and Clark expedition, or a 1944 naval battle—where you try to solve real-life problems. (These games come dangerously close to being educational.) Besides games that simulate situations, there are applications that simulate an activity, like flying a plane or driving a race car.

Board games are electronic versions of chess, checkers, and other popular games. There are also electronic *card games,* including gin rummy, bridge, poker, and blackjack.

Sports games for armchair athletes include electronic versions of football, baseball, basketball, soccer, golf, tennis, the decathlon, billiards, darts, and almost any other sport you can think of.

Special interests

Special-interest applications, also called *vertical-market software,* are applications that cater to a particular audience or profession. They're more expensive than general-purpose software, but much cheaper than hiring a programmer to write software from scratch.

Lawyers can find applications that handle billing, help with research, and keep track of court appearances and filing dates. Medical offices can get database applications customized to deal with patient histories, help diagnose illnesses, and match allergy symptoms to causes. Other medical software handles billing or appointments and helps process insurance claims. Teachers can find applications that keep track of attendance, record test scores, and help prepare tests. Farmers can get applications dedicated to herd management and crop rotation, as well as more general record-keeping software.

You can find applications for manufacturing control, for scientific measurement and analysis, and for virtually any area where there's a specialized need for calculating or sorting. Vertical-market software isn't always listed in software catalogs, but you can find out what's available by reading the software ads in professional journals and by attending computer seminars sponsored by your professional organization. The American Bar Association, for example, has a Committee for Computers that sponsors user groups for lawyers and promotes conferences and seminars on the use of computers in the legal profession.

Free software

Software that hasn't been copyrighted is called **public-domain software.** It's free. It's legal. And you can get it for the asking from your local user group or by downloading it from a computer bulletin board. Usually the only cost to you is the cost of the disk you copy it to.

But beware! The money you save may be insignificant compared to the time it takes you to learn a program that doesn't come with a manual. Also, free programs aren't always debugged as thoroughly as published applications and may not have such niceties as menus, user-friendly prompts, or help screens.

If you're still interested in exploring bargain software, ask your authorized Apple dealer for the address of a local Apple user group or call 1-800-538-9696 and ask for extension 500. You will get the names, addresses, and phone numbers of up to three user groups in your area.

Shareware

Some authors distribute their programs as **shareware.** You are free to copy a shareware program and to try it on your own. If you find the program useful, you then send payment to the author (usually $20 to $30). If you don't like or use the program, you're asked to erase your copy or pass it on. Some shareware authors provide registered users with documentation, free updates, and support. Like public-domain software, shareware is often distributed by user groups or through computer bulletin boards.

Specialty applications

In addition to general-purpose applications like database, spreadsheet, and word processing applications, you can get very, very specialized applications. Here's a sampler of subjects for which there are applications. You can find out more about these and other specialty applications by looking through computer magazines or a computer catalog.

There are thousands of education programs for the Apple IIc Plus on very specialized topics including the following:

Education

English	vocabulary	sentence diagramming
	synonyms and antonyms	capitalization
	vowels and consonants	phonics
	reading skills	verbs
	spelling	nouns
	commas	pronouns
	analogies	adjectives
	phrases	adverbs
	clauses	conjunctions
	sentences	
Foreign languages	Spanish	Latin
	Russian	Hebrew
	French	Italian
	German	
Social studies	history	
	geography	

Chemistry	titration	alkanes and alkenes
	gases	infrared spectroscopy
	calorimetry	atomic structure
	thermodynamics	periodic table
	organic chemistry	
Physics	mechanics	quantum theory
	velocity	thermodynamics
	wave theory	projectiles
	particle scattering	vectors
	sine waves	energy
Biology	plants	nucleic acids
	enzyme kinetics	reproductive organs
	bird classification	circulatory system
	ecosystems	excretion
	transpiration	endocrine system
	evolution	locomotion
	genetic mapping	photosynthesis
	population growth	respiration
	heart	nervous system
	digestive system	anatomy

Math	fractions	linear equations
	decimals	quadratic equations
	perimeters	sines and cosines
	circumference	calculus
	angles	scientific notation
	differential equations	percentages
	geometry	long division
	number theory	graphing
	algebra	trigonometry
	factoring	probability
	matrix manipulation	Fourier analysis
Astronomy	solar system	
	constellations	
Computer-science tutorials	BASIC	
	Pascal	
	Logo	
	assembly language	

Religion

The Bible
Jewish history

How-to's

play bridge	draw a floor plan
play the guitar	grow vegetables
repair your car	take photographs
redecorate your home	touch-type
landscape your yard	

Hobbies

catalog your stamp collection
chart your horoscope
study I-Ching or numerology
monitor your biorhythms
track running times and distances
classify your coin collection
design your own needlework
write your own crossword puzzles
trace your roots (genealogy)

Home

recipe database
address book
checkbook
security-system control

Self-help

build negotiation skills
lose weight
improve self-esteem


LOS ANGELES LAKERS
LAKERS
CELTICS
LOS ANGELES

CHAPTER 3

Once Over Lightly

THIS CHAPTER COVERS SOME BASIC COMPUTER CONCEPTS. IF YOU ALREADY understand how information moves through the computer system and out to peripheral devices, you may want to skip this chapter and go straight to Chapter 4, where you'll learn about using the mouse and the keyboard to control applications.

Starting up an application

Starting up is sometimes called **booting.**

When you start up an application, that application is copied into the memory of the computer and takes control of the computer system. What you see on the screen and what you can do with the computer depend completely on the application you started up with.

Figure 3-1
The application takes over

Communicating with an application

Applications communicate with you by displaying things on the screen. You communicate with applications by typing at the keyboard (or by pointing to choices with the mouse—an optional peripheral device).

Information that travels out of the computer (like the messages displayed on the screen) is called **output.** Information that travels into the computer (such as keypresses) is called **input.**

- *Input and output:* You may hear the terms *input* and *output* applied to devices. An input device is one that carries information into the computer (like the keyboard). An output device is one that carries information out of the computer (like the monitor). A disk drive is both an input and an output device: it loads programs into the computer and it saves information from the computer to disks for storage.

Input and output is abbreviated *I/O*. If you see the message I/O ERROR on your screen, it means there was a problem with the exchange of information between the computer and one of the devices. You can usually guess what the problem is based on by what you were doing when the message appeared. If you were printing, the problem is the connection between the computer and the printer. If you were loading from or saving to a disk, the problem is with the disk drive, the connection with the disk drive, or the disk.

The user interface

The way an application communicates with you is called the **user interface.** When you are choosing applications for the Apple IIc Plus, you should give plenty of thought to the application's user interface because that's the personality of the application. At one extreme are hand-holding applications that guide you slowly but surely through the application. At the other extreme are applications that give you minimal instructions and leave you pretty much on your own. If you use an application daily, you probably won't want as much hand holding as with an application you use only once or twice a month.

Interface is a word you'll see often in computer books and magazines. It refers to the way things communicate with each other. It describes both the way information is exchanged between the computer and a peripheral device (for example, *serial interface*) and the way information is exchanged between the computer and a person (*user interface*).

How information is displayed

Some applications give you a choice of how you want information sent to the display. The choice is **40 columns** or **80 columns.** To understand what that means, imagine that the screen is a grid 40 squares across by 24 squares down. Each square on the grid can hold one character (see Figure 3-2).
In 80-column format, the grid is 80 squares across by 24 squares down. With the 80-column display, you can fit twice as many characters per line as with the 40-column display, but the characters are half as wide. Some display devices, like TV sets, can display text only in the 40-column format; they don't have sharp enough **resolution** to display the narrower 80-column characters clearly.

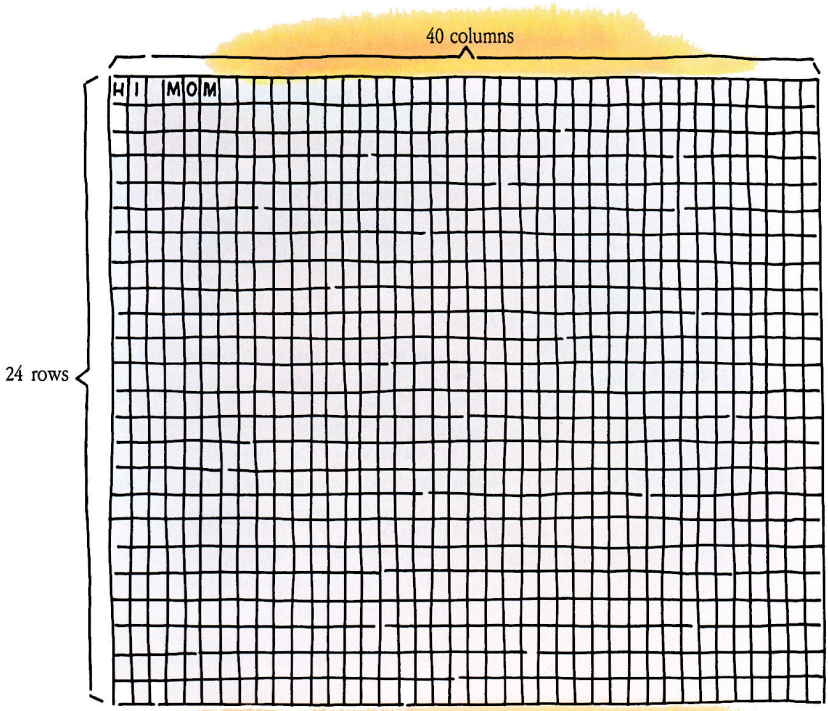


Figure 3-2
A 40-column display

Mode is the way something behaves.

Pixel is a contraction of the words *picture* and *element.*

The 40-column and 80-column formats are two **text modes.** A third way that applications can send information to your monitor is in **graphics mode.** In graphics mode, text and graphics are formed by patterns of dots, or **pixels.** The more dots used to create a picture, the sharper the resolution. The Apple IIc Plus can display graphics by using a rectangular array of 280 horizontal by 192 vertical dots. In this mode, called **double high resolution,** the dots are very close together, so it's hard to tell that the picture is made up of dots. The Apple IIc Plus also supports graphics modes developed for earlier models of the Apple II, including **high resolution** and **low resolution.**

- *Choosing between 40 and 80 columns:* Some applications automatically put your computer in the mode they require; other applications ask you to choose between 40- and 80-column modes. In general, choose 40-column mode if you're using a TV as your display device or if you prefer the larger characters. Choose 80-column mode if you're using a monitor as your display device.

Creating a document

Most of the time, you'll be using the computer to create something: a letter, a graph, a list, a budget. Things you create with the computer are called *documents,* or *files.* The kind of document you can create depends on the application you're using. You don't create a letter by using a spreadsheet application, and you don't create a spreadsheet by using a word processing application.

Figure 3-3
Different kinds of documents

As you type your document, it is stored along with the application in the memory of the computer.

Scrolling

Figure 3-4
The document is bigger than the screen

There's a lot more room in memory for a document than there is room on the screen to display it (see Figure 3-4).

How do you move different parts of the document under the screen "window"? With keyboard-controlled applications (that is, with applications that don't use the mouse), you press the Up Arrow key to see earlier parts of the document, the Down Arrow key to see later parts of the document, the Left Arrow key to see the leftmost side of the document, and the Right Arrow key to see the rightmost side of the document.

With applications that use the mouse, there's a bar, like an elevator shaft, that runs along the right side of the screen window (and sometimes along the bottom of the screen window as well). As you move the "elevator" along the shaft, you scroll different parts of the document under the window.

Whether you move your document into view with the arrow keys or with the bar, moving the document under the screen window is called **scrolling.**

Formatting a disk

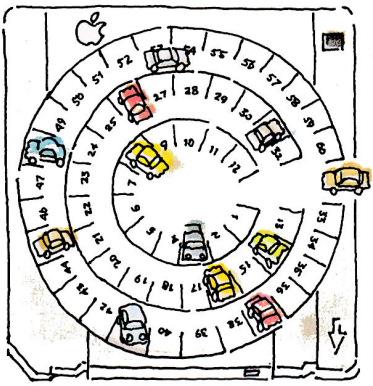


Figure 3-5
Formatting a disk

Before you can store documents on a blank disk, the disk has to be **formatted,** or **initialized.** (The terms are used interchangeably.) Formatting a blank disk magnetically divides the disk into numbered "parking spaces" where information can be stored and retrieved (see Figure 3-5).

Some applications have a formatting option on a menu within the application. Other applications expect you to format disks by using a program on the system disk. You'll learn more about formatting in Chapter 5 and in the system disk guide.

Saving a document

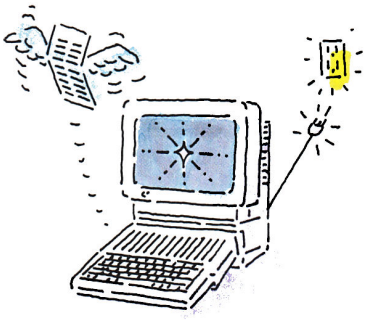


Figure 3-6
If the power goes off, the document is lost

The fact that your document is stored electronically in the computer's memory means that it's in a very dynamic, easy-to-edit state. It also means that if you turn off the power by mistake or change applications, you lose the document in memory. That's why it's important to save your work on a disk, not just at the end of your work session, but every ten minutes or so.

Saving a document on a disk is like filing a paper document in a file cabinet. How you save a document on a disk depends on the application. Sometimes Save is an option on a menu; sometimes you press a combination of keys that tells the application to save your document. The manual that came with the application will explain exactly how to save your work.

Once you've saved your document on a disk, it's OK to quit the application and turn off the computer's power. When you flip the power switch, the copy of the document that was stored electronically in the memory of the computer is lost, but you can retrieve a copy of the document from the disk any time you want to work on it.

Making a backup copy

Figure 3-7
Saving a document

Once your document is safe on a disk, you can rest easy. It's just like having a paper copy of your document in a file cabinet. The only reason you wouldn't be able to get it back is if you lost the disk or left it in your shirt pocket through a wash-and-dry cycle. This doesn't happen very often, but it always seems to happen the day before an important deadline with work that is irreplaceable. That's why it's a good idea to save the same document on two separate disks (or on three or four separate disks if the document is *really* important). Some companies go so far as to store backup copies of important disks in a fireproof safe off the premises. The least you should do is keep your backup copy far enough from the original so that one cup of coffee can't reach both in one spilling.

You can make backup copies in two ways. One way is to save the document while you're using the application program, eject that disk, and then save the document again on a second disk. The second way to make a backup copy is by using the system disk after you've quit the application. If you have a one-drive system, it's much more efficient to use the first method.

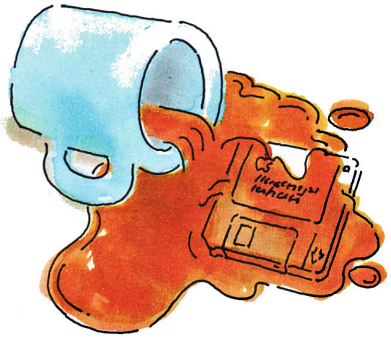


Figure 3-8
Another reason for a backup copy

You should also make backup copies of your applications. But, don't be surprised if you can't duplicate every application you buy. Many manufacturers **copy-protect** their disks to protect themselves from **software pirates,** who illegally duplicate and distribute their applications. If you can't copy an application, the manufacturer generally provides one backup copy or tells you how to replace a damaged application program disk at a nominal cost.

- *When you have a one-drive system:* Copying disks using the system disk when you have a one-drive system requires considerable disk swapping. First the computer reads information from your original disk; then you're asked to remove the disk and insert the disk you're copying to. The computer then writes the information on your copy disk and asks you to remove it again and reinsert the original so it can read more information. Copying disks in this fashion is time-consuming. Therefore, if you have only one drive, make backup copies of your important documents while you are still in the application. Then you won't have to back up entire disks.

Editing a document

To edit a document that's stored on a disk, start up the application you used to create the document (a word processing application for a letter, a spreadsheet for a budget, and so on) and then instruct the application to get the document from the disk on which you saved it. (The manual that came with the application will tell you how to do this.) At your request, a copy of that document is loaded into the memory of the computer, and a portion of the document (whatever can fit) appears on the screen.

If you make changes to the document and like what you've done, you have to save the revised version of the document on the disk. If you forget to save it, your original document will still be on the disk, but it won't include any of your additions or changes.

Figure 3-9
Saving a revised document

If you save the revised document without changing the name, the revised document *replaces* the original document on the disk (see Figure 3-9). Almost all applications warn you that there is already a document by that name on the disk and ask you to confirm that you want the new document to replace the old one. If you save the revised document with a new name (even if the new name is just the original name with a new version number), both the old version and the new one will be on the disk.

If you save several versions of the same document on one disk, there will come a time when you want to erase some of the early efforts so you can reuse the disk space. Read the system disk guide for information on deleting documents from disks.

Printing a document

Whether you've finished a document or just want to see how it looks so far, there's something very satisfying about printing your document—getting a copy of it down on paper. Many people find it easier to edit on paper than on the screen.

Before you print, you should always save a copy of your document on a disk—even if you don't plan on saving the document permanently. The reason for this precaution is that when you give the Print command, the application temporarily gives up control of the computer system to the printer. If there's a problem printing the document, the only way to fix it may be to turn off the computer. If you have to do that and you haven't saved the document, you'll have to recreate the document from scratch.

How you tell the application to print your document depends on the application, but usually Print is an option on a menu. After you choose the Print option, you may be asked to select your printer from a list of printers displayed on the screen. If your printer is on the list, select it and your document will be printed.

If your printer isn't displayed on the screen, try selecting one that is. Your printer may be compatible with the Apple ImageWriter® printer or some other printer on the list, and you'll save yourself some time and trouble getting your printer to work with your application.

If your printer is not compatible with one of the printers on the list, you'll need to provide the application with some specifications about your printer (things like the **baud,** number of **data bits,** number of **stop bits,** type of **parity,** and other specifications that may be Greek to you). The reason for providing these specifications is that different printers expect to receive information from the computer at different speeds and in different forms. The specifications tell the application how to send information to your printer. You should be able to find the specifications in the manual that came with your printer. If you can't, contact the dealer who sold you the printer.

You don't need to know what the specifications mean to find them in the printer manual and feed them into the application; but if you're curious, you can learn about the various specifications by reading "Setting the Modem and Printer Ports on the Apple IIc and Apple IIc Plus" in the system disk guide.

Some applications don't ask for the name of your printer or for specifications about your printer. They let the computer control how information is sent to the printer. If that's the case with the application you're using and if it works, don't give it another thought. But if you're having trouble getting your document to print, you may need to change the way the computer is sending information to the printer. You can do this by changing the printer port settings; see the chapter "Setting the Printer and Modem Ports on the Apple IIc and Apple IIc Plus" in the system disk guide.

Some essential jargon

This section defines some terms and explains some concepts that applications may assume you already know. For example, you may need to know that information isn't stored inside the computer as letters and decimal numbers. It's stored as strings of 0's and 1's. Each letter, number, and punctuation mark on the Apple IIc Plus keyboard has its own distinct arrangement of 0's and 1's. The letter *A,* for example, is expressed as 1000001; *B* as 1000010. The code that says which arrangement of 0's and 1's represents which character is known as **ASCII** (American Standard Code for Information Interchange) and pronounced *ASK-ee.*

Bit is a contraction of the words *binary digit.*

The 0's and 1's are called **bits.** They're not really 0's and 1's; they're opposite conditions, but it's convenient to represent them as numbers. Even though it takes only seven bits in this code to represent each character on the keyboard, the computer allocates eight bits. The extra bit is sometimes used for error checking. A string of eight bits is called a **byte.**

The computer also uses 0's and 1's to do arithmetic. Whereas humans use the decimal numbering system (based on the number of fingers on their hands), computers use a **binary numbering system** (based on the two symbols they know how to manipulate: off/on or 0/1).

So the computer processes information as 0's and 1's. It stores these 0's and 1's in **RAM,** which stands for *random-access memory.* It's called **random-access memory** because the microprocessor can go directly to any information it needs; it doesn't have to access the information sequentially the way you read a novel. The important thing to remember about RAM is that anything you store there is temporary. When you turn off the power, everything in RAM is erased. That's why you have to remember to store documents on disks.

Programs in ROM are called **firmware.**

Do not confuse RAM with a similar acronym, ROM. **ROM,** which stands for *read-only memory,* is the computer's permanent memory. It's called **read-only memory** because the microprocessor can read and use what's on ROM **chips,** but it can't store anything there. ROM chips contain the information that tells the computer what to do when you turn on the power, and other important or indispensable information. RAM is of much more interest to you because that's where the computer keeps track of the application you're working with and the document you're working on. When this manual refers to memory, it's almost always referring to RAM.


