It also needs other components so that you can exploit its capabilities.

A computer by itself is akin to a car engine with no body or chassis. Its incredible capacity for gorging and disgorging data is useless unless the user has help in handling all this information from other devices known as "peripherals." They aren't really peripheral, though. They're essential. They're on the periphery, the outside boundary, of the main activity of the computer itself, but they're much more than mere accessories. The computer is virtually useless without them.

TVs And Monitors

The TV screen is to an ACE or any personal computer what a piece of paper is to a typewriter. Everything you type on your keyboard is also displayed on the screen. Also, everything that the computer wants to tell you — the results of your calculations, the contents of a diskette, the score of the Dodgers' game — is displayed on the screen. A monitor or TV is absolutely essential. Without one of these two types of display screens, you'll never be able to have two-way communication with your computer.

A monitor is a trimmed-down, souped-up TV. It doesn't have a channel selector and antenna on it, but it does have a much sharper and clearer picture of the words that the computer is sending out than a normal TV screen does.

Should you use a TV or a monitor? That depends on what you're primarily using your computer for. If you intend to spend most of your time performing useful work on the machine, then you should use a monitor. If you're interested in color displays and those programs (generally games) that make the most extensive and intensive use of color, then you should probably

use a color TV. You can still play games if you use a monitor but they just won't be in color.

If you do decide to use a TV, then you'll need another device, an RF modulator. The name sounds exotic, but all it does is let you connect the TV to an ACE or similar computer. Typically, it's a little box about as big as a pack of cigarettes with a cable similar to regular TV antenna wire coming out of one end. This wire attaches to the antenna connections on your TV. Another cable comes out of the other end and plugs into the video connector on the back of your computer. Tune your TV to the channel suggested by the modulator manufacturer and away you go.

Printers — For Paper Copies Of What You Do

A printer is simply a typewriter without keys. After all, why would you need another set of keys when you've already got a perfectly good one on your computer? With a printer, you can transfer the results of your computerized activity onto a piece of paper.

Why would you need a copy of your work on paper when you can easily see it on the screen? Well, screens are terrific for browsing through files, looking at the contents of a floppy diskette, or performing simple calculations. The computer can display data on a screen much faster (and more quietly) than it can print it. If, however, you want a permanent record, the screen hardly suffices. How would you give a copy of your work to someone? Send a snapshot of your screen? You'll want a paper copy of your results, and for that you need a printer.
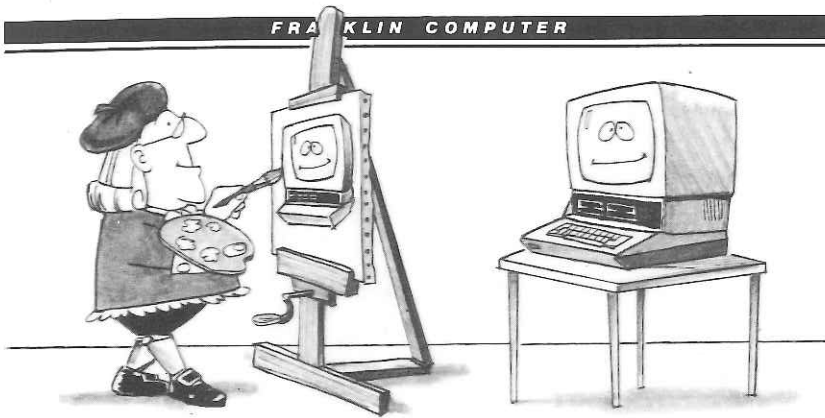
Printers also help to solve a problem sometimes called "window vision." When you're browsing through a multi-page document by viewing it on a screen, your overall view is limited by the number of lines of text displayed on the screen, normally 24. Window vision can be aggravating when you're constantly scrolling through a document to cross reference information that appears in the beginning with information that appears elsewhere in the document. With a printed copy you can spread out the pages on your desk for easy access to all the required information.

Consider buying a printer. But which one? There are hundreds available. The first thing to look for is the printer's compatibility with the programs you want to use. Another consideration is whether or not you'll need typewriter quality copies. Some can give it to you; others can't. There are also the matters of noise and speed. Be sure you listen before you buy. If you get one that's loud, you may have to build a separate room for it. Also check the manual. No printer will do you any good if you can't figure out how to use it.

If you do buy a printer, you'll have to get several other items before you can use it. You'll need a printer interface card, a cable, and, of course, paper and ribbons.

What's a printer interface card? Remember the RF modulator? Well, a printer interface card permits a similar arrangement. Your printer cable connects easily with your printer, but there's no place on the computer to plug in the other end. The printer interface card solves this problem. It's nothing more than a plastic board twice the size of a 3 x 5 index card.
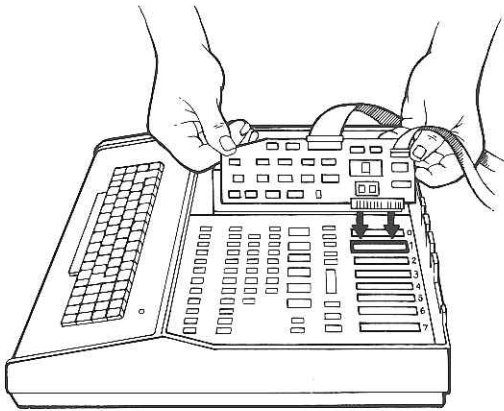
Although you should follow the directions when putting it in, installation is only a little more tricky than plugging in a toaster. Once the card is plugged in, you'll have a connector where you can plug in the free end of your cable. That's all there is to installation.

Before you try to operate it, you'll have to check the printer manual to see what you should do next.
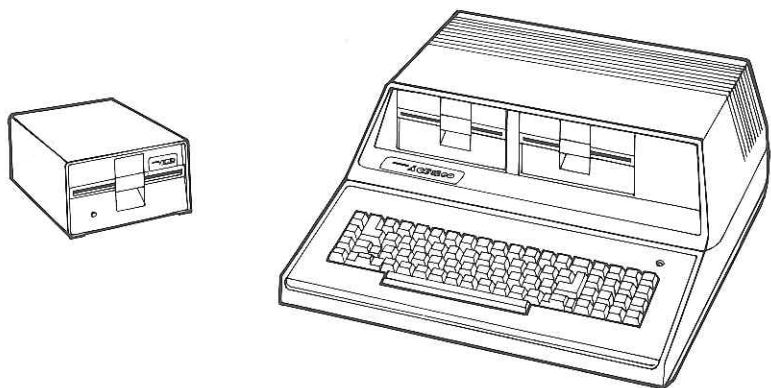
Disk Drives

Typing things twice is fine if you're learning how to type, but otherwise it's a waste of time. You might be wondering why you'd have to type things twice if your computer has a memory. Well, it does, but the memory in the computer itself is very forgetful. When the switch goes off, it forgets everything. Poof! If you want to retain what you've typed in, you've got to transfer it out of the computer's memory and store it onto floppy diskettes, your files. Memory, you see, is very different from storage.

All you have to do is instruct the computer to empty its memory onto the diskette before you turn off the power. The program you're using should provide you with a procedure for doing this. Then, when you need the information again, you can instruct the computer to read what's on the diskette back into its own memory. Voila! Whatever you typed in before is now back

in the computer so that you don't have to enter it again in order to work with it.

Disk drives are the electronic transcribers and filing clerks. They record and correctly file information on your diskettes. The electronic filing system remains invisible on the diskette, but don't worry because you can't see it. Your computer and disk drives can find and retrieve your files more quickly than you can find a file folder in a filing cabinet drawer.

There's no limit to the number of diskettes you can use, but you can only have one diskette in the drive at a time.

How many files can you store on a single diskette? Well, how many file folders can you put into a file drawer? It depends on how big the file drawer is, what kind it is, and how big the file folders are. The same thing is true with diskettes. Just as there's a limit to the number of file folders you can stuff into a file drawer, there is also a limit to how many files you can store on a single diskette.

Using a computer is almost impossible with no disk drives and still difficult with only one. In fact, some models of the ACE have space for two disk drives right inside their cases. Two drives are more than twice as good as one. Copying data from one diskette to another for backup purposes, a crucial operation, is much faster and easier with two disk drives than with one. Some personal computers let you use a tape recorder for data storage, but models like the ACE don't, simply because the cassette tape method is a very, very slow and cumbersome system. It offers very little flexibility and can't be used at all in many applications.

There are many drives on the market. By far the most widely used are the drives commonly referred to as 5-inch floppy disk drives. There are smaller drives (not too many) and bigger drives

(a good many), but the 5-inch gives you the most for the money.

The bigger drives are physically larger and they store more data. The 8-inch floppy (standard) disk drive is actually about twice as big as the 5-inch in terms of size, data capacity, and price.