June - Club Meetings
Certificate of Completion

CHAPTER 4

The Keyboard and the Mouse

YOUR APPLE IIC PLUS HAS A BUILT-IN KEYBOARD THAT LETS YOU COMMUNICATE with the computer. You use the keyboard when you're typing documents or sending typed instructions to applications. However, if you also use your Apple IIc Plus to draw pictures, you'll find a mouse useful. In addition, with some applications you can use the mouse for pointing to choices on the screen; using a mouse is another way of sending instructions to applications. The mouse and the keyboard are ***input devices;*** that is, they send information ***into*** the computer.

How these devices work depends on the application, so it's up to the manual provided with the application to tell you what you need to know to use the mouse and the keyboard with the application. But the application may assume some familiarity with the special keys on the Apple IIc Plus keyboard and with mouse terms like *clicking, dragging, selecting,* and *choosing* from *pull-down menus.* If you have questions that aren't answered in the manual provided with your application, come back to this chapter for clarification.

Applications written before the mouse came along accept only keyboard commands. These applications are called **keyboard-based applications.** More recent applications often give you a choice of using the mouse or the keyboard. These applications are called **mouse-based applications.**

The first part of this chapter describes the special keys on the Apple IIc Plus keyboard and provides pointers on typing a document. You'll discover that typing a document on your computer keyboard is a little different from typing on the typewriter keyboard.

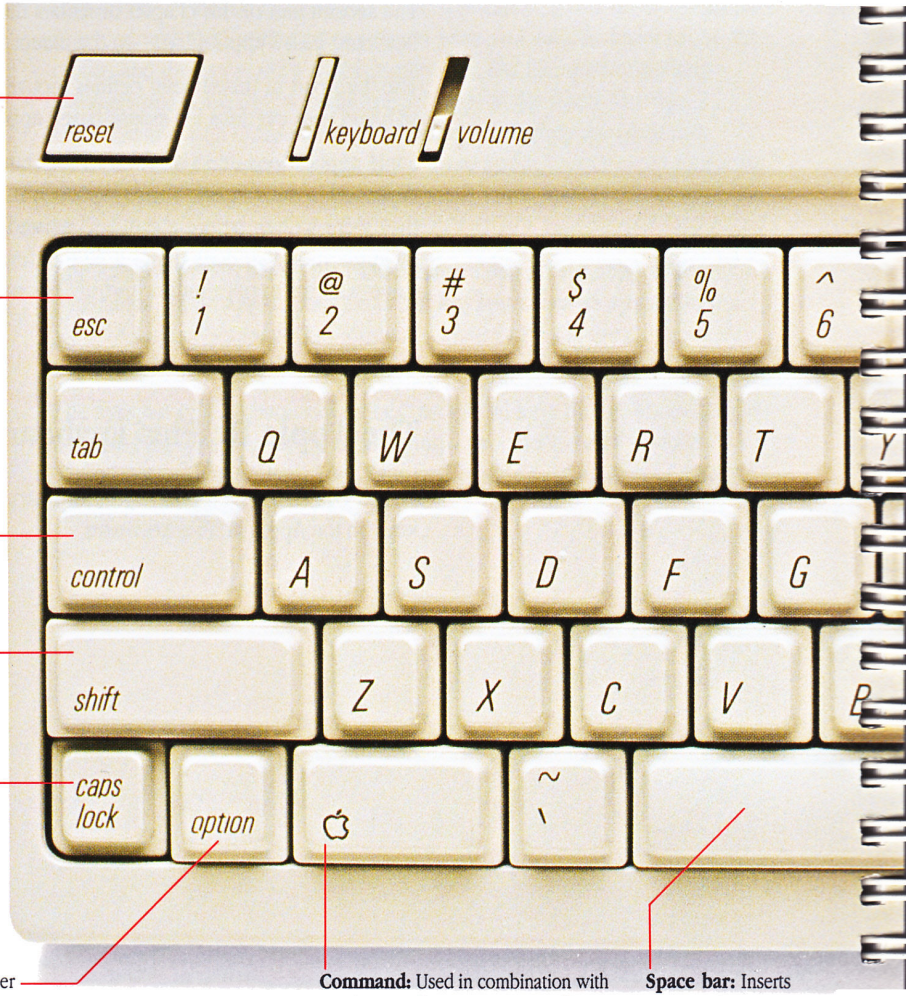
The second part of this chapter describes the standard user interface for keyboard-based applications—to the extent that there *is* a standard.

The third part of this chapter defines mouse terms and describes the standard user interface for mouse-based applications.

Some applications don't conform to the standard Apple II user interfaces described in this chapter. This is especially true of older applications because they were written before a standard existed. If you find yourself faced with an application that does things a little differently, rely on the manual that came with the application for instructions on how to use it.

The Apple IIc Plus keyboard

Figure 4-1, on the next two pages, summarizes the functions of the special keys on the Apple IIc Plus keyboard.



Reset: Used in combination with the Command and Control keys to restart the computer

Esc: Usually cancels an activity or takes you to a previous menu (*Esc* is short for *escape*). Also used to change operating speed

Control: Used in combination with another key for some special effect

Shift: Used in combination with another key to give an uppercase letter or the upper character on a two-character key

Caps Lock: Capitalizes letters, but doesn't affect other keys

Option: Used in combination with another key for some special effect (on earlier models of the Apple II, this key is labeled)

Command: Used in combination with another key for some special effect (equivalent to the Open-Apple key on earlier keyboards)

Space bar: Inserts a space character

Figure 4-1
The Apple IIc Plus keyboard

Delete: Erases the character to the left of the cursor (it's the same as the Backspace key on other types of computers)

Left, Right, Down, Up Arrow: Moves the cursor in the direction indicated

Return: Confirms a choice or tells the application that you're ready to proceed and in word processing applications, moves the cursor to the beginning of the next line

The Keyboard switch

Figure 4-2
The Keyboard switch

The Keyboard switch alternates between two keyboard layouts: the standard keyboard and the **Dvorak keyboard.**

Pressing down the Keyboard switch until it locks gives you the Dvorak keyboard, also known as the *American Simplified Keyboard.* The simplified keyboard was designed by August Dvorak to increase typing speed and efficiency by locating frequently used keys in the **home row** (see Figure 4-3).

You'll know the Keyboard switch is set to the Dvorak keyboard if, for example, you type the letter *S* and the letter *O* appears on the screen instead.

If you choose to use the Dvorak keyboard, you'll probably want to rearrange the Apple IIc Plus keycaps. Gently pry off the keys in the bottom row with a regular screwdriver. After that, you'll be able to pry off the remaining keys by hand. Rearrange them in the Dvorak layout as shown in Figure 4-3.

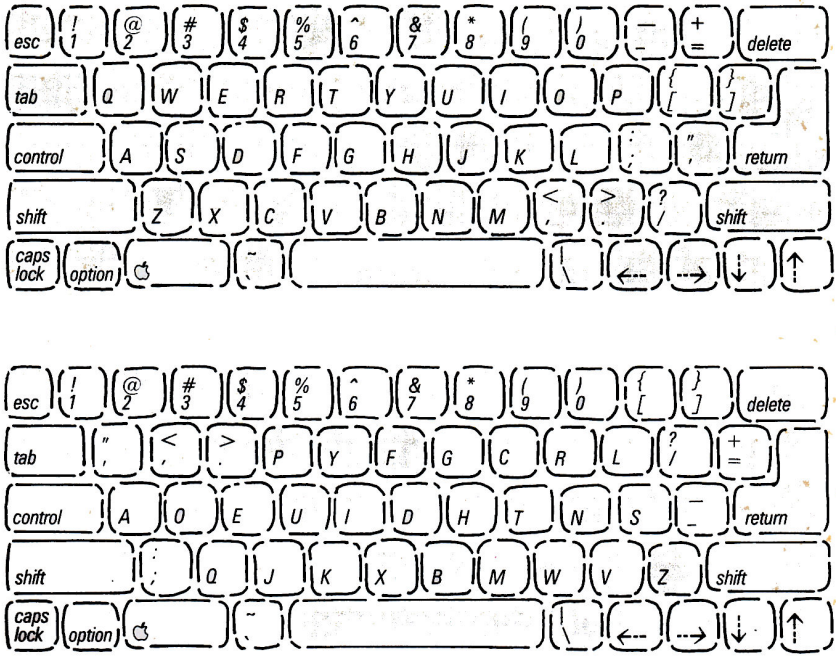


Figure 4-3
The standard keyboard and the Dvorak keyboard

Typing a document

Whether you're using mouse-based or keyboard-based applications, you'll use the keyboard to type your documents. In general, the main part of the keyboard works like the keyboard on a typewriter, but there are a few things you should know about the keys on the keyboard.

The Return key

In word processing applications, when you reach the end of a line of text, the cursor moves to the next line automatically. You use Return only when you want to start a new paragraph. If you press Return instead of letting the application handle **line breaks,** you interfere with the application's ability to rearrange the words on a line after you make changes.

If you discover that you've pressed Return by accident, you can delete the extra Return character the same way you delete any other character, even though the Return character is invisible! How do you know it's there if it's invisible? You know it's there if your lines break in funny places after you make changes to a paragraph (see Figure 4-4).

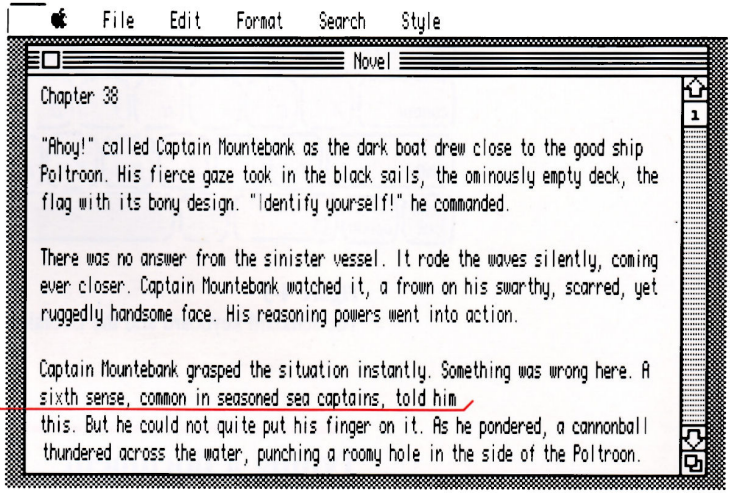


Figure 4-4
An errant Return character

Some applications give you a way of displaying Return characters so you can see if you've inserted any where they don't belong.

Incidentally, Return is represented in some applications and manuals, not by name, but as a bent arrow pointing down and to the left. The icon represents the movement of the cursor when you press the key: it moves down a line and over to the left margin.

The Shift and Caps Lock keys

The Shift keys on the Apple IIc Plus keyboard work just like the Shift keys on a typewriter. To get a capital letter, you hold down Shift while you type the letter you want capitalized. To get the upper character on a two-character key, you hold down Shift while you type the two-character key. For example, to type a dollar sign, you hold down Shift while you press 4.

If you want everything you type to come out in capital letters, you can press down Caps Lock. (You'll feel the key lock in place, and you'll notice that it has a lower profile than surrounding keys.) When you want lowercase characters again, press Caps Lock a second time and the key will return to its upright position. The nice thing about Caps Lock is that it affects only the alphabet keys; it doesn't give you the upper character on a two-character key. To get an upper character, you still have to use Shift. Unlike the typewriter, this means you can get all capital letters interspersed with numbers without releasing Caps Lock.

The Tab key

Tab works like the Tab key on a typewriter, except that instead of the typewriter's print head moving to the right a preset number of spaces when you press Tab, the cursor moves to the place you designate as the next tab marker. Using Tab and setting tab markers are handy when you're typing information in columns.

You set the tab marker (that is, you set the distance you want the cursor to move) by using a command in the application. Not all applications use Tab this way, but most word processing applications do.

Keys that can be confusing

Touch-typists often use the lowercase letter *l* for the number *1* (because the *l* is conveniently located on the home row, and the *1* is a long reach for the left pinky). You can't do that with a computer. The computer translates each keypress into a code of 0's and 1's. The code for the letter *l* is different from the code for the number *1*. If you save a document with the name *Chapter1* and try to retrieve it by typing *Chapterl* (instead of *Chapter1*), the computer will tell you there is no such document on the disk, and you could have heart failure over your lost document before you realize what you've done.

The same is true with the capital letter *O* and the number *0* (zero). The computer will balk if you try to add a number with the letter *O* in it.

The Space bar

The Space bar is another key on the computer keyboard that behaves differently than its typewriter counterpart. On a typewriter, a space is an area on the paper where nothing is typed. On a computer, pressing the Space bar inserts a *space character.* Just as *1* and *l* are different, so is a space character different from the space that you get when you press Right Arrow. Some applications, aware of the potential confusion, ignore extra space characters. But in other applications, the word *Jones* and the word *Jones followed by a space* are as different as the words *Jones* and *Smith.*

The auto-repeat feature

When you hold down a key on the Apple IIc Plus keyboard, it repeats just as it would on an electric typewriter. This feature is called **auto-repeat.**

Using keyboard-based applications

Keyboard-based applications generally start with a menu (see Figure 4-5).

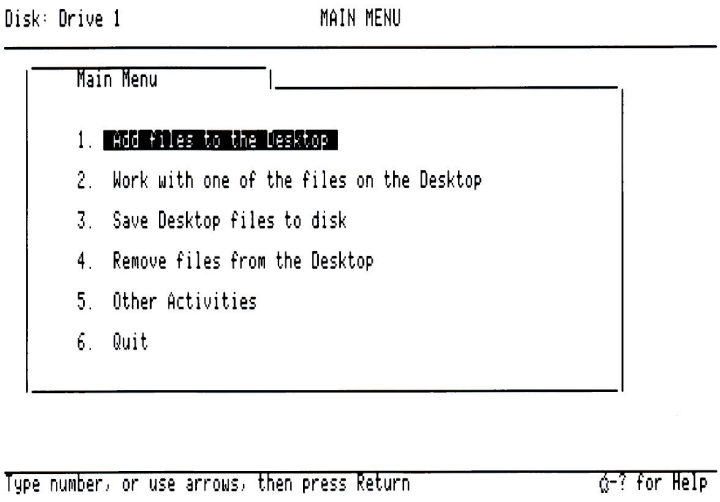


Figure 4-5
The main menu

The first menu you see is called the **main menu.** You type the number (or letter) of the option you want and then press Return. Pressing Return confirms your choice. In some applications, you can use Up Arrow or Down Arrow to highlight the menu item you want to select instead of typing a number or letter.

Depending on the application, you then either move to a more specific menu or start doing whatever you chose to do from the main menu. In some applications, secondary menus are displayed overlapping the main menu, with enough of the main menu showing to remind you of where you are in the application (see Figure 4-6).

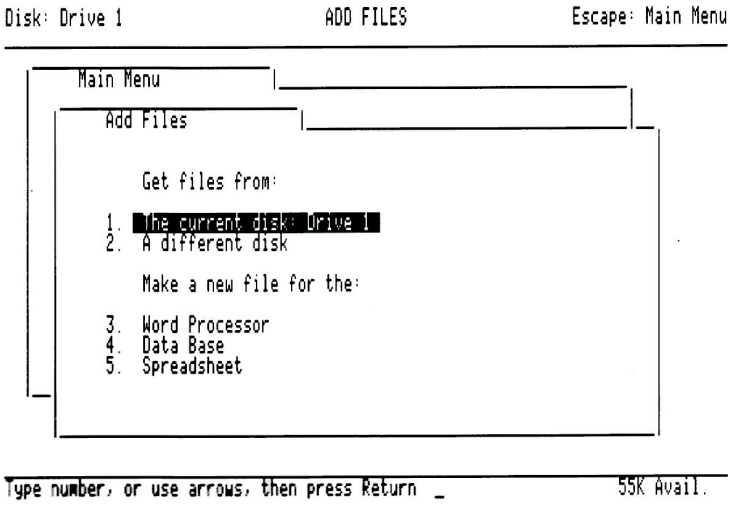


Figure 4-6
Overlapping menus

In most keyboard-based applications, you get back to the main menu by pressing Esc or Command-Esc. *Esc* stands for *escape,* and that's what it lets you do. It's sort of the opposite of pressing Return. While pressing Return confirms a choice, pressing Esc usually cancels a choice or extricates you from an activity.

Using the Control keys

You control certain functions of keyboard-based applications by using the Control or the Command key in combination with another key. For example, you might hold down Command while you press P to *print* something, Command and D to *delete* something, Command and S to *save* something, Command and C to *cut* something, and so on.

Because key combinations vary from application to application, the only way to find out how a given application uses Control and Command is to read the manual that came with the application. To make it easier to remember the key combinations, the key you press in combination with Command or Control is usually the first letter of the function it performs.

Although the Command and Control keys have similar uses, they are different keys and you must use the one specified in the manual of the application you're using.

❖ *By the way:* The Command key used to be called the Open-Apple key or simply the Apple key.

Moving the cursor

The arrow keys in the lower-right corner of the keyboard move the **cursor** up, down, left, or right. The cursor marks the spot where your next action will take place. Sometimes the cursor is a blinking box; sometimes it's a blinking underline.

Early models of the Apple II didn't have up and down arrow keys. Programmers who needed to make the cursor move up and down took matters into their own hands and designated certain keys on the keyboard to accomplish that function. Usually, they designated a set of four adjacent keys (that formed a cross) to be the up, down, left, and right cursor-moving keys (see Figure 4-7). You won't have any trouble using such an application on your Apple IIc Plus as long as you remember to use the substitute keys instead of the arrow keys.

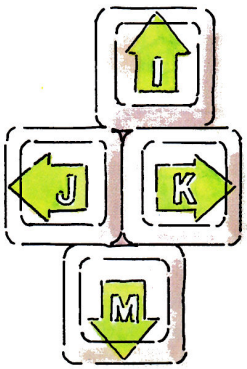


Figure 4-7
Arrow substitutes

Using mouse-based applications

Mouse-based applications generally start with a screen that has a row of words across the top. Like the main menu in keyboard-based applications, the words at the top of the screen in mouse-based applications allow you to give commands to the computer; only instead of typing your commands, you use the mouse to point to commands.

Pointing

When you move the mouse across your desk, a small arrow, called a **pointer,** moves in a corresponding way across the screen (see Figure 4-8).

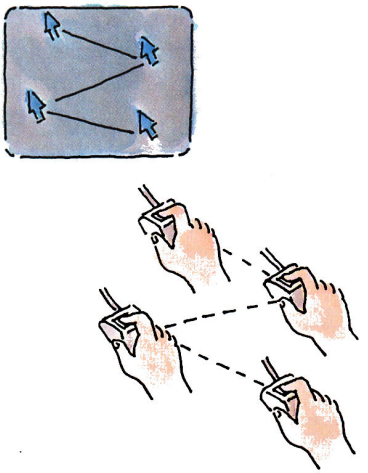


Figure 4-8
Pointing

Clicking

Pressing and releasing the **mouse button** is called **clicking** (see Figure 4-9). You point to something and click when you want to select that item for some action.

Double-clicking means pressing and releasing the mouse button twice in rapid succession. It's a shortcut used in many mouse-based applications. Where the shortcut leads depends on the application. The manual provided with the application will tell you how double-clicking is used in that application.

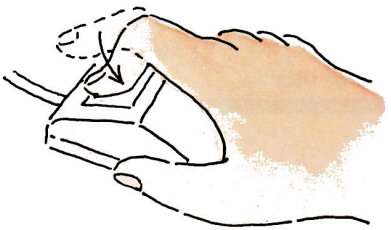


Figure 4-9
Clicking

Selecting

When you point to a word or picture and click the mouse button, you are selecting that word or picture for some action.

Selecting is an important concept in mouse-based applications. You select something; then you tell the application what action to perform on the selected text or picture. For example, you might select a block of text and then tell the application to delete it or move it somewhere else in the document.

To select a block of text, point just to the left of the first character, hold down the mouse button, move the pointer to the right of the last character, and then release the mouse button. The text between the first and last character will be **highlighted** to show that you selected it (see Figure 4-10).