A 5-inch Winchester "hard disk" stores about 50 times more data than a 5-inch floppy and you can store and retrieve the data at a much faster rate. As you might expect, the price for this kind of performance is high, especially when you consider that in most systems the Winchester doesn't completely replace floppies. You still need a storage device (either floppies or a special high-speed tape device) to "backup" the data on the Winchester. It's also impossible to remove a Winchester disk from the drive itself, so whatever happens to the drive also happens to your data. Backup becomes twice as important.

Don't get too excited about 8-inch floppies and Winchesters. They present the typical first-time computer user with a lot of problems, only some of which have been mentioned here. Some are solvable, none cheaply. If the machine you buy doesn't come with disk drives already installed, get a floppy disk system, learn how to use it, and then you'll be ready to consider the next step up.

Video Cards — For Lines Longer Than 40 Columns

Computers like the ACE can easily display text on your TV or video screen, but the quantity of the image is a function of your screen and your eyesight. The standard personal computer can put up to 24 lines of text horizontally on the screen. Each line

may hold up to 40 characters. This works out to a maximum of 960 characters on the screen at any one time. Sounds like a lot, doesn't it? It's not. The majority of computer applications are easier using a line anywhere from 60 to 80 columns wide.

Most programs handle this problem by providing you with a "scrolling" or "paging" capability.

Imagine a long document. Further imagine the document broken up into "pages," each 24 lines long. You choose the page (set of 24 lines) that you want to look at at any particular time. Usually, you don't have to worry about specific page numbers, because most programs allow you to move through the document a page at a time, letting you see the previous page or the next page. This process is called paging.

Scrolling is similar, except that you move through your document one line at a time instead of one page at a time. For example, if what you see on the screen represents the 10th through the 33rd lines of a document and you scroll forward, you will then see lines 11 through 34. If you scroll backward, you will see lines 9 through 32.

You can scroll horizontally, too. Suppose you're working on a document 80 columns wide and your computer only displays 40 characters on a line. Obviously, you wouldn't be able to see the entire line at any one time. You'd have to scroll the screen right and left to view data outside the range of the original 40 columns. Unfortunately, this horizontal scrolling isn't as helpful as vertical scrolling. Your data might seem disjointed because you'd see half of the first line, half of the second line, etc., the whole way down the screen. If data on any particular line had to be interpreted in the same context as data on the preceding line, then what you'd see would be very confusing.

One solution is to allow each line of text to "wrap" around to the next line so that anything beyond the 40th column is displayed on the line below. Much of the time, this can be very effective. In fact, if you never knew that it was possible to display 80 characters on a line, you might be perfectly satisfied with only 40 columns. However, now you do know. Once you try the larger display, you'll never want to go back to 40.

Some machines, including some versions of the Franklin ACE, come equipped with 80 column capability. With others you have to buy an 80 column video card, throw away your TV, and buy a monitor. You probably expected having to buy the video card, but the news about the TV might come as an unwelcome surprise. Unfortunately, you'd never be able to read the display if you tried to cram 80 characters onto one line of a TV screen. Because the monitor can display a clearer and sharper picture than the TV, the characters will be easy to read—as long as you get a good quality video card such as the ACE Display.

A video card looks a lot like a printer interface card, and it's installed much the same way.

There are several such video cards available today, each with various advantages and disadvantages. The two most important things to look for in selecting a video card are the quality of the display it puts on the monitor screen and the number of programs that will work properly with it.

The quality of the display is a matter of how clearly the card displays 80 character lines on the monitor. This isn't easy. Test any card you might consider buying. Pay particular attention to any symptoms of oncoming headaches, eyestrain, or seasickness as you read your card full of 80 character lines. This is Video Card Test 1. If none of these symptoms develops, and you can
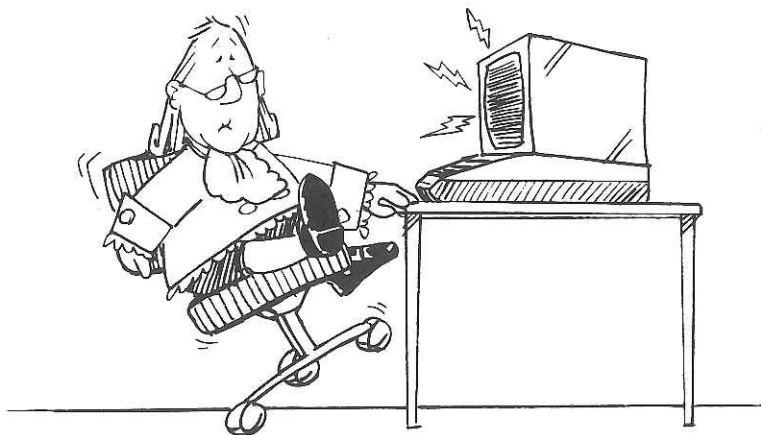
easily read the text displayed using the card (make sure you try lower case characters, too), then the card passes Test 1.