Dragging

Holding the mouse button down while you move the mouse is called **dragging.**

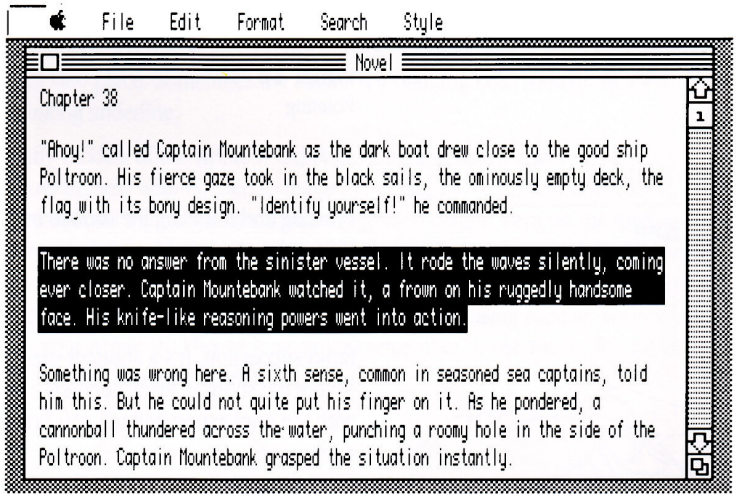


Figure 4-10
Selected text

Besides dragging across text to select it, you can use the mouse to drag objects from one place on the screen to another.

Pull-down menus

Menus in mouse-based applications stay out of sight until you need them; they're called *pull-down menus.* In this respect, they are like those maps you may have had in elementary school. The teacher pulled down the map to teach geography, then rolled it up to demonstrate subtraction on the blackboard.

To pull down a menu in a mouse-based application, just point to the title of the menu and hold down the mouse button. The menu will remain visible until you release the mouse button.

Each word or picture on the **menu bar** represents a different menu. Each application has its own menus, but there is almost always one called the **File menu.** The File menu is the menu you'll use when you want to do something to the document as a whole—save it on a disk, quit using it, and so on.

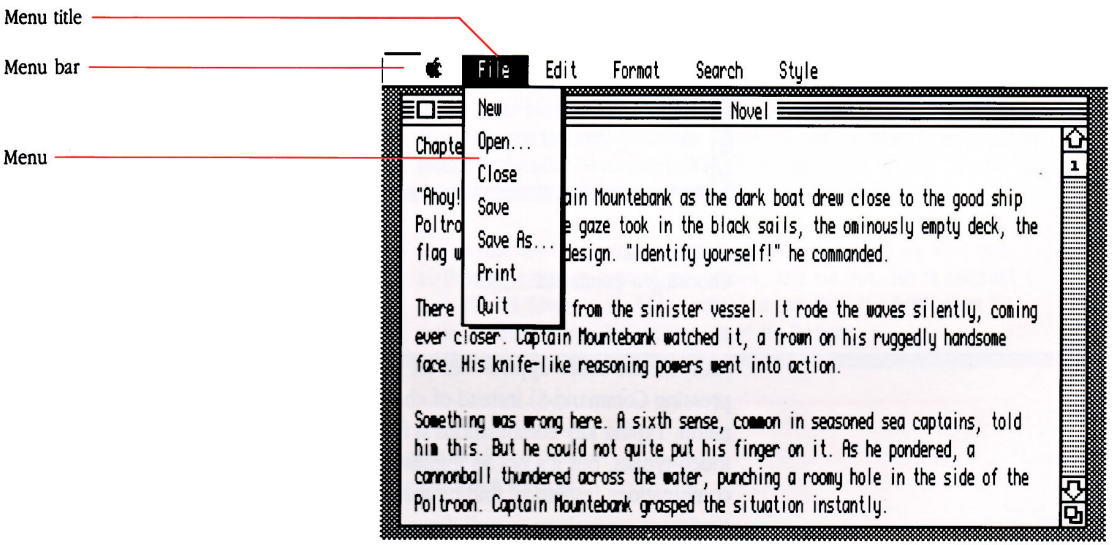


Figure 4-11
A pull-down menu

Choosing

To **choose** a **command** from a menu, point to the **menu title,** hold down the mouse button, move the pointer down the list until the command you want is highlighted, and then release the button (see Figure 4-12).

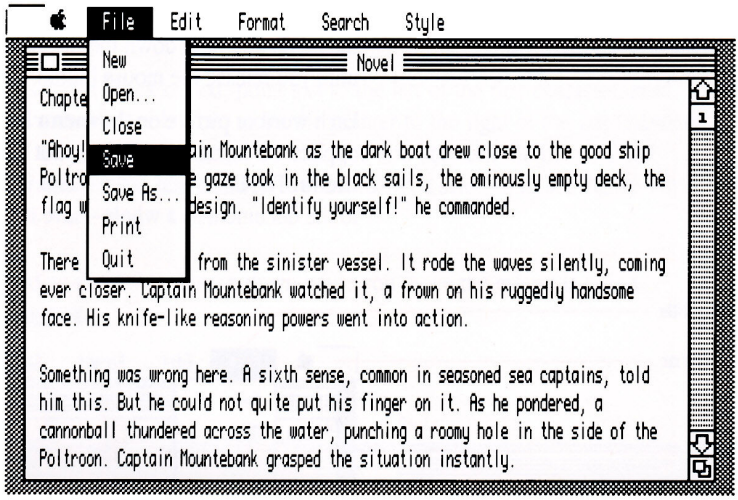


Figure 4-12
Choosing a command

Many mouse-based applications let you use a certain key combination (like pressing Command-S) instead of choosing a command from a pull-down menu. Typing key combinations is faster for some experienced users and touch-typists, but it's not as intuitive. You have to remember the key combinations instead of finding the command you want on a menu. Keyboard equivalents to pull-down menu commands are usually shown on the menu.

Windows

With most mouse-based applications, you look at your document through a **window** (see Figure 4-13). With some applications, you can have several windows on the screen. This lets you see more than one document at a time.

The contents of windows vary, but most windows have these things in common: a title bar, a close box, a size box, and a scroll bar. You can use these tools to change what you see through a window, change the size of a window, move a window, close a window, and activate a window.

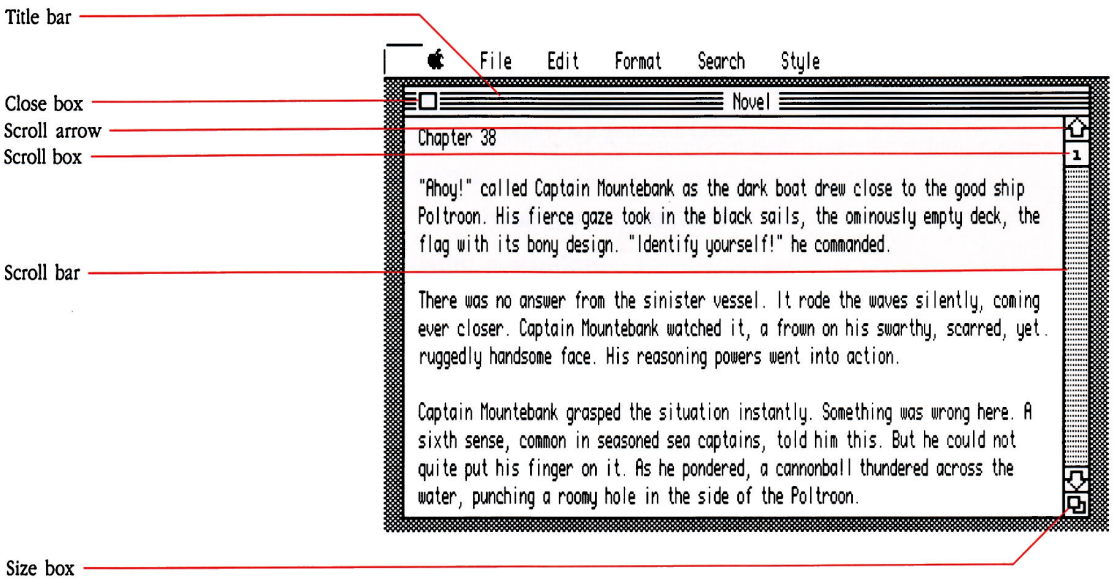


Figure 4-13
The parts of a window

Changing the size of a window

Most of the time, you want the window you're working in to fill the whole screen so you can see as much of the document as possible. But sometimes it's useful to shrink the window so you can see more than one document at a time.

To shrink a window, point to the **size box** and drag it up and to the left. To expand a window, point to the size box and drag it down and to the right.

Moving a window

To move a window, point anywhere in the **title bar** (except on the close box) and drag the window wherever you want to put it.

Activating a window

Some applications let you have several windows on the screen at one time, but only one of those windows can be active. A window has to be active before you can make any changes to the information in it. The active window's title bar is highlighted to distinguish it from nonactive windows on the screen.

To **activate** a nonactive window, use the size box to shrink the active window until you can see in the background the window you want to activate. Then click anywhere on the nonactive window and it will zoom into the foreground and become the active window.

Changing the view through a window

If a document is too long to fit in the window, there will be a bar running along the right side of the window. This is the **scroll bar.** When you drag the **scroll box** along the scroll bar, different parts of the document come into view. The scroll bar represents the total length of your document. So if you want to see the middle of your document, drag the scroll box to the middle of the scroll bar. To scroll one line at a time, click the **scroll arrow** that points in the direction of what you want to see. To scroll a windowful at a time, click within the gray area of the scroll bar above or below the scroll box.

If a document is too wide to fit on the screen, there will also be a scroll bar along the bottom of the window. Drag the scroll box left to see the leftmost side of the document; drag it right to see the rightmost side of the document.

Closing a window

To close a window, click on the **close box** in the upper-left corner of the window. This has the same effect as choosing the Close command from the File menu.


Golden Tempura Batter
VARIETY RICE
國寶
COMPANY

CHAPTER 5

Saving Documents

AFTER YOU FINISH CREATING A DOCUMENT—ACTUALLY, AS SOON AS YOU create anything worth keeping—you should save it on a disk. Otherwise, it will be lost forever when you turn off the computer's power switch (or accidentally kick the computer's power cord out of the outlet). It doesn't matter whether you save the document on a 3.5-inch disk or a 5.25-inch disk. Saving is the same regardless of the kind of disk you're saving on. What varies is the procedure for saving, and that can vary from application to application. Read the manual that came with your application for instructions on how to save documents created with that application. If the instructions are clear, you may not need to read this chapter.

With most applications, saving a document on a disk is a very easy, intuitive procedure. You select the Save command from a menu, and the application asks you a few straightforward questions about where you want to save the document and what you want to name it. Actually, the questions are only straightforward once you know what the application means by such terms as *pathname, prefix, volume name, filename, format, directory,* and *subdirectory*. This chapter explains these terms and other things you may need to know about saving documents on disks.

Introducing disks

Apple computers work with two types of disks—the more recent 3.5-inch disk and the traditional 5.25-inch disk. The 3.5-inch disk can store 800K (819,200 bytes). The 5.25-inch disk has a storage capacity of 143K (146,432 bytes).

Files that you create with an application are often called *documents*.

A disk acts like a file cabinet in which you can store information. In fact, any grouping of information with a name is called a **file.** Files include programs, letters you write with word processing software, budgets created with spreadsheets, and address lists created with a database program. Just as with paper files, the files you keep on disk can be saved, changed, sorted, or thrown away.

A disk, regardless of its size, is basically a place to keep information. Just as you store documents in a file cabinet, you can store information on a disk. Files that you save on a disk are recorded magnetically. Nonetheless, computer users normally refer to *writing* data to a disk and *reading* data from a disk. Some programs refer to disk files as documents.

Two other common terms are *program disk* and *data disk*. The difference between the two lies in their contents. Typically, a **program disk** contains one or more programs, such as a word processing program. A **data disk** contains the information that you create with a program. Storing different files by topic (addresses, letters, budgets, for example) on different data disks is a good way to classify information for easy access. People with two drives often run their programs from the startup drive and store their data on a disk in the second drive.

- *How long will a floppy disk last?* You can expect years of service from a good-quality floppy disk, given proper care and handling.

Although 3.5-inch disks and 5.25-inch disks have a great deal in common, they are different enough to warrant separate sections for the following topics:

- disk anatomy
- care and handling of disks
- how disks work
- putting a disk in a drive
- write-protecting a disk

The next section describes 3.5-inch disks.

The 3.5-inch disk

Learning the parts of a disk provides a good background for understanding how disks work and how to take care of them. Figure 5-1 shows the anatomy of a 3.5-inch disk.

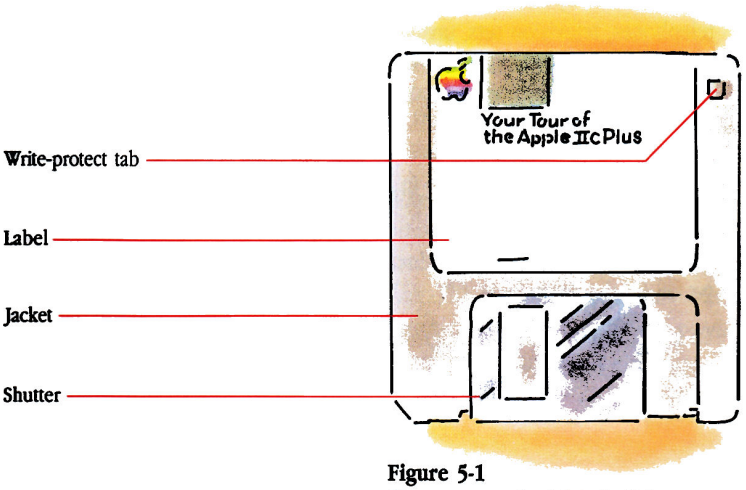


Figure 5-1
The anatomy of a 3.5-inch disk

The disk itself is a circular sheet of plastic with a metallic oxide coating. A hard plastic **jacket** contains and protects the disk. The disk jacket protects the disk in two ways. First, it keeps dust, fingerprints, and other foreign substances from reaching the disk surface. Second, it gives you the means to protect the disk's contents from unwanted changes. (See "Write-Protecting a 3.5-Inch Disk" later in this section.) The jacket also contains a liner that cleans and lubricates the disk when the disk spins.

- *What kind of disk to buy:* Always buy high-quality, name-brand disks. The cheap, no-name disks may be made of lower-quality materials and tend to break down or wear out rather quickly. When a disk goes bad, the computer can no longer read it and your work is lost. When buying 3.5-inch disks, always make sure you get *double-sided* disks. The disk drive works with both sides of the disk. A single-sided disk has a capacity of only 400K.

Caring for 3.5-inch disks

The most important rule in caring for 3.5-inch disks is never to open the shutter and touch the disk beneath it. Also keep these rules in mind:

- Keep disks away from magnets or devices containing magnets, like telephones, television sets, unshielded monitors, copy stands with magnetic paper holders, batteries, and large motors.
- Keep disks away from moisture.
- Keep disks away from direct sunlight and extremes of heat and cold. On a hot day, the heat that builds up in car trunks, on dashboards, and in glove compartments can ruin disks.
- Don't use an eraser on a label. Eraser particles can damage the disk if they get under the shutter.
- To keep dust and other foreign matter away from the disk itself, do not slide the shutter open.

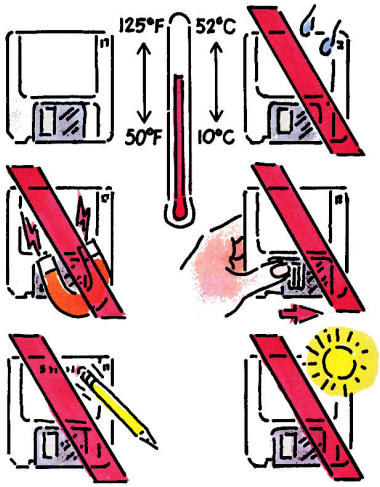


Figure 5-2
Caring for 3.5-inch disks

How 3.5-inch disks work

When you put a disk into the drive, the drive slides the shutter open, exposing the disk itself to the **read-write head,** and then spins the disk inside its jacket. As the disk spins, this head either reads data from the disk or writes new data to it.

When you save your work on a disk, the read-write head records your work on the disk as magnetic patterns. When you load information into the computer's memory, the read-write head copies these patterns from the disk. This is much like the activity of the record and play heads on a cassette recorder. The disk records and plays data patterns; the cassette records and plays sound patterns.

Putting a 3.5-inch disk into a drive

To put a 3.5-inch disk into its disk drive, follow these three steps:

1. Make sure there isn't a disk in the drive already. If there is, press the eject button to eject the disk.

   - *Ejecting a disk when the computer is off:* If the computer is off, straighten a paper clip and insert one end of the clip into the little hole to the right of the slot. Press the wire in only until the disk is ejected.

2. Grasp the disk by the label with the label facing up. If the disk doesn't have a label, make sure the metal shutter enters the drive first. The metal "button" in the center of the disk should never face up.

3. Push the disk in until you feel the drive take the disk. See Figure 5-3. When the computer is on, you'll hear the drive whir as it reads the disk.

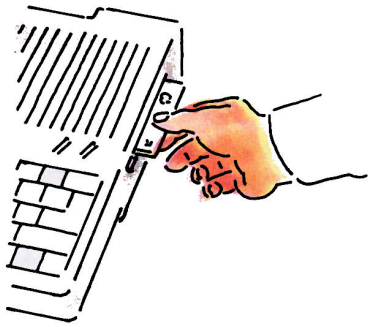


Figure 5-3
Inserting a 3.5-inch disk into a drive

Write-protecting a 3.5-inch disk

If you have a disk with important information on it, for example, a program disk or a disk with archival information, you might want to write-protect it.

The 3.5-inch disk has a **write-protect tab** in the upper-right corner of the disk. Slide the tab toward the upper edge of the disk to "lock" the disk; that is, to protect the data from changes. If you find you need to change the information on a write-protected disk, you can easily unlock it. To unlock the disk, slide the tab back so it covers the rectangular hole. See Figure 5-4.

If you are accustomed to using 5.25-inch disks, where you cover a write-enable notch to write-protect the disk, you might find it confusing to uncover the opening on a 3.5-inch disk when you want to write-protect it. It might help if you think of the plastic tab as a drawbridge that is either in place permitting information to cross over onto the disk or not in place.

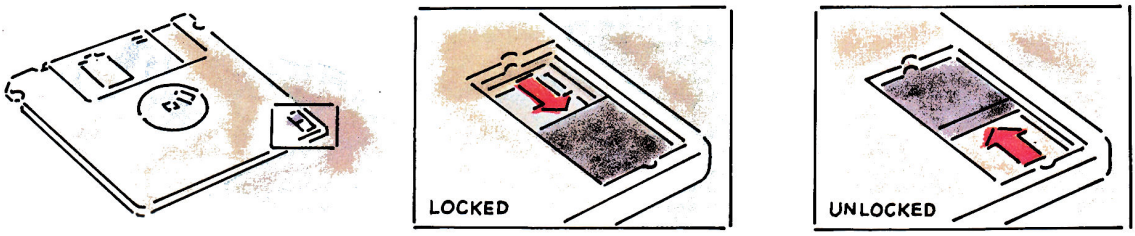


Figure 5-4
Setting the write-protect tab on a 3.5-inch disk

Although the built-in disk drive in your Apple IIc Plus uses 3.5-inch disks, you may have connected an external 5.25-inch drive to your computer. If so, read the next section on 5.25-inch disks. If you won't be using 5.25-inch disks, go on to "Formatting a Disk."

The 5.25-inch disk

Figure 5-5 shows the anatomy of a 5.25-inch disk.

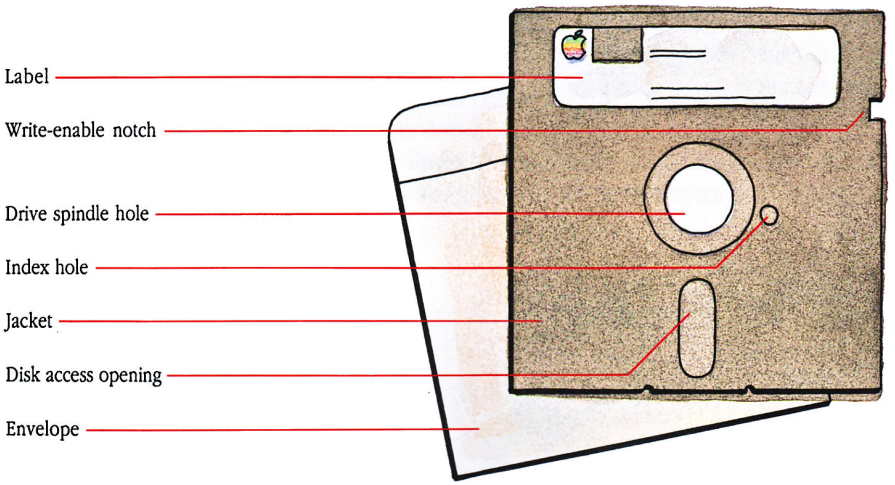


Figure 5-5
The anatomy of a 5.25-inch disk

The disk itself is a circular sheet of plastic with a metallic oxide coating. A flexible plastic jacket contains and protects the disk. The disk jacket protects the disk in two ways. First, it keeps dust, fingerprints, and other foreign substances from reaching the disk surface. Second, it gives you the means to protect the disk's contents from unwanted changes. (See "Write-Protecting a 5.25-Inch Disk.") The jacket also contains a liner that cleans and lubricates the disk when the disk spins.

- *What kind of disk to buy:* Always buy high-quality, name-brand disks. The cheap, no-name disks may be made of lower-quality materials and tend to break down rather quickly. When a disk goes bad, the computer can no longer read it and your work is lost. Although most retailers know what you want when you ask for a box of disks for an Apple II computer, you should specify *single-sided, double-density, soft-sectored disks.*

Caring for 5.25-inch disks

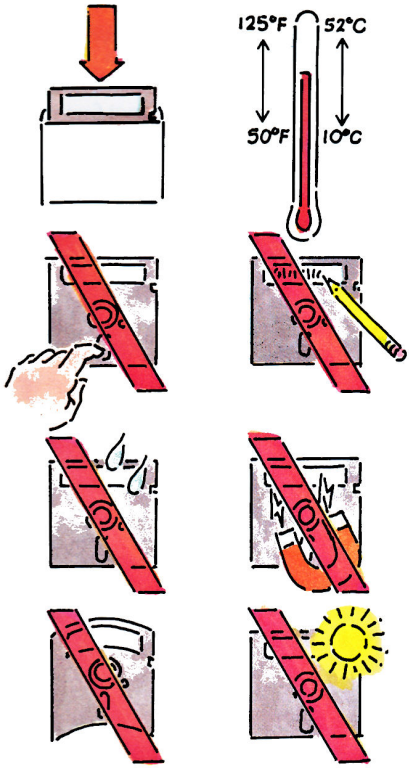


Figure 5-6
Caring for 5.25-inch disks

The most important rule in caring for disks is never to touch any exposed area of the disk itself; always handle a disk by its jacket. Also keep these rules in mind:

- Keep disks away from magnets or devices containing magnets, like telephones, television sets, unshielded monitors, copy stands with magnetic paper holders, batteries, and large motors.
- Store 5.25-inch disks in the envelopes in which they came.
- Store disks vertically to keep dust from collecting on them. Some people prefer to store disks in plastic disk boxes or special disk albums for further protection (and better organization).
- Use a felt-tip pen to write on the disk label. A pencil or a ball-point pen can dent the recording surface of a 5.25-inch disk and thereby ruin data.
- Don't place anything on a disk. A sharp edge or too much pressure could damage the disk.
- Don't use an eraser on a label. Eraser particles can damage the disk.
- Don't attach paper clips to disks.
- Keep disks away from moisture.
- Keep disks away from direct sunlight and extremes of heat and cold. On a hot day, the heat that builds up in car trunks, on dashboards, and in glove compartments can ruin disks.

How 5.25-inch disks work

When the computer activates the drive, the disk spins inside its jacket. As the disk spins, the area of the disk that can store data passes under the *disk access opening,* exposing the area to the read-write head.

When you save your work on a disk, the read-write head records your work on the disk as magnetic patterns. When you load information into the computer's memory, the read-write head copies these patterns from the disk. This is much like the activity of the record and play heads on a cassette recorder. The disk records and plays data patterns; the cassette records and plays sound patterns.

Putting a 5.25-inch disk into a drive

To put a 5.25-inch disk in a drive, follow these four steps:

1. Open the drive door. If a disk is in the drive, remove it. A drive can work with only one disk at a time.
2. Grasp the disk by the label with the label facing up. If the disk doesn't have a label, make sure the seams on the disk jacket face downward.
3. Slide the disk into the drive as far as it will go. See Figure 5-7. (Do not force the disk.) The trailing edge of the disk should be inside the drive, so that you can close the drive door.
4. Close the drive door. A drive cannot work with a disk when the drive door is open.

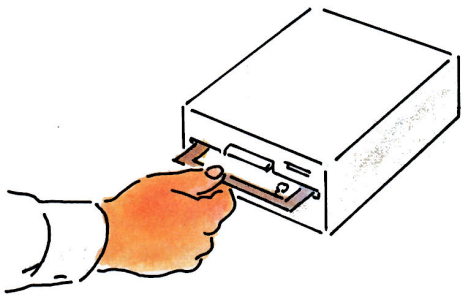


Figure 5-7
Inserting a 5.25-inch disk into a drive

Write-protecting a 5.25-inch disk

If you have a disk with important information on it, such as a program disk or a disk with archival information, you might want to write-protect it.

On 5.25-inch disks, the key to protection is the notch in the upper-right corner of the disk jacket, the **write-enable notch.** When the notch is uncovered, the disk drive can write new data on the disk and erase data currently stored there.

To protect the contents of a disk from accidental changes, cover the write-enable notch with a removable **write-protect tab** (see Figure 5-8). You'll find sheets of write-protect tabs packed with boxes of blank disks.

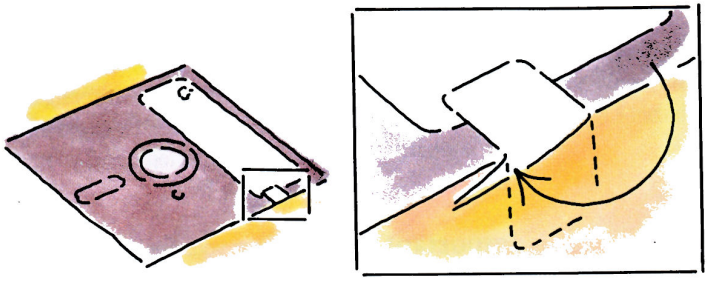


Figure 5-8
Putting a write-protect tab on a 5.25-inch disk

If you find you need to change the information on a write-protected disk, you can easily unlock it by removing the write-protect tab.

- *No write-enable notch:* Many program disks have no write-enable notch. Software publishers do this to keep you from accidentally erasing the program.

Formatting a disk

Before you can save documents on a blank disk, the disk has to be formatted. **Formatting** divides a disk into sections where information can be stored.

Different applications go to different lengths to help you get disks formatted:

- Some applications offer to format a disk automatically when they discover that you've asked them to save a document on a blank, unformatted disk.
- Some applications offer formatting as one of the commands on the application program's menu.
- Some applications, discovering an unformatted disk, just beep and put a message on the screen to the effect that you'd better exchange the blank disk for a formatted one if you expect to save anything on it.

△ **Important** Find out how your application handles formatting before you create a lengthy or important document. If your application is the type that doesn't format disks and you don't have a formatted disk handy, you'll have to quit the application and lose the document in memory in order to format a disk. △

When a disk is formatted, three things happen:

1. You're asked to give the disk a name (often referred to as the **volume name,** for reasons explained a little later).
2. The disk is divided into sections where information can be stored—parking space for your data.

3. A **directory** is set up on the disk. At first, the directory is empty except for the name of the disk and the amount of space available on the disk; but as you save documents on the disk, the names, sizes, and locations of those documents are recorded in the directory. Applications use the directory to find the locations of the documents you ask them to load into memory. You can use the directory to see what's on a given disk. (You'll learn much more about directories in the system disk guide.)

△ **Important** Formatting erases everything stored on a disk. You should format a disk only before you save something on it for the first time or when you want to erase everything that's on the disk. △

❖ *Why disks are sometimes called volumes: Volume* is a general term for an area where information is stored. It's less media-specific than the word *disk*. When you're storing information on a 5.25-inch disk or a 3.5-inch disk, *disk name* and *volume name* are synonymous.

Saving a document

When you want to save a document on a disk, you choose the Save command from the application's menu. Then the application usually asks you where you want to save the document. There are lots of ways the application might ask this question; one way is to give you a list of choices like this:

```
Save To:

3.5-inch Drive #1

3.5-inch Drive #2

PATHNAME:
```

References to *built-in drive* may not refer to the 3.5-inch drive built into your Apple IIc Plus. They might refer to the 5.25-inch drive built into the Apple IIc. Identify the disk in your built-in drive by slot and drive number (5, 1) or by ProDOS pathname, not as the disk in the built-in drive.

Saving to a disk in a certain disk drive

If you choose 3.5-inch Drive #1 or 3.5-inch Drive #2 (or any disk drive shown on the screen), the next question is, what do you want to name the document? You type a name and press Return, the document is saved on the disk you specified, and the name you gave the document is recorded in the disk's main directory along with its location on the disk.

Naming a document

You can name your document anything you like, provided there isn't already a document by that name on the disk and provided the name conforms to the application's rules for naming documents. You should be able to find the rules for naming documents in the manual that came with the application. Document names are also called *filenames*. Some applications won't allow spaces in document names. Other applications won't let you start a document name with a number or a punctuation mark. And still other applications limit the length of the document name to 15 characters. If you want to play it safe, follow these guidelines in naming your documents:

- Start the name with a letter.
- Don't use spaces.
- Don't make it longer than 15 characters.

If you don't want to play it safe, give your document any name you like and see if the application lets you get away with it. The worst that can happen is that you'll get a beep and an error message like ILLEGAL FILENAME. You'll know that the name you typed was too long, started with the wrong kind of character, or included spaces when the application didn't allow it. Then you'll get a chance to type another name.

Saving with a pathname

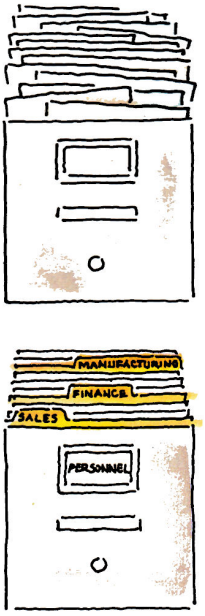


Figure 5-9
Two ways to organize documents

Some programs give you the option of saving a file by typing a pathname. This option is for people who organize their disks into subdirectories. Organizing a disk into **subdirectories** is like putting documents into file folders instead of throwing them randomly in a drawer (see Figure 5-9).

For example, you might have a drawer in your office where you file personnel information on your employees. In that drawer you have folders titled Finance, Sales, Manufacturing, and so on. Inside each folder are documents with personnel information on each employee in that department. You can use this same system to organize information on a disk. You would name the disk PERSONNEL; set up subdirectories on the disk called FINANCE, SALES, and MANUFACTURING; and save documents with personnel information on each employee in the appropriate subdirectory.

Organizing documents into subdirectories not only makes it easier for you to find documents on a disk, but also makes it faster for the computer to locate and load documents you want to revise.

When you look at the directory of a disk, you don't see the name of every document in every subdirectory. You see only the subdirectory names and the names of documents you saved directly onto the disk rather than into subdirectories. (Looking at a disk directory and seeing only subdirectory names is like opening the drawer of a file cabinet and seeing the names on the folders rather than seeing every document in every folder.) If you want to see the names of the documents in a subdirectory, type the disk name *and* the subdirectory name when you ask the application for a directory listing.

Creating subdirectories

Before you can save documents in subdirectories, you have to create the subdirectories. Some applications give you a way to create subdirectories from within the application; others expect you to create them with the system disk.

Once you've created your subdirectories, you can save documents in one of those subdirectories by typing a pathname. A **pathname** is the complete name of the document, starting with the disk name (also called *volume name*), then the subdirectory name, then the document name. The pathname starts with a slash, and each part of the pathname is separated with a slash. The pathname /PERSONNEL/SALES/JONES tells the application to save the document on the disk called /PERSONNEL in the subdirectory called /SALES and to name it JONES. If you don't use subdirectories, the pathname is simply the disk name and the document name—for example, /PERSONNEL/JONES.

As the word suggests, a pathname describes the path or route to a document (see Figure 5-10).

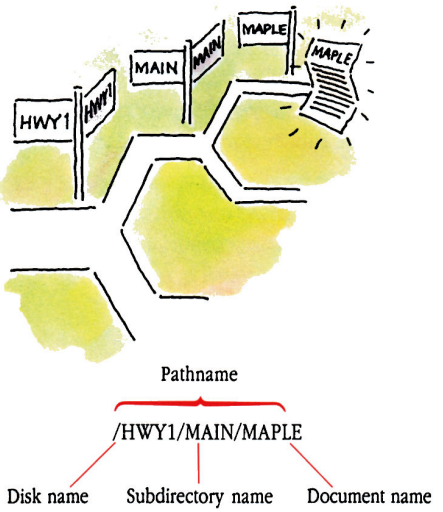


Figure 5-10
A pathname

Setting a prefix

Creating subdirectories gives you an efficient way to organize your information on a disk, but /PERSONNEL/SALES/JONES requires a lot of typing. Fortunately, there's a shortcut. You can set a prefix. A **prefix** is the first part of a pathname. It can be just the disk name (/PERSONNEL/) or it can be the disk name and the subdirectory name (/PERSONNEL/SALES/). Once you've set the prefix, you don't have to type the whole pathname. You just type the document name (for example, JONES), and the application tacks the disk name and subdirectory onto the front of what you type.

Setting a prefix allows you to work with different documents in the same subdirectory more conveniently. You can save or load any document in that subdirectory by typing just the document name, not the whole pathname. When you want to work with a document in a different subdirectory, you can either change the prefix or override the current prefix by typing the complete pathname of the document.

The application you're using will tell you how to set a prefix.

Other ways to save

If an application asks for a **slot number** and a **drive number** when you choose the Save command, it's asking which slot contains the drive you want to save to and whether that drive is the first or second drive in that slot. The Apple IIc Plus doesn't have slots, but the ports are designed to correspond to the slots on other models of the Apple II.

Some applications shorten the question to: S?D? (*S* stands for *slot*; *D* stands for *drive*.)

- For 3.5-inch drives, the corresponding slot is 5.
- For 5.25-inch drives, the corresponding slot is 6.
- If you have more than one drive of the same type connected to the disk drive port, drive 1 is the drive closest to the computer and drive 2 is the drive connected to drive 1.
- If you have more than two 3.5-inch drives, the corresponding slot for the third and fourth drives is slot 2.

Other applications may expect you to indicate where you want your document saved by typing the document name followed by a comma, followed by the letter *D* (short for *drive*) and a drive number. For example, typing MEMO,D2 tells the computer to save the document named MEMO on the disk in drive 2. If you don't type a *D* and a drive number, the application assumes you want to save it on the disk in the drive you last saved to or retrieved information from.

Disk operating systems

Figure 5-11
What the disk operating system does

When you tell your application to save a document on a disk, it hands the job over to a subcontractor called the *disk operating system,* or simply the *operating system.*

The **disk operating system** is a set of programs on every application program disk that handles the transportation of documents between the memory of the computer and disks (see Figure 5-11).

The only reason you need to be aware of the disk operating system is that there are three varieties for Apple II computers—ProDOS®, Pascal, and DOS 3.3—and each variety requires that disks be formatted in a particular way. If your application uses ProDOS (that is, if the application is ProDOS-based), documents created with that application can be stored only on ProDOS-formatted disks. If your application program is Pascal-based, documents created with that application can be stored only on Pascal-formatted disks.

If formatting is handled by the application, you don't need to know what that application's disk operating system is; the application knows and will format disks the way it needs them to be formatted.

If formatting isn't handled by your application, you'll use the system disk to format disks, and you'll need to know whether you want the disks formatted for ProDOS, Pascal, or DOS 3.3.

How do you know what operating system your application uses so you know how to answer the question? See if the operating system is shown on the disk label. If it's not, you can find out by using the Catalog a Disk command on the system disk.

If you want to know why there are three disk operating systems for the Apple II and more about them, read on.

Apple II disk operating systems

In the beginning, there were only 5.25-inch disks and one system for saving information on them. The system was called **DOS,** an acronym for *disk operating system.* Over the years, DOS was improved and version numbers were tacked on to distinguish one version from the next. The last and best version was DOS 3.3.

The first applications written for the Apple II were written either in **assembly language** (a programming language only slightly removed from the language of 0's and 1's that the Apple II speaks fluently) or in BASIC (a programming language that uses English-like words to tell the computer what to do). Both assembly-language programs and BASIC programs used the DOS 3.3 system for formatting disks and for saving and retrieving documents, so users didn't have to know what kind of program they were using.

Then a version of the Pascal programming language was adapted for the Apple II. This was a big breakthrough because Pascal is a powerful programming language, and the fact that it was available led to the development of lots of sophisticated applications for the Apple II. The only drawback was that Pascal applications didn't use DOS 3.3. Pascal applications used their own operating system. (Now there's a version of the Pascal programming language that uses the ProDOS operating system, but the first version of Pascal for the Apple II required its own operating system.)

With Pascal on the scene, users had to keep track of whether the disks holding their documents were formatted for DOS 3.3 or for Pascal. If they tried to save a Pascal document on a DOS 3.3 disk, they got an error message, and vice versa.

Then came larger-capacity disks—3.5-inch disks and hard disks—capable of holding hundreds of documents instead of the dozens you could store on a 5.25-inch disk. The Pascal operating system was equipped to handle the larger storage devices, but DOS 3.3 wasn't. So DOS 3.3 was supplanted with a disk operating system that could take advantage of all that extra storage space.

The DOS 3.3 replacement was **ProDOS,** an acronym for *Professional Disk Operating System*. The most important feature of ProDOS, besides its ability to use all that extra storage space, is that it supports subdirectories. It's the only one of the three Apple II disk operating systems that does; so if an application refers to subdirectories or pathnames, you know it's a ProDOS-based application program.

You can still run DOS 3.3-based applications on the Apple IIc Plus, but you can't save the documents on 3.5-inch disks. DOS 3.3 was designed for 5.25-inch disks with a storage capacity of 143K; 3.5-inch disks have a storage capacity of 800K. If you have DOS 3.3 applications and documents and want to save them on 3.5-inch disks, you can convert them to ProDOS by copying them to ProDOS-formatted disks using the system utilities. The procedure is explained in the system disk user's guide.


66

CHAPTER 6

Peripheral Devices

ALTHOUGH THE APPLE IIC PLUS—WITH ITS BUILT-IN KEYBOARD AND DISK DRIVE—may have all the features you need today, what about tomorrow? What if your needs change? Or what if you've already determined that you need something more than the basic Apple IIc Plus? Clearly, different users have different needs, and even one person's needs can change over time. There's a wide range of peripherals that you can attach to an Apple IIc Plus—so that the computer you have today can meet your needs tomorrow.

Connecting peripheral devices

Most peripheral devices connect to the Apple IIc Plus through the ports on the back of the computer. Connecting peripheral device cables to the Apple IIc Plus is easy because there is a symbol above each port showing you which device goes where. Figure 6-1 gives you an overview of how to connect various peripheral devices to your computer.

Figure 6-1
The back panel of the Apple IIc Plus

▲ **Warning** Before you plug anything into the back panel of the Apple IIc Plus, make sure the power switch (on the far right as you face the back of the computer) is set to O for *off*. ▲

Shielded cables

The Apple IIc Plus and all Apple IIc Plus peripherals come with shielded cables. If you use other devices with your Apple IIc Plus, make sure the cables are shielded.

Retaining screws

Some connectors have small screws on either side. Tightening these screws makes a strong connection between the cable and the computer—and eliminates interference that could affect television or radio reception in the area. You may need a small screwdriver to tighten and loosen the screws. Do not overtighten the screws.

See "Radio and Television Interference" in the front of this book for more information about preventing interference.

Symbols on the back panel

Most of the symbols on the Apple IIc Plus back panel are self-explanatory. If you have any questions about which device or devices a symbol represents, check Figure 6-2.

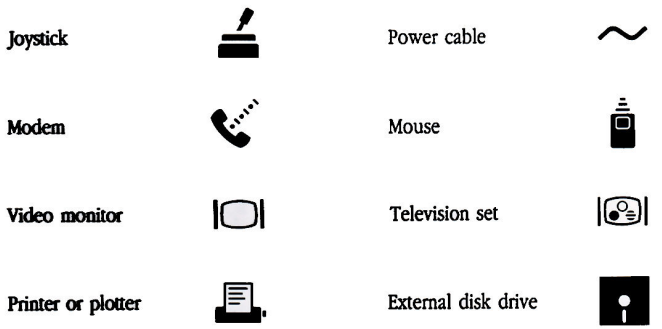


Figure 6-2
The symbols on the Apple IIc Plus back panel

Ports on the back panel

Most of the ports on the back of your Apple IIc Plus are designed for a particular type of peripheral device (a joystick, disk drives, a monochrome monitor, or a color monitor), and the instructions that tell the computer how to work with that device are stored in ROM (the permanent memory of the computer). The exceptions are the two ports shown in Figure 6-3. These are general-purpose serial ports, and you can change their configuration so that the computer can "talk" to a variety of devices that use a **serial interface.**

Serial interface means that the computer and the peripheral device exchange information one bit after another along a single wire, as opposed to **parallel interface**, where the eight bits that represent each character travel along parallel wires. The Apple IIc Plus works with serial devices.