Test 2 is called, "Will it work with the programs I'm going to want to use?" You see, the video card makers all do things a little bit differently, while the program writers are busy doing things even more differently. This creates some finger pointing, and, more importantly, many incompatibilities. To avoid such problems, get your dealer's advice and try the card.

These are the ONLY two qualities that you should look for in buying an 80 column card. Don't let yourself be confused by the endless variety of miscellaneous features that the various card manufacturers try to impress you with (unless, of course, you really care if your video card can whistle "Dixie," in which case that's the card for you.) In particular, don't pay extra for a lower case feature if your machine already has one. All ACE computers do.

Communication Devices — For Talking to Another Computer

The purpose of communication devices isn't to establish a social life for your new computer. Communicating with another computer is actually one of the more important things you can do with an ACE or other personal computer. In fact, telecommunications is the main reason why some people buy personal computers.

You can hook your computer up to your standard telephone, dial the number of your local computer center, and start sending and receiving information. This is an amazingly powerful setup. Just by calling, you have access to a large, very powerful computer well beyond the financial means of any individual.

Since many people can be hooked up to it at the same time, the costs of purchasing and maintaining the big machine are distributed among many users. To the occasional user like you, this translates to cheap. In fact, in some cases, it translates to free, except for the cost of the phone call.
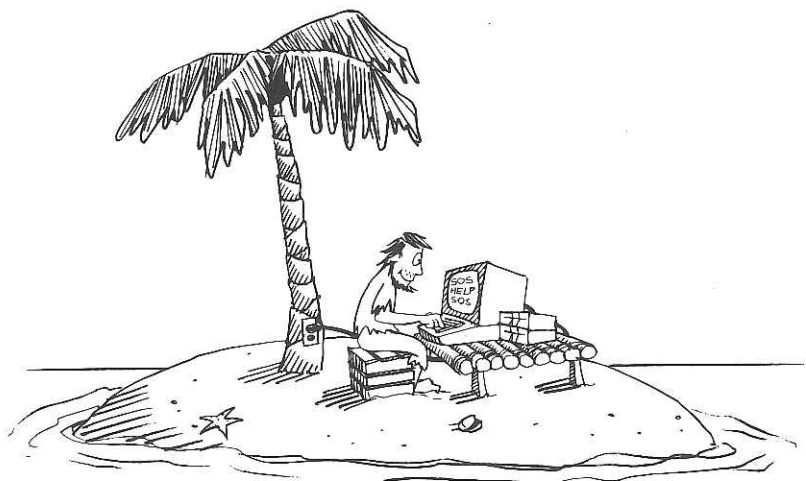
Once you're connected, you can instruct the central computer to do things for you just the way you do on an ACE. A wide variety of services is available to lonely people out there who like to call up computers. Typically, a dealer sells you the service and gives you a phone number to call, an instruction manual, and some identification numbers so that the big computer will talk to you. It won't, unless its humans know where to send the bill.

As usual, there's a catch, a common one in computerdom. You settle up with your dealer, run home all excited to call up big brother for a chat, try to plug the phone into your computer and say, "Hold on here. Where do I plug the phone in?" Well, unless your dealer has sold you a telephone interface card, you can't. Just like the printer, the telephone needs an interface card.

Computer people being the way they are, though, the telephone interface card isn't called a telephone interface card. You have to learn a buzzword — modem — if you want to buy one. Whisper the word to your dealer, and he'll know what you're talking about.

You plug the modem card into one of the slots in the back of your computer (now you begin to see why there are so many slots back there), connect a cable to the card, run it out the back of the ACE, and . . . now what?

How you connect the modem to your phone depends on which type of card you buy. The first type of modem is called a "direct connect" because it attaches directly to your phone line. Where? Into the little outlet jack on your wall where your phone plugs in. The little jack for wall phones is hidden behind the phone.