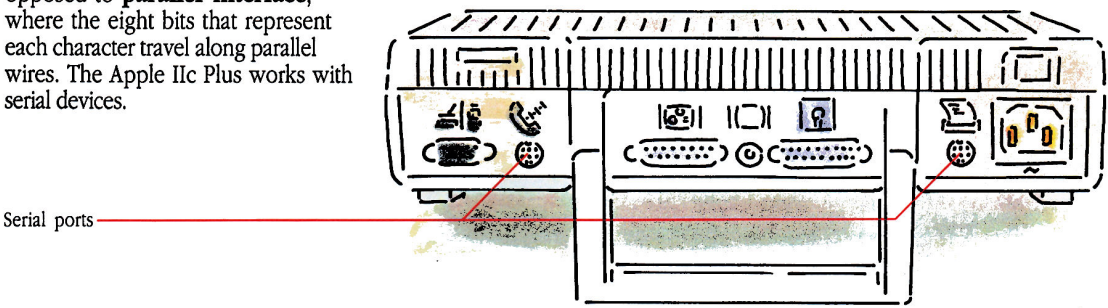


Figure 6-3
Serial ports on the Apple IIc Plus

You change the configuration of the serial ports by using the Set Serial Ports option on the system disk. If you connect an Apple printer to the printer port, and an Apple modem to the modem port, you won't have to change the configuration of the ports. And many non-Apple devices are also designed to work automatically with the serial port settings, so it's always a good idea to try using the device before you change the port settings.

Choosing peripheral devices

Here are some things to think about when you're evaluating any peripheral device:

- Does it work automatically with the Apple IIc Plus and your application? It doesn't matter how many fancy features a printer or modem has if you can't get it to work with your computer.
- Does it have all the features you want—not just the features you need today, but the features you'll want down the road? You should buy hardware the way you buy clothes for kids—with room to grow.
- How much does it cost? You should do some comparison shopping, but don't trade away compatibility with your software or the features you need just to get a bargain.
- What kind of service and support come with the hardware? Is there an adequate warranty period? Can you get inexpensive service coverage?

Printers

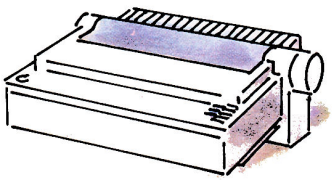


Figure 6-4
A printer

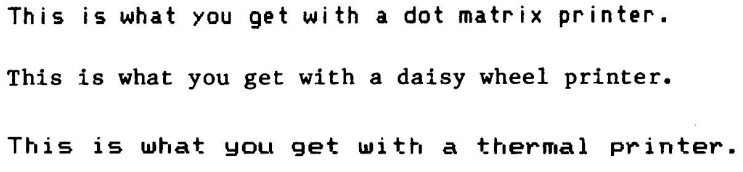
A printer produces a paper copy of documents you create with your computer. Some printers are designed exclusively for printing text; others are especially good for illustrations and can even print in color. Decide what's important to you and look for a printer that meets your needs.

Be sure to purchase a serial printer—parallel printers won't work with the Apple IIc Plus without the use of a special parallel interface. Beyond that, the single most important consideration in choosing a printer is compatibility with your Apple IIc Plus and with your software. In addition, you want to be able to choose the Print command from the menu without worrying about whether your printer will know how to interpret the bits that come streaming out of the printer port and down the cable. Most applications designed for the Apple II work automatically with the ImageWriter, the ImageWriter II, and printers advertised as being compatible with the ImageWriter.

Graphics-based applications (and some word processing programs are graphics-based) usually require a dot-matrix printer. Make sure you get a printer that works with your applications.

The second most important consideration is print quality. Do you need professional-quality text, or is it OK if you can see the little dots that make up each character? In general, you'll get the most professional quality from a daisy-wheel printer. But not everyone needs professional quality, and other types of printers are cheaper and can do more things—like graphics.

The most common types of printers are dot-matrix, daisy-wheel, and thermal transfer printers (see Figure 6-5).



This whole book is an example of what you get with a laser printer.

Figure 6-5
Print samples

Dot-matrix printers

Dot-matrix printers form characters and pictures with patterns of dots. They're fast, economical, ideal for graphics, and fine for drafts, memos, and personal letters. Because of the way they form characters, dot-matrix printers can produce a wide variety of type sizes and type styles (boldface, italic, and so on)—so you can create headlines and other special effects. You can even get dot-matrix printers that print in color.

The only drawback to dot-matrix printers is that, with some of them, you can see the pattern of dots that make up each character. This can give your documents a look that people associate with computer printouts. If you need a printer that can produce professional letter-quality documents, you may need a daisy-wheel printer. But check the quality of dot-matrix printers before you decide; you may not be able to tell the difference between text produced with a good dot-matrix printer and text produced with a daisy-wheel printer.

Daisy-wheel printers

Daisy-wheel printers, also known as *letter-quality printers,* form characters the same way high-quality typewriters do—by rotating a print wheel until the right character is aimed at the paper and hammering that character into a ribbon, leaving the appropriate symbol on the page. Daisy-wheel printers are generally slower and more expensive than dot-matrix printers, but if the appearance of your correspondence is important and you don't need graphics, a daisy-wheel printer may be the right choice for you. Most daisy-wheel printers use a circular print wheel (they look something like a daisy) to produce fully formed characters.

Keep in mind that daisy wheel printers limit you to the characters on the print wheel, whereas a dot-matrix printer can print graphics and a variety of type fonts and sizes.

- *Near letter quality:* Near-letter-quality printers (sometimes called *letter-matrix printers*) are dot-matrix printers that use so many dots to form each character that they appear to have been formed with a daisy-wheel printer.

Thermal transfer printers

Thermal transfer printers transfer ink dots in the form of characters onto paper by heating the ribbon. They are inexpensive and quiet. The print quality varies quite a bit among different kinds of thermal printers. Some are good enough for correspondence; others are suitable only for drafts and interoffice memos. Some thermal printers require specially treated paper. Check the price and availability of the special paper before deciding on what kind of printer to get.

Modems

A **modem,** short for *modulator/demodulator,* is a device that converts (modulates) computer signals into tones that can be sent over phone lines (see Figure 6-6). A modem on the receiving end converts (demodulates) the signals to their original computer-readable form.

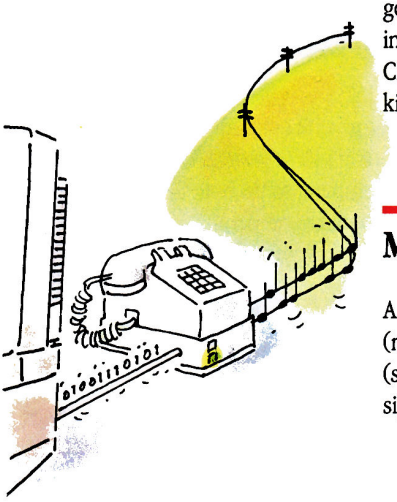


Figure 6-6
What the modem does

Different modems send and receive information at different speeds, referred to as the **baud** or *baud rate*. The most common baud for modems is 1200. You can also get modems that send and receive data at 300 baud, 2400 baud, or at your choice of speeds.

▲ Warning Your display might be erratic at speeds greater than 1200 baud. If you have trouble with your display, try setting the modem baud to 1200. ▲

Modems that operate at 1200 baud generally cost more than 300-baud modems, but they're much faster. Because you may be paying long-distance phone rates while your modem is sending and receiving information, the time you save with a faster modem usually justifies the higher initial cost.

Monitors

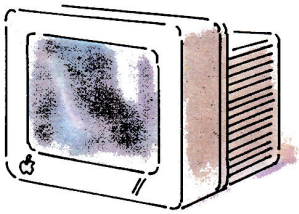


Figure 6-7
A monitor

There are two types of monitors: monochrome and color. **Monochrome monitors** come in three varieties: white, green, or amber. Some studies indicate that an amber display is easier on the eyes; others, that a green display is easier to read. Some people prefer black and white because it more closely resembles a typewritten page. The best choice is the one that looks best to you.

Color monitors are ideal for computer graphics and for displaying business charts and graphs. Until recently, they didn't have good enough resolution to display text, so people who wanted a computer to do both text and graphics had to get two monitors or settle for monochrome graphics. Today you can get color monitors capable of displaying both graphics and clear text.

Using a television set as a display device

You can use a standard television set (with a device called an **RF modulator**) as a display device for the Apple IIc Plus, but you're limited to a 40-column display. While 40 characters per line is fine for some applications (games and educational applications), most people find it restrictive for business letters or electronic spreadsheets. The training disk and many business applications require an 80-column display.

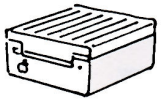


Figure 6-8
A disk drive

Disk drives

Disk drives record information on disks and retrieve information from disks. Sometimes the information is an application; sometimes, a document. It's all the same to the disk drive.

The 3.5-inch disk drive

The most popular type of disk drive for the Apple IIc Plus is the 3.5-inch drive. It uses 3.5-inch disks that each hold 800K (about 400 pages) of text. You can attach up to three of them to your computer in addition to the built-in drive. The advantage of having two (or more) drives is that you can use one for the application program disk and one for the document disk. If you have only one drive, you usually have to trade your application disk for your document disk when you want to save your document.

The 5.25-inch disk drive

You can also use 5.25-inch drives with the Apple IIc Plus (or a combination of 3.5-inch and 5.25-inch drives). The 5.25-inch drive uses 5.25-inch disks that each hold 143K (about 70 pages) of text. The 5.25-inch drive was the original disk drive (and for years the only type of disk drive) available for the Apple II. Consequently, lots of people own them, and thousands of applications are still distributed only on 5.25-inch disks. The 5.25-inch drive stores less information per disk, accesses that information a little more slowly, and takes up more desk space than the 3.5-inch drive. But it's 100 percent compatible with the Apple IIc Plus, and it makes sense to use one if you already have a library of 5.25-inch application program disks or you share disks with others using 5.25-inch drives.

You can attach up to two 5.25-inch drives to your Apple IIc Plus.

Memory expansion cards

A memory expansion card adds from 256K to 1 megabyte of RAM to your Apple IIc Plus. By having your authorized Apple dealer install a memory expansion card in your Apple IIc Plus, you can gain advantages such as the following:

- Run sophisticated programs, like AppleWorks®, that take advantage of the memory on the card as if it were an extension of the 128K that's built into your system.
- Speed up copying. With a memory expansion card you can copy documents from one disk to another without a lot of disk swapping. Just copy everything from the source disk to the memory expansion card, swap disks and copy everything from the card to the destination disk.
- Accelerate applications. By copying applications to the memory expansion card and running them from there, you save time because it's faster for the computer to get information from the memory expansion card than it is to get information from a disk.

❖ *Also known as a RAM disk:* When you use the memory expansion card as a place to temporarily store applications and documents, it's called a **RAM disk.**

△ **Important** The Apple IIc Memory Expansion Card is not designed to be used with the Apple IIc Plus. Ask your authorized Apple dealer to recommend a compatible card. △

Other devices

There are all sorts of other devices that can be attached to your computer. Some peripherals are available from Apple Computer, Inc. Many more are available from other sources. Ask your authorized Apple dealer for guidance in choosing peripheral devices that are compatible with the Apple IIc Plus.

△ **Important** With the exception of the memory expansion card, cards or devices that require interface cards aren't designed for the Apple IIc Plus. △

This list will give you some idea of the possibilities:

- **Mouse:** A device that can be used in some applications as a drawing tool or as a way of controlling mouse-based applications.
- **Joysticks and hand controls:** These devices are mostly used to control the movement of creatures and objects in games.
- **Home control device:** A device that you can attach to an electrical outlet and program to turn on a light, coffee maker, radio, sprinkler, or other appliances.
- **Adaptive devices for the disabled:** Contact the National Rehabilitation Information Center (NARIC), Closing the Gap, or the Trace Research and Development Center for information on adaptive devices compatible with the Apple IIc Plus.

  NARIC
  4407 8th Street NE
  Washington, DC 20017
  (202) 635-5826

  Closing the Gap
  P.O. Box 68
  Henderson, MN 56044
  (612) 248-3294

  Trace Research and Development Center
  University of Wisconsin
  314 Waisman Center
  1500 Highland Avenue
  Madison, WI 53705
  (608) 262-6966

Appendix A
Ask Apple

THIS APPENDIX PRESENTS QUESTIONS FREQUENTLY ASKED BY NEW APPLE owners and the answers to those questions. If you have other questions, ask your dealer, people at an Apple user group, or write to one of the Apple-oriented computer magazines.

Can I run all Apple II, Apple IIe, Apple IIc, and Apple IIGS software on my Apple IIc Plus?

You can run the overwhelming majority of Apple II, Apple IIe, and Apple IIc software; but you probably won't be able to run software specifically developed for the Apple IIGS. You can't use most software that requires a peripheral card. The Apple IIc Plus has no slots, so it can't run software that uses devices that must be connected through cards in slots. It also can't run software that uses early versions of DOS (3.1, 3.2).

Can I run software for other computers on my Apple IIc Plus?

The software that runs on the Apple IIc Plus uses one of Apple's operating systems: ProDOS, DOS 3.3, or Pascal. Software written for other computers doesn't use these operating systems and consequently won't work on the Apple IIc Plus. You will find, however, that most major software publishers have versions of software that run on Apple computers.

I've heard horror stories about people typing pages and pages of information and then having it disappear. How can I prevent this from happening to me?

Save! Save! Save! Every application program has a way for you to transfer information from the computer's memory to a file on a disk. Once stored on a disk, information is reasonably safe. Information stays in memory only as long as the power is on and the computer is working properly. Power surges, electrical failures, computer failures, and accidentally disconnected power cords are rare occurrences, but they do happen—usually just after you've entered half the names from your address book into a database or written a brilliant letter. By saving frequently to a disk (at least every 10 minutes), you won't lose too much information.

Saving to a disk is only half the solution. At the end of the day, always make a backup copy of each new or revised document. No matter how careful you are, disks can get damaged. The only way to guard against a damaged disk is to have a spare copy.

Can software break?

Software doesn't "break," but it may contain bugs. A **bug** is a programming error that causes unexpected or undesirable things to happen. Although software may appear "buggy," the problem may lie with the hardware or the user.

If you think your software has problems, check the manual first. If, after reading the manual, you still think the software is not working correctly, do a repeat test: Note the error and then follow the same sequence of steps to see if you can get the error to happen again. If it does, your next task is to figure out whether you have a hardware problem (something wrong with the computer itself or with a disk drive, for example). Try running other programs on your computer. If they also don't work properly, chances are that hardware is the problem.

If you try running the software on your dealer's computer and have the same problem, you've probably discovered a software bug. Once you've caught a bug, report it to your dealer. The dealer may have a patch (a corrected piece of software) or be able to help you work around the problem. If your dealer can't help, contact the software publisher directly; most have software support teams available to answer your questions.

How much do I need to know about operating systems?

Using a general utilities disk is the closest you may need to get to an operating system. However, if you plan to do serious programming, you'll need more in-depth knowledge. If you choose to program in BASIC, read *BASIC Programming With ProDOS* and the *ProDOS 8 Technical Reference Manual.* If you want to write DOS programs, you'll need the *DOS User's Kit.* (DOS is the operating system Apple used before ProDOS.) Finally, if you want to write Pascal programs, you'll need the Pascal operating system and the accompanying manual. Logo works with the ProDOS operating system, and the Logo manuals explain how to use it.

What does ProDOS do that DOS doesn't?

ProDOS allows you to use large-capacity disks, speeds up access to information stored on disks, and allows you to create subdirectories to keep related information together.

What is booting?

In computer terminology, *booting* (or *bootstrapping*) means starting your computer. When you turn on the computer's power switch, a program in ROM called the Monitor turns on the disk drive and gets special operating instructions from the disk. These instructions, which are loaded into memory, allow the computer to access other things on the disk. All this must happen before the computer is ready to work. So, figuratively, booting is the computer pulling itself up by its own bootstraps.

Is my Apple very fragile? I worry about breaking it.

Your Apple is about as fragile as a television set or stereo. You can't break your Apple by pressing the wrong keys, any more than you can break your TV set by turning to the wrong channel.

Are disks fragile?

Disks are a lot more susceptible to damage than your computer is. In fact, damaged disks are probably the most common cause for what people think is a broken computer or buggy software. With 5.25-inch disks, dust is a major offender. To guard against dust, always keep 5.25-inch disks in their envelopes and in some kind of disk storage case or box (even a shoe box). Although not as dangerous, dust is no friend to 3.5-inch disks either. However, with 3.5-inch disks, the danger comes more from introducing dust into the disk drive. Keep disks away from extreme heat, sunlight, liquids, and anything that contains a magnet, like a telephone, a speaker, or a magnetic copy stand.

When preparing labels for 5.25-inch disks, write on the label first and then stick the label on the disk. (This isn't necessary with 3.5-inch disks because they have a hard plastic case.) If you must write on a label that's already on a 5.25-inch disk, use a felt-tip pen, rather than a ball-point pen. A pencil or a ball-point pen could dent the surface of the disk. Finally, never try to erase a disk label. Eraser particles can damage either kind of disk.

Do I need an external disk drive?

No, you can use almost all software with one disk drive. A second disk drive just makes using your computer a lot easier. The time when a second drive comes in most handy is when you're making backup copies of disks. If you copy a disk using only one disk drive, you have to do a lot of swapping—that is, swapping your original and backup disks in and out of the built-in disk drive. If you have an external disk drive, you can put your original disk in one drive, your backup in the other, press a few keys, and then let your computer do the work.

You may need an external 5.25-inch drive if you use older, DOS 3.3-based software or if you exchange software with others who use 5.25-inch disks.

Is it OK to use both sides of a 5.25-inch disk?

Only if the disk is certified for double-sided use. You risk losing data when trying to use both sides of a single-sided disk. The 3.5-inch disks to be used with Apple 3.5-inch drives are double-sided; the drive is designed to read and write data on both sides of the disk.

How much electricity does my Apple IIc Plus use?

Your Apple IIc Plus system, complete with monitor, uses less electricity than a 100-watt light bulb.

Should I turn off my Apple after using it?

If you're going to be away for more than an hour or two, it's a good idea to turn off your computer, just so you don't waste electricity. If you're just taking a stretch or grabbing a drink, leave your Apple on (but save what you're working on before you get up).

Do you recommend opening up the Apple IIc Plus so I can see how it works?

Absolutely not. First of all, opening up your Apple IIc Plus voids your warranty. Second, your computer's innards aren't much more interesting than your toaster's. If you want to learn how the Apple IIc Plus works, go through "The Inside Story" section on *Your Tour of the Apple IIc Plus.* It gives you some idea of what the inside of the computer looks like and what its parts do. Apple IIe and Apple II Plus and some Apple IIGS owners need to open their computers to attach peripherals like printers and modems. The Apple IIc Plus lets you connect peripherals without opening it up.

If you're curious about what the inside of a computer looks like, ask your dealer to show you the circuit board of an Apple IIe or an Apple IIGS. Both are very similar to the insides of an Apple IIc Plus.

Do I need a power surge protector?

You may want to invest in a surge protector to be on the safe side or if you live in an area that is particularly prone to electrical storms or electrical failures. If electrical service in your area is undependable, consider buying a battery pack. Then, if the electricity goes off, you have the time and the power to save your work before quitting.

What's K and how much do I need?

To understand what a K or kilobyte is, you first need to know what a byte is. A **byte** is the space one letter or digit takes up in the computer's memory. A **kilobyte** is equal to 1024 bytes. That means that a computer with 128K, like the Apple IIc Plus, can store a little more than 131,000 characters in its memory. The more kilobytes your computer has, the more information it can store and the larger the programs it can run. 128K is enough memory for just about all home and business applications.

Do I need to touch-type to use a computer?

No. Lots of people use the hunt-and-peck method on their computers. In fact, people who are not touch-typists report greatly increased typing speeds after a few days with a computer. If you want to learn to touch-type, you can buy a touch-typing program. These programs give you typing instructions on the screen and test your progress. Some are designed as games to make learning and practice fun.

Is it bad for my eyes to look at the screen for too long?

Some people report getting headaches or eyestrain after lengthy sessions at the computer. Often, these symptoms are caused by sitting in the same position for long periods rather than from the way information is displayed. Try pausing occasionally and focusing on an object across the room. Stand up and stretch once in a while.

How do I add a memory expansion card to my Apple?

See your authorized Apple dealer. The dealer sells and installs the card for you. Once the card is installed, some programs like AppleWorks® find and use the extra memory automatically.

How can I get in touch with an Apple user group? What are the meetings like?

Ask your dealer or call (800) 538-9696, extension 500. Meetings are informal gatherings of Apple owners. At a meeting, you can expect to get questions answered, see new products, and meet people with interests similar to your own. Many groups have a small membership fee to cover club costs, like a newsletter, a public-domain software library, and refreshments.

How can I get free software?

You can get public-domain software for free or for a nominal charge when you join an Apple user group. You should bring your own blank, formatted disks for the software.

Are parts for my Apple computer easy to get?

Apple's service is oriented toward modular repair, rather than supplying parts to customers. See your authorized Apple dealer for service. Apple offers an inexpensive repair insurance called Apple*Care*®, described in Appendix B. For details, talk to your authorized Apple dealer.

Why doesn't Apple offer a one-year warranty on its computers?

The Apple 90-day warranty is the industry standard. It covers faulty materials or workmanship. Faulty electronic parts tend to fail early (sometimes within hours), rather than wearing out over months or years as mechanical parts do. To detect faulty parts, Apple "burns in" new systems before sending them to dealers. To *burn in* means to leave a computer on for a number of hours with a program running.

Does Apple offer a mail-order catalog?

No. Apple doesn't sell products directly to customers. Your dealer has up-to-date information about Apple products and will be glad to help you select the items you need. You may also want to look at some of the independently published software catalogs (available through your dealer, local library, or bookstore).

How do I clean my disk drive?

It's better not to clean your drive yourself. The jackets of floppy disks and 3.5-inch disks lubricate and clean the disks and the drive as you use them. If you have problems with your disk drive, see your authorized Apple dealer for cleaning, adjusting, or repair.

I got my Apple before I moved. Will dealers in my new area honor the warranty and help me with questions?

Any authorized Apple dealer will honor your warranty. Apple dealers are trained to answer questions about Apple products.

How did Apple get its name?

The name *Apple Computer* was chosen late one afternoon as Steve Jobs and Steve Wozniak, Apple's founders, faced the deadline for filing a Fictitious Name Statement (a business licensing procedure). After volleying names back and forth with Wozniak for hours, Jobs looked at the apple he was eating and decided that, unless he or Wozniak arrived at something better by five o'clock, they would call the company Apple. Five o'clock came and went; Apple was the new company's name.

Is there such a thing as the Apple I?

Yes. The Apple I was the first computer that Steve Jobs and Steve Wozniak created. The computer was manufactured in a garage that belonged to Steve Jobs's parents. Although advanced for its time, it was still pretty primitive—no case, no keyboard, and no disk drive. As a result, Apple I owners found themselves digging through electronics surplus stores for cases and keyboards and storing their programs and data on cassette tape. About 200 Apple I's were built. Collectors now pay between $10,000 and $15,000 for an Apple I.

Did the Apple I have a manual?

Yes. It was about eight pages long.

Who designed the Apple logo?

The Apple logo was designed by Regis McKenna, a Silicon Valley public relations firm. The original Apple logo was a design of Sir Isaac Newton under an apple tree. But Newton didn't lend himself to reproduction, so Regis McKenna was called in to create a snappier insignia.

Should I worry if I find myself talking to my Apple IIc Plus?

No. Lots of people talk to their computers, especially when they're just learning to use them. What's nice about the current crop of computers is that they can't understand what you're saying. In a decade or so, you may have to watch your language.

Appendix B
Guide to Service and Support

TO HELP YOU GET THE MOST FROM YOUR APPLE SYSTEM, APPLE COMPUTER, INC. has established a worldwide network of full-support dealers. Your local authorized dealer has a complete package of services for you. Each has an Authorized Service Center with specially trained technicians. The center is equipped with the latest diagnostic programs and an inventory of replacement parts for fast, efficient service.

If you need answers to technical questions or information about product updates, your full-support dealers can help you. Apple's Technical Support organization backs each dealer to assure prompt, reliable assistance.

Service

If your system requires service, take it to any authorized Apple dealer. If you have moved, take it to the nearest Authorized Service Center. There are more than 3000 Authorized Service Centers worldwide. For the location nearest you, in the United States call (800) 538-9696; in Canada (800) 268-7796 or (800) 268-7637.

If you live elsewhere, write

Apple Computer, Inc.
Attn: Customer Relations
20525 Mariani Avenue
Cupertino, CA 95014
(408) 973-2222

Apple Canada, Inc.
7495 Birchmount Road
Markham, Ontario
L3R 5G2

During the initial warranty period, your dealer will repair or replace, at no charge, any Apple-manufactured product that proves to be defective. Apple also offers Apple*Care* Carry-In Service, which will keep this same protection in force for an additional year. This coverage is available through your full-support dealer. (See "Apple*Care*" in this appendix for information.)

Support

If you have a problem, check your manual first. If you still have questions, call on your dealer for assistance. Apple training and technical support stand behind each dealer. Apple Technical Support provides your dealer with Technical Notes, which answer commonly asked questions, and with access to technical support specialists.

Your dealer has the latest information on new hardware and software products and will keep you informed about any product updates. If you want to upgrade your system, your dealer can help you select compatible components. For service and support, look to your authorized Apple dealer.

Apple*Care*

A 90-day warranty on parts and labor protects you from any unexpected service costs. You can add one full year to this protection with Apple's fixed-cost, carry-in service plan—Apple*Care*. It combines convenient service with fast turnaround.

Apple*Care* Carry-In Service is the lowest-priced service package in the industry. And your Apple*Care* agreement will be honored at all Apple Authorized Service Centers within the country of purchase—added insurance should you relocate. Local service means time saved in getting your Apple back to work.

Ask your Apple dealer for details. You may purchase Apple*Care* at any time. But for uninterrupted protection, buy it along with your system. Purchase with your system means you don't have to pay for the dealer inspection of your system that becomes necessary after the 90-day warranty has expired.

Apple*Care* is available through all authorized Apple dealers.

Appendix C
Troubleshooting

THE CARDINAL TROUBLESHOOTING RULE IS *DON'T PANIC.* INSTEAD, OBSERVE AND analyze. You might begin with "General Troubleshooting Tips." If you get a specific message (like `DISK TOO FAST`) or have a specific problem (the monitor is blank, a drive doesn't respond), see "Finding and Solving a Problem."

General troubleshooting tips

Following these general troubleshooting tips can solve a variety of problems:

- If you have trouble with the timing of an application—if messages appear and disappear before you have time to read them—the problem is probably caused by the special accelerator in the Apple IIc Plus. Try restarting by holding down the Esc key and pressing Command-Control-Reset. Release the Reset key, then release the Esc key when you see the word *Normal* on the screen; then release the other keys. If you don't see the word *Normal,* try again. If the application works correctly, you've found the problem. To turn the accelerator back on for other applications, just restart the computer without pressing the Esc key.
- If the problem occurs when you type something, check your typing. The computer is very literal. If you type `RYN` instead of `RUN`, it will respond with an error message, as it will if you type the letter `l` instead of the number `1`, or the letter `O` instead of the number `0`.
- Press Caps Lock down. (Applications designed for earlier models of the Apple II accept entries only in uppercase.)
- Check the application manual's error message section.
- Check the application manual to see if you did the problem procedure correctly.
- Get help from someone familiar with the application.
- Get help from your authorized Apple dealer. Dealers are usually knowledgeable about most problems, although they may not know every feature of every application.
- Call the help hotline. Many software companies answer questions over the phone for registered users.

Finding and solving a problem

If general troubleshooting doesn't help, here's a list of specific symptoms, probable causes, and suggestions for recovering from a variety of problems. Problems are grouped by activity—what you were doing when the problem occurred.

- problems starting the computer
- problems switching between applications
- problems quitting an application
- problems with a display device
- problems with a disk drive
- problems saving data on a disk
- problems with a printer
- problems with a modem
- two common error messages
- problems understanding an error message

Find the heading that describes the general nature of your problem; then locate the specific description of your problem followed by suggested solutions. If none of the solutions works and you've checked the appropriate manuals, see your authorized Apple dealer.

Problems starting the computer

- **The power light doesn't come on when you start the computer.**

Turn the power off. Then check your power cord connections. Is the cord plugged into the computer and into an outlet? If you're using a power strip, is it plugged in and turned on?

- **The computer stalls.**

Sometimes if you switch the power off and back on without pausing a few seconds, you can cause the computer to stall. This is actually a protection feature in the Apple power supply, protecting the circuitry from voltage overloads. If this happens, turn the computer off and wait at least one minute before turning it back on. If everything looks OK, see if the power outlet to which you've connected the computer is connected to an on/off switch. If it is, make sure the switch is on.

Problems switching between applications

- **You see gibberish on the screen when you switch applications by turning the power off and then on again.**

The first application wasn't entirely erased from memory before the next application was loaded. Wait a full minute before restarting your computer. Better yet, switch from one application to another by pressing Command-Control-Reset. Be sure to release Reset before you release the other two keys.

Command is the key with the Apple symbol on it.

Problems quitting an application

Most applications give you an easy way out. If your application doesn't have a Quit option on the menu, try these escape methods (until you find one that works):

- Press Q for *Quit*.
- Press Esc.
- Press Control-C.
- Press Control-C; then press Return.
- Press Control-Reset.
- Press Command-Control-Reset.
- Eject any disks and turn off the power.

Problems with a display device

- **Nothing appears on the screen when you turn on the power.**

When you see a blank screen even after the disk in-use light comes on and you hear the disk drive working, check these four things:

- Is the monitor turned on?
- Is the monitor electrical cord plugged in?
- Is the monitor cable plugged into the computer and into the monitor?
- Are the contrast and brightness properly adjusted?

If you're working with a TV set, is the RF modulator properly installed? Is its switch properly set? Is the TV in working order?

If your TV set has a built-in video jack, check the switch on the back of the TV. Is it set to "TV" or to "Video"?

- **The screen image is too bright or too dim.**

The monitor's contrast or brightness isn't set properly. Adjust the contrast or brightness knob until the display is easy to read. (See the monitor manual to locate the controls.)

- **Unusual characters are intermingled with regular text.**

The presence of non-keyboard characters (little arrows, check marks, and odd symbols) indicate that the application program you're using was designed for earlier models of the Apple II and is using a character set now reserved for **MouseText** characters. MouseText characters replaced a redundant set of characters in earlier models of the Apple II. Older applications using the redundant character set will display MouseText characters in place of uppercase, inverse text.

Ask your dealer if you can exchange your application for an upgraded version.

- **You're using a television set, and the characters are small and blurry.**

The program you're using is designed for an 80-column display. TV sets can display only 40 columns clearly. If the program gives you a choice when you first start up, select the 40-column display. If it doesn't, use a monitor (if available).

Problems with disk drives—in general

- **You see the message THIS IS A DATA DISK, NOT A STARTUP DISK.**

The disk in the drive does not have an operating system on it. Remove the disk, insert a startup disk, and repeat the startup procedure.

- **You see the message DRIVE TOO FAST.**

Your disk drive speed is too fast. Take the drive to your authorized Apple dealer and have the speed of your disk drive adjusted.

- **You see the message DRIVE TOO SLOW.**

Your disk drive speed is too slow. Take the drive to your authorized Apple dealer and have the speed of your disk drive adjusted.

Problems with 3.5-inch disk drives

- **The computer's power light comes on, but the built-in drive doesn't activate.**

The drive may need alignment or adjustment. If you have more than one drive, see if you can start from the other drive. If you can't, you may have a problem with the computer or the program. Ask your authorized Apple dealer to check the program, drive, or computer, as necessary.

- **The built-in drive whirs briefly, but the program doesn't start.**

Try a different startup disk. If it works, the problem probably lies with the first disk. It may not have an operating system on it, or it may be defective. See the dealer who sold you the program or contact the program's publisher. If different disks don't work, see your authorized Apple dealer for service. You may need to have the built-in drive aligned or replaced.

Problems with 5.25-inch disk drives

- **A 5.25-inch disk used as a startup disk spins without starting a program.**

First stop the disk drive by pressing Control-Reset.

Three things can cause this problem:

- a damaged program disk
- a damaged or unformatted disk
- a misaligned disk or drive

Try this simple procedure to recenter a 5.25-inch disk:

1. Remove the disk from the drive.
2. Adjust the disk's spindle hole so that its perimeter is centered in relation to the hole cut in the disk's jacket.
3. Very gently reinsert the disk in the drive.
4. Close the drive door and restart the computer; press Command-Control-Reset, releasing the Reset key first.

If two or three attempts at aligning the disk don't work, contact your dealer for help or a replacement. If the problem occurs with a program disk, contact either the dealer who sold you the program or the publisher of the program. See "Verify That a Disk is Readable" and "Format a Disk" in the system disk guide.

- **The disk drive won't stop whirring.**

There's no disk in the drive, or the disk in the drive isn't formatted. Press Control-Reset to stop the disk drive. If the problem is with your startup drive, put a program disk in the drive and start again. Use the system disk to catalog the disk that wouldn't respond. Is it formatted?

- **A 5.25-inch disk is not handling information properly.**

Symptoms include the disk not recording (saving) information, not loading previously saved information, not cataloging a data disk, or messages telling you the computer can't save or retrieve data.

You may not be positioning the disk properly in the disk drive. When you insert a disk into the drive, be sure that you feel and hear it click into place. Close the door completely.

If a 5.25-inch disk causes the problem, try the simple procedure in "A 5.25-inch disk used as a startup disk spins without starting a program" earlier in this section. Also see "Verify That a Disk is Readable" in the system disk guide.

- **The program won't start. All you see is a bracket (]) prompt and a blinking rectangular cursor.**

The prompt and the cursor mean you're in the Applesoft environment, ready to program. The reason is that the program on the disk isn't self-starting. (You're most apt to run into this situation with programs written by friends or those acquired from a user group.)

Type `CATALOG` and press Return.

This should produce a list (catalog) of the files on the disk. You can run any of the programs with the letter `A` in front of them by typing `RUN` and the name of the program (usually in capital letters) and then pressing Return. For example, type `RUN BREAKOUT` and press Return to run a program titled "Breakout."

You can run some of the programs with the letter `B` in front of them by typing `BRUN` and the name of the program and then pressing Return. For example, type `BRUN BOOT13` and press Return to run the program BOOT13. The letters A (Applesoft) and B (Binary) refer to the program's file type. Other types are T (Text) and I (Integer BASIC).

- **Your 5.25-inch disk drive makes an even whirring sound, but nothing happens.**

The disk is probably formatted by an early version of DOS (DOS 3.2 or earlier). To start from such a disk, you need a program on the *DOS 3.3 System Master* disk called START13, which enables you to load DOS 3.2 programs. If you didn't get a *DOS 3.3 System Master* disk with your disk drive, get a copy from your dealer or a friend and then follow these directions for loading DOS 3.2 programs:

- *BASICS disk:* DOS 3.2 programs may tell you to "boot the BASICS disk," as a way to load DOS 3.2 programs. The BASICS disk is no longer supplied with DOS because the START13 program is easier to use.

1. Start up your *DOS 3.3 System Master* disk.
2. Type `RUN START13` and press Return. You'll see this message:

```
13-SECTOR BOOT UTILITY
SLOT TO BOOT FROM (DEFAULT=6)?
```

3. Remove the *DOS 3.3 System Master* disk, put the DOS 3.2 disk in your first 5.25-inch drive, and press Return.

When you press Return, your program will load and run.

Problems saving data

■ You see the message DISK WRITE-PROTECTED.

The program needs to write something on a 3.5-inch disk, but it can't because you've moved the write-protect tab to uncover the rectangular hole in the upper-right corner of the disk. Or, on a 5.25-inch disk, you've covered the write-enable notch with a write-protect tab, or the disk was write-protected by the manufacturer to keep you from altering it.

If the disk is write-protected, try to remember why you chose to protect this information. To be on the safe side, you might remove the write-protected disk and insert another formatted disk on which to save the data.

■ You see the message DUPLICATE FILENAME.

A file with the name you gave already exists within the current directory. Give the file a different name and repeat the save procedure. Within a given directory, each file must have a unique filename.

■ You see the message DISK FULL.

Your disk doesn't have enough room to store all of the current file. Check the application manual to see if you can insert a different disk and save the file on the new disk. If you don't have any formatted disks handy, can you format a disk from within the program?

❖ *Pascal users:* You can compact files on your disk and make more room by issuing the Filer's Krunch command. Krunch your data disks regularly to keep maximum storage space available.

Problems with a printer

- **You give the print command in an application and nothing happens.**

Make sure your printer is connected to your computer, that it's plugged into a power source, and that it's turned on.

If the application asks for your printer's slot number, answer *slot 1*.

- **Your printout shows line-spacing problems.**

How many spaces appear between lines in a printout depends on how many line feeds you request after every carriage return. No line feeds causes every line to be printed on the same line; one line feed yields a single-spaced document; and two, a double-spaced document. If you have a spacing problem, you need to change the number of line feeds accordingly.

You can turn line feeds on or off in one of three ways:

- with a switch on the printer itself
- with the line feed option within the application program you're using
- with the system disk to change the port configuration

See the printer manual, the application manual, or the system disk guide for details on sending line feeds after carriage returns.

See your printer manual for solutions to other printing problems.

Problems with a modem

As you're troubleshooting your modem, keep in mind that working with modems and communications software can be very complex. Don't be surprised if it takes a certain amount of trial and error (and phone calls to more experienced friends) to make contact with another computer for the first time. Follow the instructions that came with your communications software and answer *slot 2* if the application asks for the slot number of your serial interface card.

- **Meaningless characters appear on the screen.**

Your modem is sending or receiving information at a different speed or in a different format from that of the modem on the other end of the phone line. To solve the problem, make sure your communications software and the other computer have the same

- **baud** settings
- number of **data bits**
- number of **stop bits**
- number of **parity bits**

Check your communications software manual for details on how to change settings. If you're using an information service, the manual should specify these settings.

Two common error messages

- **You see the message SYNTAX ERROR.**

Some programs require that all your entries be in uppercase letters. Did you type in lowercase? Perhaps the program doesn't recognize the command or instruction you typed. Did you misspell a command or an instruction?

To put everything in capital letters, press Caps Lock down and type your entry again. Check your typing. If you made a mistake, retype the command. If that doesn't do it, check the manual. Does the command exist? Do you have its syntax (the form of the command) correct?

- **You see the message I/O ERROR.**

This can happen with all peripheral devices, not just external disk drives. Check to make sure the device involved is securely connected to the computer. Also check the section on error messages in the device manual.

An I/O Error message means there is a problem with the exchange of information between the computer and one of its peripheral devices. You can usually guess what the problem is, based on what you were trying to do when the message appeared. If you're trying to print something, the problem is probably the connection between the computer and the printer. If you're trying to load something from or save something to a disk, the problem is with the disk drive.

If an external disk drive is the problem, consider these possibilities:

- Did you put an unformatted disk in the disk drive?
- Did you put the wrong disk in the drive?
- If you're using a 5.25-inch disk, is the disk centered within its jacket?
- Could the disk be damaged? See "Verify That a Disk Is Readable" in the system disk guide.

If none of these solutions fixes the problem, see your authorized Apple dealer. The device may need adjustment or repair.

Problems understanding an error message

Although it's not always easy to tell which entity generated the message, you might consider these rules of thumb before searching through several manuals:

- If the message deals with a device (I/O ERROR), the operating system requires your attention. Also check the device in question. Is it connected? Is it on-line? Have you given it the proper software settings?
- If the message relates to an application activity (for example, FIELD TYPE INCOMPATIBLE in a data base), you've violated an application rule.
- If you're not programming and you get a message like GOSUB WITHOUT RETURN, you've uncovered a program bug. If you're programming, dig out the reference manual.

Appendix D
Specifications of the Apple IIc Plus

THIS SECTION PROVIDES HARDWARE AND SOFTWARE SPECIFICATIONS AND operating parameters for the Apple IIc Plus.

Processor

65C02 eight-bit internal architecture, 4 MHz clock frequency.

Memory

128K bytes of RAM; 32K bytes of ROM (includes Applesoft BASIC, disassembler, and machine-language Monitor program).

Storage

Built-in 3.5-inch disk drive, with controllers for three additional drives (no more than two of the three can be 5.25-inch drives).

Display

80-column display with built-in uppercase and lowercase characters, plus MouseText characters and color graphics capability.

Sound

Built-in speaker with volume control.