If you don't feel like unplugging your phone and plugging in your modem every time you get the urge to call the central computer, contact your local phone company and have them install an extra jack for you. It's not too expensive. The only problem is the hassle you generally get if you tell the phone company that you want to hook your computer up to their precious lines. This unpleasant encounter can be avoided. If you don't tell them why you want the extra jack, no one else is likely to.

The second type of modem uses what's called an "acoustic" connection to the phone. Instead of directly wiring the modem card into the phone line, you establish the connection by letting the modem use your telephone handset to "talk" and "listen" to the big computer. This takes a little more than just an extra wall jack.
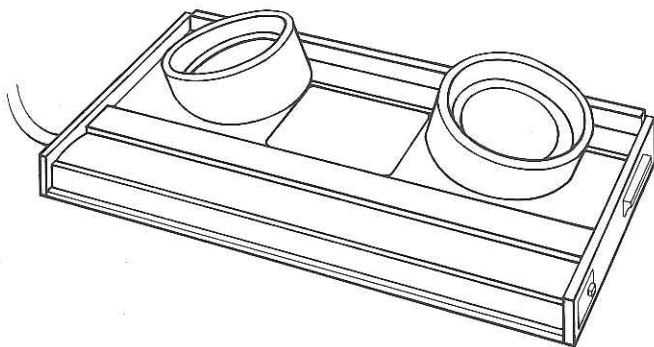
The acoustic coupler is a box with two foam rubber rings on it and a cable coming out. The handset of your phone plugs into the rubber rings, and the cable plugs into your modem. With that done, you're all set.

Which type of modem should you buy? The acoustic method is usually cheaper. It is also less reliable, and it can't provide you with as many features. If you can afford it, buy the direct connect type. It's easier to use and more versatile as well.

A word of warning: Don't buy a modem unless you already have a disk drive. Modems come with diskettes containing programs that tell your computer how to communicate through the device. Without a disk drive, your computer won't be able to get the instructions off the diskette, and your modem card will be worthless.

Computers In A Computer —
If One Is Good, Two Are Better

The ACE is a very powerful machine. With it you can take advantage of a huge library of programs, no matter which model of the ACE you buy.

But for some ingenious people, that wasn't enough. They found a way to roughly double the number of programs that can be run on an ACE or ACE-compatible computer by inventing devices like the ACE 80 CPU Card.

Think of computers as countries, each with its own language. Computer A understands Swahili, computer B speaks French, and so on. This means that computer A can't understand the same set of instructions as computer B. In this Tower of Babel, the sets of instructions are called programs, and the computer that understands "Bonjour" doesn't understand "Uhuru."

Further suppose that someone named Joe Coder has come up with a fantastic idea for a program. It's so terrific that the world is going to beat down his door trying to buy it. Joe Coder is going to get rich!

Well, not just yet. First Joe has to develop the set of instructions (the program) that will make the computer do what he

wants it to do. That's not easy, and that's why people will pay Joe handsomely for his efforts. Unfortunately, Joe has a problem. Since computer A will not understand a program written for computer B, which computer should he write his program for?

Well, Joe isn't stupid. He develops the program for the computer that he thinks will give him the largest market. Fine for Joe but not so good for you, unless you share Joe's preference in computers.

In the personal computer field, there are two major types of computers (countries, if you will). There's the type known as "**DOS 3.3**" that you find in the ACE and ACE-compatible machines like the APPLE, and the type known as "**CP/M**® ." **CP/M** systems work in many kinds of computers, all of which understand the same language. Programs written for one **CP/M** system usually work on any other **CP/M** system. However, as you'd probably expect, programs written for **DOS** will not work on a **CP/M** system and vice versa. This is too bad, because there are terrific programs written for each system that half the personal computer owners can't use.

Fortunately, a solution is available. All you have to do is plug the ACE 80 CPU (optional on some models of the ACE, standard on others) or other **CP/M** card into one of the slots at the rear of the machine. With the card in place, the computer can use either type of program.