Keyboard

63 keys (includes arrow keys) plus Dvorak option.

Programming languages available

BASIC, Pascal, Logo, 65C02 machine language, Fortran, FORTH, C, LISP, Modula-2.

Interfaces

Display interface: composite video output (NTSC) and RF modulator.

External disk drive (slot 5, 2, and slot 6 equivalent in Apple IIe).

Serial printer interface (slot 1 equivalent in Apple IIe).

Serial modem interface (slot 2 equivalent in Apple IIe).

Joystick/mouse/hand-control port.

Internal memory expansion connector (slot 4 equivalent in Apple IIe).

Input

Line voltage: 95 to 135 volts AC, RMS.

Frequency: 60 Hz.

Power: 10 watts continuous, 15 watts intermittent.

Environment

Operating temperature: 50°F to 104°F (10°C to 40°C).

Storing temperature: –40°F to 116°F (–40°C to 47°C).

Relative humidity (operating): 10% to 95% (non-condensing).

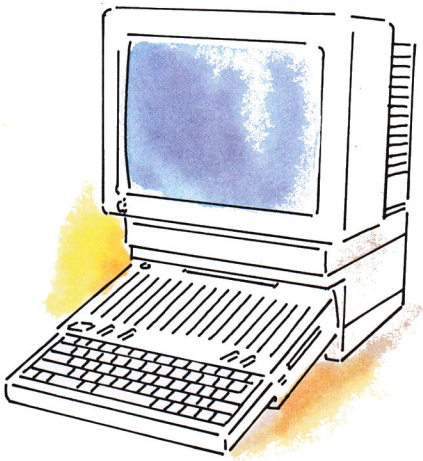
Altitude: Up to 10,000 feet (3048 meters).

For technical information, see the *Apple IIc Plus Technical Reference* manual.

Appendix E
Apple II Family Differences

THERE ARE THOUSANDS OF PROGRAMS FOR THE APPLE II FAMILY OF COMPUTERS. You can run most of them on your Apple IIc Plus if you take into account the differences between the Apple IIc Plus and the rest of the Apple II family. The first section summarizes the differences. The rest of the appendix gives you work-arounds for these differences. If you can't get an older application to work on your Apple IIc Plus, contact your dealer or the publisher of the software to see if an upgraded version of the software is available. The following chart summarizes Apple II family differences that could affect the way software works.

Apple IIc Plus



Display Columns: 40 or 80 (depending on software). Resolution: low (16 colors, 40 by 48); high (6 colors, 280 by 192); double high (16 colors, 560 by 192).

Keyboard Uppercase and lowercase. Switch on case can be set to Dvorak or standard keyboard layout.

Memory 128K.

Microprocessor 4 MHz 65C02; its instruction set is a superset of the 6502's with 27 additional instructions.

Peripheral devices 3.5-inch drive built-in. Ports for serial printer, modem, monochrome or color monitor, 3.5-inch and 5.25-inch drives, mouse, joystick, or hand controls. No slots.

Accelerator Runs applications up to four times faster than previous 65C02 computers.

Apple IIc

Display Columns: Switch on case can be set to 40 or 80. Resolution: low (16 colors, 40 by 48); high (6 colors, 280 by 192); double high (16 colors, 560 by 192).

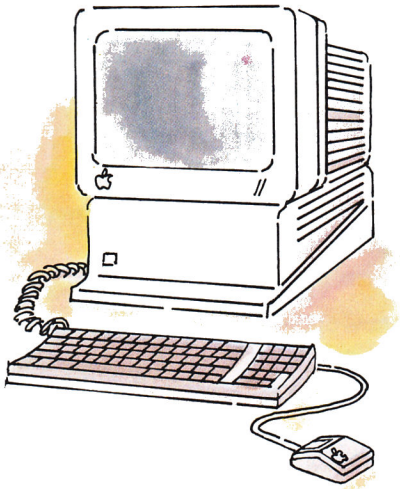
Keyboard Uppercase and lowercase. Switch on case can be set to Dvorak or standard keyboard layout.

Memory 128K.

Microprocessor 65C02; its instruction set is a superset of the 6502's with 27 additional instructions.

Peripheral devices Ports for serial printer, modem, monochrome or color monitor, 3.5-inch or 5.25-inch drive, mouse, joystick, or hand controls. No slots.

Apple IIGS



Display Columns: 80 or 40, selectable with Control Panel Program. Resolution: low (16 colors, 40 by 48); high (6 colors, 280 by 192); double high (16 colors, 560 by 192); super high (4 colors, 640 by 200; 16 colors, 320 by 200).

Keyboard Uppercase and lowercase. Detached keyboard with numeric keypad. Option replaces but generates same code. Choice among standard, Dvorak, and eight international keyboard layouts with Control Panel Program.

Memory 256K standard—128K for Apple II emulation, 128K for enhancements. Applications in 65C816 mode (that is, not emulating Apple II) can use most of the 256K. Memory expansion card can add from 1 to 8 megabytes in increments of 256K.

Microprocessor 65C816; can emulate 65C02.

Peripheral devices 8 slots: 7 general-purpose, 1 for memory expansion card. Ports for serial printer, modem, monochrome and analog RGB color monitors, 3.5-inch and 5.25-inch drives, mouse, joystick, hand controls, and AppleTalk.

Apple IIe

Display Columns: 40; expandable with 80-column card in AUX.CONNECTOR slot. Resolution: low (16 colors, 40 by 48); high (6 colors, 280 by 192); double high (16 colors, 560 by 192).

Keyboard Uppercase and lowercase. Numeric keypad.

Memory 64K; expandable to 128K with extended 80-column card in AUX.CONNECTOR slot.

Microprocessor 65C02 on enhanced and current Apple IIe; its instruction set is a superset of the 6502's with 27 additional instructions.

Peripheral devices 8 slots: 7 general-purpose, 1 for 80-column auxiliary memory card.

Keyboard

The Apple IIc Plus keyboard is slightly different from the keyboard on earlier types of Apple II computers. You can run software designed for these other types of computers if you keep these differences in mind:

- Programs designed for the Apple II Plus don't recognize lowercase characters. Press Caps Lock and the programs should run.
- The Apple II Plus didn't have Delete, so programs designed for it won't respond when you press Delete. Check the program manual for instructions on how to delete characters.
- The Apple II Plus didn't have Up Arrow or Down Arrow, so programs designed for it won't move the cursor up or down when you press these keys. Check the program manual for instructions on how to move the cursor up and down.

Slots, ports, and built-in devices

The Apple IIc Plus has a built-in 3.5-inch disk drive and ports for connecting peripheral devices. The Apple IIc has a built-in 5.25-inch disk drive and ports. Other models of the Apple II have no built-in drives and have slots for connecting peripheral devices. You can run most software designed for these other models of the Apple II as long as you keep these differences in mind:

- If the application asks for the location of a disk or document by slot and drive number, answer *slot 5, drive 1* for the built-in drive; *slot 5, drive 2* for the first external 3.5-inch drive; *slot 2, drive 1* for the second external 3.5-inch drive; *slot 2, drive 2* for the third external 3.5-inch drive; *slot 6, drive 1* for the first 5.25-inch drive; *slot 6, drive 2* for the second 5.25-inch drive; and *slot 4, drive 1* for a memory expansion card used as a RAM disk.
- If the application asks which slot your printer card is in, answer *slot 1*. If an application asks which slot your modem card is in, answer *slot 2*.
- Software references to *built-in drive*, may not refer to the 3.5-inch drive built into your Apple IIc Plus. They might refer to the 5.25-inch drive built into the Apple IIc. Identify the disk in your built-in drive by slot and drive number (5, 1) or by ProDOS pathname, not as the disk in the built-in drive.

Display

Applications designed for earlier models of the Apple II won't take advantage of special characters available on the Apple IIc Plus. But you may notice little apples and check marks in place of uppercase **inverse** characters in older applications.

These odd characters appear because the original **character-generator ROM** (the ROM that generates screen characters) had two identical sets of uppercase inverse characters, one of which was unnecessary. In the new character-generator ROM, the redundant set of uppercase inverse characters has been replaced with **MouseText** characters, the symbols shown in Figure E-1. Older Apple II applications that used the redundant set of uppercase inverse characters now display MouseText characters in their place.

MouseText characters replaced a redundant set of characters in earlier models of the Apple II. Older applications using that redundant character set will now display MouseText characters in place of uppercase, inverse text.

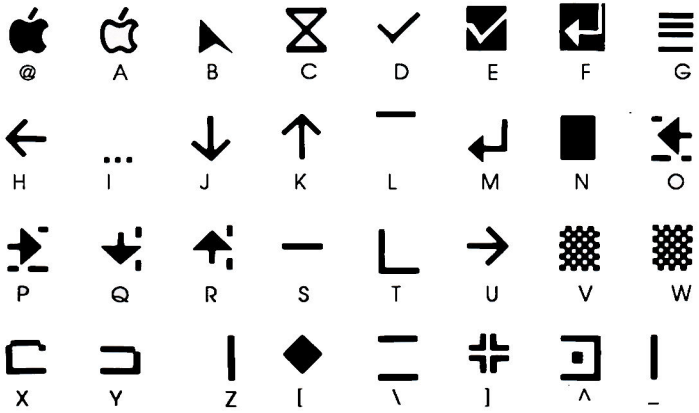


Figure E-1
MouseText characters

Glossary

accelerator: Circuitry that allows the Apple IIc Plus to run applications up to four times faster than other 65C02 computers.

access: To get information from something—like a disk or an information service.

accounting software: A type of application that lets you keep track of accounts payable, accounts receivable, inventory, and so on.

activate: To make a nonactive window active by clicking anywhere inside it.

active window: The frontmost window on the screen; the window where the next action will take place. The active window's title bar is highlighted.

adventure game: A type of game that places you in a fantastical situation and challenges you to reason your way out of simulated trouble into simulated wealth or happiness.

American Simplified Keyboard: See **Dvorak keyboard.**

Apple*Care:* Apple's fixed-cost, extended carry-in service plan.

Apple key: See **Command key.**

Apple I: The prototype for the Apple II family of computers; designed by Apple Computer co-founder Steve Wozniak.

Apple II: A family of computers, including the Apple IIc Plus, IIGS, IIe, IIc, and II Plus.

Applesoft BASIC: The Apple II "dialect" of the BASIC programming language; it's built into your Apple IIc Plus. See also **BASIC.**

application: Software designed for a particular purpose, such as home finance, education, or word processing.

arrow keys: The keys in the lower-right corner of the Apple IIc Plus keyboard that you can press (in most applications) to move the cursor in the direction indicated.

art application: An application for drawing.

ASCII: Acronym for *American Standard Code for Information Interchange;* pronounced *ASK-ee.* A communications code that defines the representation of letters, numbers, and punctuation marks.

assembly language: A programming language very close to the language of electrical impulses that is the Apple IIc Plus's native tongue. Because assembly-language programs require very little translation, they can be very fast.

auto-repeat: To repeat automatically. The keys on the Apple IIc Plus keyboard are auto-repeat keys: if you hold one down, the computer will keep generating that character automatically.

backspace: To move the cursor to the left.

backup copy: A duplicate of a disk. Making a backup copy of a disk is like making a photocopy of a paper document.

BASIC: Acronym for *Beginners All-purpose Symbolic Instruction Code.* The most popular language for personal computers; a version of it is built into your Apple IIc Plus.

baud: A unit of data transmission speed; also called *baud rate.*

BBS: See **bulletin board system.**

binary numbering system: A system in which every number is expressed as a combination of zeros and ones. It's perfectly suited to computers because the computer's microprocessor is made up of switches—like light switches—that can be either on or off. *On* can be represented as the number 1; *off* as 0.

bit: Contraction of the words *binary* and *digit.* The smallest item of useful information a computer can handle, represented as a 1 or a 0. Eight bits equal one **byte.**

bits per second: Abbreviated **bps.** The number of bits per second that are transferred between two computers. See **baud.**

boot: See **start up.**

bps: See **bits per second.**

bug: An error in an application or a problem with hardware. The expression comes from the early days of computing when a moth flew into a room-size computer and caused a breakdown.

bulletin board system: Abbreviated **BBS.** A computerized version of the bulletin boards frequently found in grocery stores—places to leave messages and to advertise things you want to buy or sell. One thing you get from a computerized bulletin board that you can't get from a cork board is free software. See **public-domain software.**

business graphics application: An application that lets you analyze numerical information in a visual way.

button: The raised area on top of the mouse. You press it when you want to choose from a menu or perform other activities in mouse-based applications. Also, in mouse-based applications, a rectangle with rounded corners and a word inside that you click to designate, confirm, or cancel an action.

byte: A sequence of eight bits that represents an instruction, a letter, a number, or a punctuation mark.

C: A programming language that makes it relatively easy for programmers to adapt applications designed for one type of computer for use on others.

CAI: See **computer-aided instruction.**

Caps Lock: A key that you can lock into place so that subsequent letters you type will come out capitalized. Caps Lock doesn't affect nonalphabet keys.

carriage return: Abbreviated **CR.** A nonprinting character that tells the computer or printer to end a line of text and start a new one. It's used to end paragraphs. Even though you can't see them, you can delete carriage returns the same way you delete other characters.

case: The outer covering of the computer.

catalog: See **directory.**

cell: The intersection of a row and a column in a spreadsheet. A cell can hold a number, label, function, or formula.

character: A letter, number, or other symbol.

character generator: The integrated circuit responsible for printing characters on the screen.

character set: The letters, numbers, and symbols that can be generated by pressing keys on a keyboard.

chip: A small silicon wafer containing thousands of microscopic components. See also **integrated circuit.**

choose: To pick a command from a menu. Usually you do this after selecting something for the Apple IIc Plus to act on.

circuit board: See **main circuit board.**

circuitry: A network of wires, chips, resistors, and other electronic devices and connections.

click: To position the pointer on something, then to press and quickly release the mouse button.

character-generator ROM: The ROM that generates screen characters.

clip art application: Electronic pictures that you can clip from one disk or document into another. You can buy disks of clip art and use these professional-quality drawings to illustrate your documents.

close box: The small box on the left side in the title bar of an active window. Clicking a close box closes the window.

column: A way of designating the number of characters that fit on the computer's display. A column is one character wide.

command: A word or character that causes the computer to do something.

Command key: The key that has the Apple symbol on it. You use it to modify the way other keys work in an application. Also called *Open-Apple* or *Apple key.*

communications software: An application that makes it possible to exchange information with other computers over phone lines.

compatibility: The condition under which devices can work with each other.

composite: A video signal that includes both display information and the synchronization (and other) signals needed to display it. There is a monitor port on the Apple IIc Plus for an NTSC composite monitor (one that accepts signals that conform to the standards set by the National Television Standards Committee).

computer: A machine that processes words and numbers faster than a food processor can slice potatoes. Not particularly creative or intuitive, but very good at repetitive tasks.

computer-aided instruction: Abbreviated **CAI.** Learning math, history, home economics, or almost anything else with the help of a computer application.

computer system: A collective term for the Apple IIc Plus and everything attached to it.

configuration: A general-purpose computer term that can refer to the way you have your computer set up (that is, the devices you have attached to it) or to the way you have your computer set up to send information to a printer, a modem, or some other peripheral device.

connect time: The amount of time you spend connected to an information service.

construction set: An application that lets you design and build things like games and machines.

contrast knob: A control on your video display that lets you adjust the contrast between the light and dark on the screen.

Control: A key on the Apple IIc Plus keyboard that, when pressed in conjunction with another key, makes the other key behave differently. It controls the operation of other keys. Compare **Command key.**

copy-protect: To prevent someone from duplicating the contents of a disk. Compare **write-protect.**

courseware: Educational software.

CR: See **carriage return.**

cursor: A blinking underline, rectangle, or other symbol that marks your place on the screen. It shows you where your next action will take place. Sometimes called an *insertion point.* Compare **pointer.**

cut: To remove text or pictures from a document by using the Cut command.

cut and paste: To move something from one place in a document to another. It's the computer equivalent of using scissors to clip something and glue to paste the clipping somewhere else.

daisy-wheel printer: A printer that produces professional quality correspondence comparable to a high-quality typewriter.

data: Information, especially raw or unprocessed information.

database application: A type of application that helps you keep track of lists of information. It makes it easy to recall, update, and cross-reference information.

data bits: The form in which the computer sends and receives information—as a string of bits.

data disk: A disk that contains your work—letters, budgets, pictures, and so on.

debug: To find and fix software problems.

default: A preset response to a question in an application. The response is used by default unless you supply an alternative.

Delete: A key that you can press (in some applications) to erase the character to the left of the cursor.

device: See **peripheral device.**

directory: A list of all the files on a disk. Sometimes called a *catalog*. See also **subdirectory.**

disk: A circular plastic object coated with iron oxide. You can buy applications prerecorded on disks, and you save your work on blank disks. Disks come in different sizes for use with different types of disk drives. See **5.25-inch disk** and **3.5-inch disk.**

disk drive: A device that loads information from a disk into the memory of the computer and saves information from the memory of the computer onto a disk.

disk drive light: A light that comes on when your disk drive is loading from or storing on a disk. Sometimes called an *in-use light.* When the light is off, it's safe to put disks in or take disks out. When the light is on, don't remove the disk inside.

disk operating system: See **operating system.**

display: A general term to describe what you see on your screen when you're using a computer.

document: Information you create with a computer program. It could be a memo, a picture, a budget. Also called a *file.*

DOS 3.2: An early Apple II operating system; 3.2 is the version number. DOS stands for *Disk Operating System.*

DOS 3.3: One of three operating systems used by the Apple IIc Plus; 3.3 is the version number.

DOS 3.3 System Master: A disk that used to be packed with 5.25-inch disk drives. It performed some of the functions now handled by the *Apple II System Disk.* It has programs for initializing disks, for copying DOS 3.3-based applications and documents, and more.

dot-matrix printer: A type of printer that forms characters with patterns of dots.

double-click: To position the pointer where you want an action to take place, and then press and release the mouse button twice in quick succession without moving the mouse.

double high resolution: A graphics mode that can display information using a rectangular array of 560 horizontal by 192 vertical dots for black and white and 140 horizontal by 192 vertical dots for 16 colors.

Down Arrow: A key that you can press (in some applications) to make the cursor move down one line.

download: To send a file from one computer to another.

drag: To position the pointer on something, press and hold the mouse button, move the mouse, and release the mouse button. When you release the mouse button, you either highlight a selection or move an object to a new location.

drill-and-practice application: A type of educational application that presents information, tests your retention of the material, and gives feedback based on your answers.

drive: See **disk drive.**

drive number: An application might ask you to distinguish between disk drives by number. Drive 1 is the built-in drive or the drive of its type connected closest to the computer. Drive 2 is the drive of its type connected to drive 1.

drive 1: The disk drive where you put the application program disk you want to start up.

drive 2: See **drive number.**

Dvorak keyboard: A keyboard layout designed to increase typing speed and efficiency by locating the keys used most often in the home row. Also called the *American Simplified Keyboard.*

Edit menu: A menu in most mouse-based programs that lists editing commands—like Copy, Cut, and Paste.

educational software: Software that teaches something. Also called *courseware.* See also **computer-aided instruction.**

8-bit processor: A processor that can address 65,536 memory locations directly.

80-column card: An interface card that made it possible for earlier models of the Apple II to display text in 80-column form instead of the standard 40-column form.

80-column display: The screen display format that can fit 80 characters in one line. The other option is 40 columns.

eject: To remove a disk from a disk drive.

electronic mail: Abbreviated **E-mail.** A message sent from one computer with a modem to another computer with a modem over phone lines.

E-mail: See **electronic mail.**

error message: The computer's way of alerting you to a failure in the communication process; often accompanied by a beep.

Esc: A key you can press (in some applications) to get back to the menu or to cancel a procedure that's in progress. Also used to change the processing speed.

extended 80-column card: An interface card used in other models of the Apple II that adds 64K of memory and makes it possible for the computer to display information in 80-column format instead of the standard 40-column format.

field: A word you'll run across in database applications and ads for database applications. It refers to a category of information. If your database is an address book, *name* and *address* will be two of the fields.

file: A collection of information that you store on a disk. Also called a *document.*

file management: A general term for copying files, deleting files, and for other housekeeping chores involving the contents of disks.

File menu: A menu in mouse-based applications that lists commands that affect whole documents—commands like Save, Print, and Quit.

filename: The name you give your file (document) before you save it on a disk.

firmware: Another name for the programs in ROM (read-only memory). It's more permanent than the software in RAM (random-access memory)—thus the name.

5.25-inch disk: A disk 5.25 inches in diameter. For many years, the only type of disk you could use with Apple II computers. It can store 143K of information (about 70 pages of text). Compare **3.5-inch disk.**

font: Style of characters (Helvetica, Geneva, and so on).

footer: Text that appears at the bottom of every page or every other page in a document. Compare **header.**

format: To divide a disk into sections where information can be stored. Disks must be formatted before you can save information on them. Also called *initialize.*

form feed: The way perforated printer paper is pulled into position for printing. Compare **friction feed.**

formula: An equation. By writing formulas to define relationships between the various numbers in your spreadsheet, you can try out different numbers, and the formulas will recalculate all the totals for you.

FORTH: A programming language.

Fortran: A programming language.

40-column display: The screen display format that can fit 40 characters in one line. The other option is 80 columns.

free-form database: A database that lets you enter information in paragraph form (instead of by categories) and designate key words that you can search for later.

friction feed: The way a printer moves individual sheets of paper into position for printing. It's the same way typewriters move paper into position. Compare **form feed.**

function: A built-in formula in a spreadsheet you can use to calculate an average, a square root, and the like.

garbage: A string of meaningless characters that bears no resemblance to your document. It's an indication that your computer and peripheral device are using different bauds or data formats.

graphics: Information presented in the form of pictures or images.

graphics mode: A way of displaying text and graphics on the screen. In graphics mode, images are formed by patterns of dots.

hand controls: Peripheral devices used mainly in games to move creatures and objects. Also used in simulation applications.

hardware: Those parts of the computer that you can see and touch. The computer and the machines that attach to it: the disk drive, printer, and other peripheral devices. Compare **software.**

header: Text that appears at the top of every page or every other page of a document. Compare **footer.**

highlight: To select something on the screen to distinguish it from other choices.

high resolution: A graphics mode that can display information using a rectangular array of 280 horizontal by 192 vertical dots.

home computer: A computer, like the Apple IIc Plus, that is small enough and affordable enough to have in your house. (When you take a "home computer" to the office, it becomes a "productivity tool.")

home control device: A device that can regulate the temperature of your home, turn lamps on and off, or monitor smoke detectors and burglar alarms.

home finance application: An application that helps with budgeting, portfolio management, tax planning, and so on. Like a spreadsheet, but easier to use.

home row: The row of keys on the keyboard where the fingers of touch-typists rest when they aren't reaching for other keys. In the standard keyboard layout, the home row contains A, S, D, F, G, and so on. In the Dvorak keyboard layout, the home row contains what August Dvorak determined were the most frequently used keys (A, O, E, U, I, and so on).

icon: A symbol like the one on the back panel of the computer that shows you where to plug in the monitor, or a symbol on the screen in mouse-based applications that represents a disk, a document, or something else you can select.

information service: A large database that you can subscribe to for news, stock quotes, and other services.

initialize: See **format.**

input: Information traveling into the computer (like keypresses and mouse moves).

input/output: Abbreviated *I/O*. Refers to the means by which information is sent between the computer and its peripheral devices.

integrated circuit: An electronic circuit—including components and interconnections—entirely contained in a single piece of semi-conducting material, usually silicon. Often referred to as a *chip.*

integrated software: A group of application programs, usually on one disk, designed to share data.

interface: Hardware or software that links the computer to a device.

interface card: A circuit board you plug into one of the slots in some models of the Apple II to link the computer to a peripheral device.

in-use light: See **disk drive light.**

inverse characters: *Inverse* means *opposite.* If characters ordinarily show up as light characters on a dark screen, inverse characters would show up as dark characters on a light screen. Inverse is one form of highlighting.

I/O: See **input/output.**

I/O error message: A message you get when there's a problem with the way information is being exchanged with peripheral devices.

jacket: A square of plastic that protects a 5.25-inch disk. You don't remove the jacket (and expect to ever use the disk again).

joystick: A peripheral device that moves creatures and objects in games.

K: Stands for **kilobyte.** The unit of measurement for computer memory: 1 K equals 1024 bytes, and it takes one byte to make one character.

keyboard: One way to communicate with the computer. It looks like the keyboard on a typewriter, but programmers can make the keys do anything they want them to.

keyboard-based application: An application that accepts input only from a keyboard.

keyword: A word you designate when you're entering data (information) into certain kinds of database applications. Later, when you want to retrieve that information, you type the keyword.

kilobyte: See **K.**

label: A strip of paper you stick on a disk to identify it.

language card: An interface card with 16K RAM that can be connected to a 48K Apple II Plus so the computer can operate in Integer BASIC (the first dialect of BASIC available for the Apple II computer) and Applesoft BASIC.

Left Arrow: A key you can press (in most applications) to move the cursor one character to the left. In some applications, as the cursor moves to the left, it erases characters.

LF: See **line feed.**

line break: The end of a line of text on the screen or on a printed page. You can force a line break by pressing Return, or you can let the application break lines for you.

line feed: A nonprinting character that instructs the computer or printer to advance to the next line.

LISP: A programming language.

load: To read data or programs into the computer from a disk.

Logo: A computer language that encourages learning through discovery. Easy and fun to learn, but powerful enough for serious programming.

log on: To establish contact with a computerized information service or other remote computer.

low resolution: A graphics mode that can display information using a rectangular array of 40 horizontal by 48 vertical blocks.

machine language: The binary language of 1's and 0's that is the only language the computer understands. All other programming languages, like BASIC, have to be translated into this binary code before the computer can understand them.

macro: A command defined by you (user-defined) that tells the application to carry out a series of commands when you type the macro.

mail-merge application: An application that takes names and addresses from a database and puts them into form letters.

main circuit board: A large circuit board that holds RAM, ROM, the microprocessor, custom integrated circuits (chips), and other components that make the computer a computer.

main menu: The first menu you see in keyboard-based applications. It presents the application's top level of options.

megabyte: A million bytes—a unit of measurement used to describe memory capacity.

megahertz: Abbreviated *MHz*. One million cycles per second.

memory: Integrated circuits (chips) that store instructions for the microprocessor. There are two kinds of memory: temporary memory (called *random-access memory—RAM*) and permanent memory (called *read-only memory—ROM*). The contents of RAM disappear when you turn off the power; the contents of ROM do not.

memory expansion card: A card that can be installed in your Apple IIc Plus to give specially designed applications access to an additional 256K to 1 megabyte of memory.

menu: A list of choices.

menu bar: In mouse-based applications, the horizontal strip at the top of the screen that contains menu titles.

menu title: A word, phrase, or picture in the menu bar in mouse-based programs that designates one menu. When you point to a menu title and hold down the mouse button, you can see what's on the menu.

MHz: See **megahertz.**

microprocessor: The brain of the computer—the processor of information. The Apple IIc Plus has a 65C02, 8-bit microprocessor.

mode: A state that determines the computer's behavior.

modem: Short for modulator/demodulator. A device that links your computer to another computer or an information service over phone lines.

Modula-2: A programming language.

monitor: Like a television set without channels. It displays instructions from the application to you and shows what you've typed into memory.

monochrome monitor: A black-and-white, amber-and-black, or green-and-black monitor.

mouse: The small device you roll around on a flat surface next to your computer. When you move the mouse, the pointer on the screen moves correspondingly.

mouse-based application: An application that accepts input from a mouse.

mouse button: The button on top of the mouse. You press it to choose from menus or when you want to move items around on the screen.

MouseText: Special characters, like check marks and little apples, used in mouse-based applications.

music application: An application that can teach you how to read music or help you compose music.

NTSC: The standard video format defined by the NTSC, the National Television Standards Committee.

on-line: The condition of a device being connected or of data being accessible to the computer.

operating system: A program that, among other things, controls the way information is loaded into memory, the way the computer works with the information, the way information is stored on a disk, and the way the computer communicates with a printer and other peripheral devices. ProDOS, DOS 3.3, and Pascal are three operating systems available for the Apple IIc Plus.

Option key: A key on the Apple IIc Plus keyboard that, when pressed in conjunction with another key, creates a special effect. On some other models of the Apple II, this key is labeled ♦.

output: Information traveling out of the computer.

parallel device: A printer or other device that sends and receives data eight bits at a time over eight parallel wires. Compare **serial device**.

parallel interface: The condition of a computer and a peripheral device exchanging information eight bits at the same time along eight parallel wires. Compare **serial interface.**

parity: A way of checking data to make sure bits of data didn't get lost or garbled during transmission.

parity bit: A bit used to check for errors when sending or receiving data.

Pascal: A programming language taught in high school and college computer-science courses because it stresses a systematic approach to problem solving.

password: A secret word that gives you, but no one else, access to your data or to messages sent to you through an information service.

paste: To put a copy of whatever was last cut or copied at the cursor position.

pathname: The complete name of a document beginning with the name of the disk (also called the *volume name*), the name of the subdirectory it's in (if it's in one), and the name of the document. The pathname begins with a slash, and the parts of the pathname are separated with slashes. It's called a pathname because it describes the route to the document.

peripheral device: A device that is connected to the computer, like a printer or a modem.

PILOT: Acronym for *Programmed Inquiry, Learning, Or Teaching*. A programming language that lets teachers design their own educational software.

pin-feed paper: A stack of attached, perforated sheets designed to feed into a printer without much human intervention.

pixel: Contraction of the words *picture* and *element*. In graphics mode, text and graphics are formed by patterns of dots called pixels.

pointer: A marker that moves across the screen when you move the mouse across your desk (in mouse-based applications). Compare **cursor.**

port: A connector on the back panel of the Apple IIc Plus for connecting peripheral devices.

power light: A light that tells you whether or not the Apple IIc Plus is on.

power strip: A device that plugs into one three-hole, grounded outlet, but that can accommodate four or six three-pronged plugs. A must if you have more than two devices that need to be plugged into a grounded, three-hole outlet.

power switch: A rocker switch on the back of the computer that you switch on when you want to use your computer.

prefix: The first part of a pathname—the name of the disk and, if you like, the name of a subdirectory. Applications that ask you to type a pathname usually let you set a prefix so you don't have to type the complete pathname every time you want to work with a document on a particular disk or in a particular subdirectory. Once the prefix is set, all you do is type the rest of the pathname.

press: (1) To position the pointer on something and then hold down the mouse button without moving the mouse. (2) To hold down a key on the keyboard.

printer: A device that produces a paper copy of the information you create using the computer.

ProDOS: Stands for *Professional Disk Operating System*. The primary operating system for the Apple IIc Plus. See also **operating system.**

program: (v.) To write instructions for the computer—to talk to the computer in terms it understands. (n.) A set of instructions that tells the computer what to do.

program disk: A disk that contains an operating system and a self-starting application program.

programmer: A person who writes computer programs.

prompt: A character displayed on the screen to prompt the user to take some action. For example, a bracket ( ]) prompt character is used in the Applesoft BASIC programming language.

public-domain software: Software that is free for the taking. You can get it at user group meetings or through computer bulletin boards.

pull-down menu: A menu that is hidden until you press on its title with the mouse.

radio-frequency (RF) modulator: A device that transforms your television set into a computer display device.

RAM: See **random-access memory.**

RAM disk: A cross between a disk and random-access memory. Like a disk, it must be formatted before you can put files on it; also like a disk, it must be addressed by its volume name (disk name) or by its slot number. As with RAM, the computer can access the information on it very quickly. Also like RAM, what's stored on it is stored temporarily; when the power is turned off, the information on it is lost.

random-access memory: Abbreviated *RAM.* Temporary memory. RAM stores applications and data for the microprocessor.

read: To get information from a disk and put it in memory.

read-only memory: Abbreviated *ROM.* Permanent memory. Applesoft BASIC is stored in ROM along with other programs that regulate communication between the microprocessor and other parts of the computer system.

read-write head: The mechanism in a disk drive that reads data from a disk or writes information to it.

record: All the information about one person or one thing in a database.

remote computer: The computer on the other end of the phone line; it can be across the room or across the country. You can use your Apple IIc Plus, a modem, and a communications application to communicate with a remote computer.

report: A subset of the information in a database. You may have a database with information about your employees—like their names, addresses, phone numbers, birthdays, social security numbers, and salaries. There are times when you want only a list of names and salaries—that's one report. Other times you want names and phone numbers—that's another report. You can generate all sorts of different reports from one database.

Reset: The key that you can press in combination with Control and Command to restart an application.

resolution: The degree of clarity of your display. A monitor has better resolution than a television set used as a monitor.

Return: A key that you can press to move the cursor to the beginning of the next line. Also used in many applications to accept choices or indicate that you've finished doing something and are ready to proceed.

RF modulator: See **radio-frequency modulator.**

Right Arrow: A key you can press (in most applications) to move the cursor one character to the right.

ROM: See **read-only memory.**

row: A way of designating the number of horizontal lines that fit on the computer's display.

run: What applications do when the computer is carrying out their instructions.

SAT: Stands for *Scholastic Aptitude Test.* Colleges use the results of the SAT to decide if a student is college material. There are computer applications that help you prepare for the SAT.

save: To store an application or data on a disk, as opposed to storing it temporarily in the memory of the computer.

screen: The part of the monitor where information is displayed. Like a movie screen, it's the place where things are projected.

scroll: To move a document so you can see a different part of it.

scroll arrow: An arrow on either end of a scroll bar in a window. Clicking the scroll arrow moves the document one line. Holding down the scroll arrow causes continuous scrolling.

scroll bar: A rectangular bar that may be along the right or bottom of a window. Clicking or dragging in the scroll bar causes the view of the document to change.

scroll box: The box in a scroll bar. The position of the scroll box in the scroll bar indicates the position of what's in the window relative to the entire document.

search and replace: To look for a particular word or phrase throughout a document and exchange it for another word or phrase you specify.

sector: A part of a track on a disk. When disks are initialized for DOS 3.3, they are divided into tracks and sectors.

select: In mouse-based applications, to designate where the next action will take place. To select something, you click on it or drag across it.

Select button: A button on a printer that determines whether the printer should accept data from the computer or instructions from other buttons on the printer control panel (like the line-feed button or form-feed button).

serial device: A device that sends and receives data one bit at a time over a single wire. Compare **parallel device.**

serial interface: The condition of a computer and a peripheral device exchanging information one bit at a time along a single wire. Compare **parallel interface.**

serial port: One of two ports (printer and modem) on the back panel of the Apple IIc Plus designed for serial devices.

shareware: Software you can copy and try before sending payment to the author.

Shift: A key that you can press in combination with another key to get an uppercase letter or the upper character on a two-character key.

simulation: A computerized representation of something in action.

65C02: The type of microprocessor used in the Apple IIc Plus.

size box: A box on the lower-right corner of some active windows that lets you resize the window.

slash: A character used to separate the parts of a pathname.

slide-show option: A feature of some applications that lets you arrange displays in a sequence so you can use them in presentations. The application changes "slides" after a certain time interval or when you press a certain key.

slot: A long, narrow connector inside some models of the Apple II that lets you connect peripheral devices to the computer.

slot number: A way an application might ask you to describe the location of a peripheral device. In some models of the Apple II, there are seven general-purpose slots on the main circuit board for connecting peripheral devices to the computer. They are numbered from 1 to 7 with 1 on the left as you face the front of the computer. If your device is connected to a port instead of a slot, you can still use the application by typing the slot number that corresponds to the port.

software: Instructions, usually stored on disks, that tell the computer what to do. Compare **hardware.**

software catalog: A book that describes software.

software pirate: A person who copies applications without the permission of the author.

Apple key: The Solid Apple key found on some models of the Apple II. With the Apple IIc Plus, press the Option key whenever an application tells you to press the Solid Apple key.

Space bar: The bar at the bottom of the keyboard. Pressing it inserts a space character in your text.

special-interest application: An application designed for a particular audience—diagnostic applications for doctors, crop-rotation applications for farmers, and so on. Also called *vertical-market software.*

spreadsheet application: An application that simplifies financial planning, cost estimating, and other number-crunching tasks. It is laid out in columns and rows.

START13: An application on the *DOS 3.3 System Master* disk that makes it possible to run DOS 3.2-based applications.

start up: To load an application from a disk into the memory of the computer. Also called *boot.*

startup disk: A disk used to start up the computer.

stop bit: A binary digit (0 or 1) that indicates the end of a character in a string of serially transmitted bits. You can use the utilities to set up your serial ports to send the appropriate number for the device you're communicating with.

structured language: A type of programming language in which programs are built out of smaller subprograms. Programs are planned in advance instead of designed on the fly. Pascal is an example of a structured programming language.

subdirectory: A directory within a directory; used to organize the information on disks by grouping related documents.

super-high resolution: A graphics mode supported by the Apple IIGS that can display information using a rectangular array of 640 horizontal by 200 vertical dots in 4 colors or 320 horizontal by 200 vertical dots in 16 colors.

syntax: The rules that govern the structure of statements or instructions in a programming language or in an operating system.

syntax error message: A message you get when you misspell a computer command.

SYSOP: See **system operator.**

system configuration: See **configuration.**

system operator: Abbreviated *SYSOP.* The human operator of a computerized bulletin board.

Tab: A key that, when pressed, moves the cursor to the next tab marker.

telecommunications: The exchanging of information with other computers over phone lines. To telecommunicate, you need a computer, a modem, communications software, and a similar setup on the other end of the phone line. You can telecommunicate with other personal computers or with commercial information services.

Tell Apple card: Your way of telling us how to improve Apple products. You'll find a Tell Apple card in the back of this manual.

template: A form or an electronic overlay. For example, spreadsheet templates allow nonaccountant-types to use spreadsheet applications.

text generator: Firmware that prints characters on the screen in response to keypresses.

text mode: Information that is sent to the display in the form of characters that fit in a 40-column by 24-line grid or in an 80-column by 24-line grid.

thermal transfer printer: A printer that works by heating small points that produce dots on special heat-sensitive paper.

3.5-inch disk: A disk 3.5 inches in diameter. The most common storage medium used with the Apple IIc Plus. It can store 800K of information (approximately 400 pages of text). Compare **5.25-inch disk.**

title bar: The horizontal bar at the top of a window that shows the name of the window's contents and lets you move the window.

track: One of numerous concentric bands into which a formatted disk is divided. Compare **sector.**

transmitting device: The computer that is sending information.

troubleshooting: Diagnosing a problem—and solving it. It's best to get peripheral devices that work automatically with the Apple IIc Plus so you won't have personal experience with this activity.

turtle: A cursor shaped like a triangle. Using Logo programming commands like FORWARD, BACK, LEFT, RIGHT, you can move the turtle around the screen and create graphics.

Up Arrow: A key you can press (in some applications) to make the cursor move up one line.

user group: A computer club whose members share programs they've written and information they've learned.

user ID: A number that identifies you as a subscriber to an information service.

user interface: The way a computer application communicates with you.

utilities or **utility program:** A set of applications that controls and manipulates the information on disks.

vertical-market software: See **special-interest application.**

video monitor: See **monitor.**

volume name: The name of a disk or its main directory. Compare **pathname.**

window: With mouse-based applications, one or more areas on the screen showing one or more documents at a time.

word-processing application: A type of application designed to make writing and editing easier and faster.

word wraparound: In some word processing applications, the automatic jump to the start of the next line (bringing the word you're typing with it) when the cursor reaches the right margin; lets you avoid pressing Return at the end of each line.

write: To record information on a disk.

write-enable notch: A small, square cutout in the upper-right corner of a 5.25-inch disk or the small, square hole in the upper-right corner of a 3.5-inch disk that indicates whether or not information can be recorded on the disk.

write-protect: To prevent changes to the contents of a disk by covering the write-enable notch on a 5.25-inch disk or by sliding the small, plastic tab to uncover the square hole on a 3.5-inch disk. Compare **copy-protect.**

write-protect tab: A piece of tape that you can use to cover the write-enable notch on a 5.25-inch disk so information can't be recorded on it. The write-protect tab on a 3.5-inch disk is a small piece of plastic that slides to cover or uncover a square hole in the upper-right side of the disk.

Index

THE APPLE PUBLISHING SYSTEM

This Apple manual was written, edited, and composed on a desktop publishing system using Apple Macintosh® computers and Microsoft® Word. Proof pages were created on the Apple LaserWriter® Plus; final pages were printed on a Varityper® VT600™. Line art was created using Adobe Illustrator™ and typeset on a Linotronic® 300. POSTSCRIPT®, the LaserWriter page-description language, was developed by Adobe Systems Incorporated.

Text type and display type are Apple's corporate font, a condensed version of Garamond. Bullets are ITC Zapf Dingbats®.

Apple Computer, Inc.
20525 Mariani Avenue
Cupertino, California 95014
(408) 996-1010
TLX 171-576

030-1334-C
Printed in Singapore