This feature amounts to putting another computer inside your computer, a significant achievement. The designers even made it very easy for you. You don't have to know which of the little devils in your computer is running the program! All you do is insert a diskette, start the computer up, and everything necessary to allow you to use that program is done automatically.
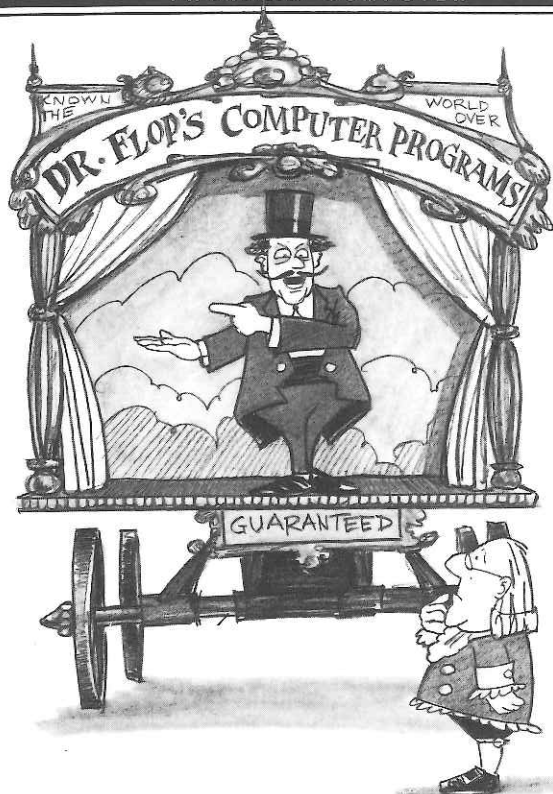
Programs

Equipment alone — no matter how sophisticated — is not all you need to operate your computer. Computers need programs.

Programs are easy to come by, but few people can really explain what it is that they have even after they get them. Nobody can tell you exactly what programs are, although everyone seems to be buying them, selling them, writing them, swearing at them, or pirating them these days.

The standard definition is that a program is a set of instructions to a computer. That's correct as far as it goes, but what does it really tell you? Does it help you to understand

"PAC-MAN™,'" the "computer errors" you get on your bank statement, and the workings of NORAD buried in Cheyenne Mountain in Colorado? Programs are involved in all of these computer processes, but people who write them probably couldn't agree on a definition more specific than the one just given.

Why can't people come up with a good definition of "program"? They're so difficult to explain primarily because you can't see, hear, touch, or smell them. Since programs are for the machine's "eyes" only, you'll never see the programs themselves, only their effects on the machine. They're somewhat akin to a "life force" that lets a machine be productive when the electricity is turned on. Perhaps yet another reason is that a definition isn't really necessary. You really don't have to know what they are in order to use them.

The last point is probably the most important, and yet it's also the one that causes the most profound suspicions and rankest uneasiness. People generally like to see a definition to know what they're dealing with. But if you think about it, you probably use things every day that you don't fully understand or feel compelled to define. What do you really know (or care) about the telephone signal, without which you couldn't reach out and touch someone? How about those electronic signals that come out of thin air to make your television set full of *The Dukes of Hazzard* or *Hill Street Blues* or *Live at the Met* with Itzhak Perlman?

You don't really need to know what a television signal is in order to like or dislike a program, to turn it on or turn it off. So too with computer programs. The fact that they're also electronic signals is about as necessary for you to know as is the fact that David Hartman is nothing but reconfigured electronic impulses when you watch him over coffee in the morning.

Admittedly, when you use a computer program you're more involved in some of the intricacies of how it works than you are in the operation of the television when you sit down to watch a program. You don't really watch computer programs. You use them. You play with them. And, eventually, you develop a sense of what they are.

No matter how they define the term, most computer people agree that the best way to understand programs is to use them. Learn what they are inductively, empirically, not through a textbook definition or a muddled series of analogies that do as much to confuse as they do to clarify.

Just dive in. Start with simple, utilitarian programs that you can master quickly. Then decide what you want to do with your computer, buy some programs, and go for it.

Be warned, however. Programs are expensive and they vary greatly in quality. Before you buy one, make sure it has some practical application to justify its cost, and be sure you're comfortable with the documentation that comes with it. If the manual or instruction booklet is written in computer gibberish, the program may be more trouble than it's worth. Look for lucid and complete explanations.

Be careful not to confuse impressive activity with valuable service. Programs and add-on devices are proliferating beyond imagination these days. Some of them are good, some of them merely cute, and some of them downright ridiculous. (A clock program, you say? One that will make my video screen look like a chunk off of my kitchen wall? Great! With second hands yet?)

On closer analysis, however, the sole purpose of many of these wonders in programming is to separate you from your money.

Don't fall into the trap of buying a program simply to have something running. There are many worthwhile products available, so take your time, look around, try things out, and then buy what you can really use.

Be forewarned that somewhere, sometime, someplace, some enterprising young man who seems to know ten times what you do about computers is going to try to convince you that his program will make a jug of cider jump off the table and turn ducks' eggs into solid gold. Look this man straight in the eye and ask him for names of people who are successfully using his program. DO NOT, under any circumstances, bet him that he can't do it. There's no telling what someone might be able to make a computer do.
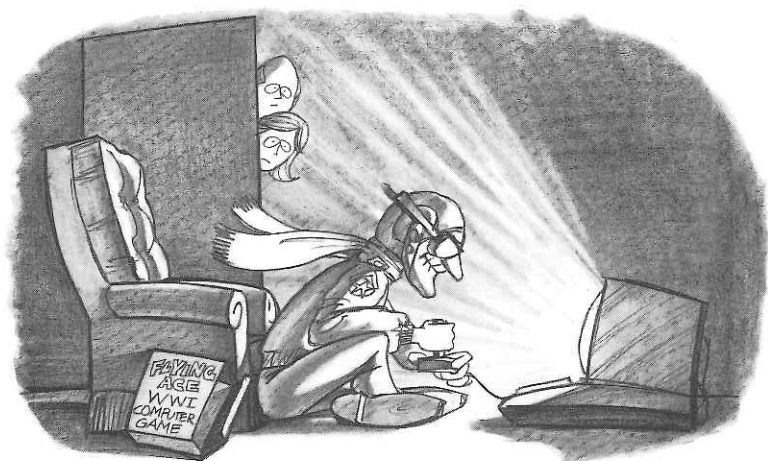
Paddles and Joysticks

If you want to play video games in the privacy of your own home (or office), or if you're sick of sending the kids to school with plenty of lunch money, only to find them dragging home

from the arcade with empty stomachs and aching wrists, maybe you should consider buying some game programs and a set of paddles or joysticks. These gizmos let you beep or zap or pursue or escape, depending on what video game you happen to be playing.

Paddles, usually sold in pairs, vary somewhat in size and shape. They all have dials, one to move something vertically on the screen, the other to move something horizontally. What kind of something? That depends on what game you're playing. It might be a helicopter or a spaceship, a tank or some creature. By turning both dials at the same time, you can control your direction all over the screen, even make your something move in circles. To zap an oncoming invader, you have buttons on the sides of paddles. Often they make the machine go beep.

A joystick provides the same kinds of directional control, except that instead of two dials you have one stick on one little unit. Your movements on the screen correspond directly and immediately to the direction you push the stick. Just as with the paddles, you have a button that lets you beep and go zap. Neither device would leave you defenseless.

Joysticks and paddles connect to your computer at a tiny socket marked I/O. The exact location of this socket varies from computer to computer, but in most cases it's the only place inside the machine where the 16 pin plugs for the joysticks or paddles look like they might plug in. The I/O socket comes empty, waiting for you to plug in one of those devices or the other.

By the way, the games themselves come on diskettes. You'll find everything you need at your computer store to turn your computer into an arcade.

One last word of advice: Protect the plugs on the joysticks and paddles by sticking them in styrofoam when you're not using them. The little pins at the end have a way of getting mangled otherwise.

Before You Try To Set Up A Personal Computer

There are a few items you should bring home with you once you decide to get a computer. Do you have at least one floppy disk drive? The ACE and most other personal computers aren't much good without one. Did you get some floppy diskettes? You should have a box to get yourself started. How about a printer? If you get one, make sure you have the cable for it. And don't forget paper.

Here is a short checklist of other things to consider:

1. Did you get an RF modulator? If you plan to use a TV as a screen, you'll need one.

2. Are there enough AC sockets where you're going to set up your system? You'll need at least two sockets, one for the ACE and one for the TV or monitor. You'll need another if you also have a printer.

3. Did you buy a game program that you can't wait to fire up? Then pick up a set of paddles or joysticks.

It Isn't All That Difficult

After reading through this booklet, you have all the general information you need to set up and use a personal computer with complete confidence. You may run into snags every now and again. Everyone does. If you stay loose, follow directions, and experiment a little, you'll soon resolve any difficulties. Remember that you can count on the dealer, the club, and the company for help if you need it. You're not alone, so don't let yourself feel isolated.

You're ready now to get set up and go. Franklin hopes this introduction has been helpful and that you have the best of luck with your new computer.