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BY THE EDITORS OF  
CONSUMER GUIDE®

**THE USER'S GUIDE TO  
COMMODORE 64  
& VIC 20  
COMPUTERS,  
SOFTWARE, & PERIPHERALS**



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## CHAPTER 1

# WELCOME TO HOME COMPUTING

Computers are truly changing our world. Many people believe that computers are creating a revolution as dramatic as the Industrial Revolution several hundred years ago. One of the most amazing products of our decade is the home computer. For a price that barely would have bought a calculator a decade ago, you can now buy a home computer that is more powerful than the room-filling computers of just a few years ago. Even more amazing are the uses that people are finding for these new computers.

Now that you are the proud owner of a VIC 20 or a Commodore 64 home computer, you have entered the exciting world of computers. You will find that learning to use your computer is not as difficult as you may have thought. One of the main claims Commodore makes about its computers is that they are *user friendly*. This means that these computers are simple to use. You do not need to learn the hundreds of secret passwords and cryptic commands that made the early large computers so difficult to understand.

With the VIC 20 and Commodore 64 computers, you can use just a few simple instructions to tell your computer what to do. If you

make a mistake, the computer lets you know immediately and the problem is usually easy to correct. In fact, because the VIC 20 and Commodore 64 computers are so simple to use, you will feel confident in knowing the basics after only a few hours of using your computer!

This *User's Guide* will help you to get started using your VIC 20 or Commodore 64 computer. Through a combination of reading about your computer and doing some simple exercises, you will learn how to get the most out of your computer in a short amount of time. Before you begin, though, take a few minutes to learn about the capabilities of your computer.

## **MEET THE VIC 20 AND COMMODORE 64 COMPUTERS**

The VIC 20 and the Commodore 64 computers are similar in many ways. Both computers use similar keyboards to instruct the computer to do something. When you type instructions, you use the same *language* for both computers: Microsoft BASIC. This language is simply a set of words and phrases that your computer has been programmed to understand. When you type any of these words or phrases (called *commands*) into the computer, it automatically follows your instructions. Both computers use similar accessories, and both display messages—yours and the computer's—on a TV screen or a monitor.

The main difference lies in how much each computer can do. Each computer has a certain amount of *memory*, which allows it to store information. For computers, memory is measured in units called *bytes*. Bytes are like mailbox slots that hold information. One byte holds one character (one letter, number, or symbol) of information. One *kilobyte* (or *K*) is equal to approximately 1,000 bytes. The VIC 20 has 5K of memory, while the 64, quite aptly, has 64K of memory.

What does this considerable difference in memory mean? The larger the memory, the more information the computer can hold. The Commodore 64, therefore, can store larger programs than the VIC 20 can. A *program* is simply a series of instructions that tells the computer how to perform specific tasks—like keeping track of a budget, teaching a foreign language, or playing a game. You can always add more units of memory to each computer, but as to the initial amount of memory that comes with each, the 64's memory is much larger than the VIC's. Because of this difference, more complicated programs are available for the 64 computer than for the VIC.

Both the VIC 20 (which we'll simply call the VIC) and the Commodore 64 (which we'll call the 64) have the capabilities to display pictures and shapes. This is known as *graphics capabilities*. While both computers are able to produce a variety of graphics, the 64 is

capable of doing more with graphics than is the VIC.

The same is true for sound. While both computers have the capabilities to produce sound, more can be done with sound on the 64 because of its larger memory.

Despite this difference in memory, both the VIC and the 64 are quite capable computers that can perform a variety of tasks. In addition, both computers are able to use different colors (if you have them hooked up to a color TV or a color monitor). While the 64 can use more colors than the VIC, both can use enough colors to make striking pictures—important for both interesting educational programs and exciting games.

## **WHAT CAN YOU DO WITH YOUR COMPUTER?**

Briefly, computers can do two things: *calculate* and *make decisions*. Of the two, it is decision-making capabilities that set a true computer apart from pocket calculators. Let's say you need something done. Can the computer do it? To find out, see if you can describe your chore as a list of actions and decisions. If so, there is a fair chance that a computer can perform the task.

Of course, some tasks would take more time or money than they are worth. But don't let that stop you from thinking about using a

computer to perform the task. History is full of people doing the impossible, finding new solutions to age-old problems.

## **YOU CAN BUY PACKAGED SOFTWARE FOR YOUR COMPUTER FOR DIFFERENT PURPOSES**

Your VIC or 64 computer can do many things without you having to write the instructions (programs) yourself. Since Commodore computers have been sold to more than a million people over the past several years, you can benefit from what others have done with their computers. When a person figures out a series of instructions that make the computer do something interesting or useful, the instructions can be saved on a cassette or a floppy diskette for later use. You can then buy such a program, called a *software program*, for a reasonable cost. Thus a program that one person has developed can benefit thousands of people, especially newcomers who don't know how to write complicated programs but still want to use them. Most of these programs are easy to use. Many give you instructions for using the program right on the screen as you go along. There are programs available for many different purposes.

### **You Can Use Planning and Budgeting Programs**

There are software programs available for the VIC and 64 computers that allow you to make budgets, perform calculations automatically,

and use spreadsheets right on the screen. These programs can be used for business purposes or simply to figure out the family budget.

### **Or Write Letters and Documents**

*Word processing* software programs let you use your computer as a typewriter—and a lot more. Word processing lets you type letters, documents, and reports into the computer. You can view your work on the screen and make any changes you want—before printing anything on paper. You can also save your work on a cassette or diskette so that you can use it again and again. By using word processing software with your computer, you can easily correct mistakes, move paragraphs, adjust word spacing. You can give your business letters or school papers the finished look of well-printed books. And again, this software is available at reasonable costs for your VIC or 64 computer.

### **Or Just Have Fun**

There are a variety of games available for your VIC or 64 computer. You will learn more about these games, as well as about other types of software programs available, in Chapter 5, "Software."

## **WHAT IS COMPUTER LITERACY?**

Imagine living before there was public education. Picture yourself unable to read, in a world where people with power and influence read well. To make knowledge and skills available to everyone, universal education was made a national priority. Literacy—knowing how to read and write—became essential to most jobs and to everyday living.

Now we need another kind of literacy: *computer literacy*. Not everyone will need to learn how to program a computer, any more than everyone has to be a mechanic in order to drive a car. However, it is becoming essential for everyone to be at least familiar with computers and to be able to use them. The use of computers has increased dramatically since World War II. Now there are computers in cars, coffee pots, and even thermostats, not to mention computer-like calculators and watches. Beyond this, computers are assisting in nearly every line of work, both changing and eliminating many jobs. As a result, many people must learn about computers if only out of necessity—to keep themselves employable.

## **COMPUTER LITERACY AND YOU**

Now that you have your own computer, you can learn to use it well and join the world of computer literacy. After some time of using other people's programs, you may study their methods and develop new ideas of your own. Eventually, you may want to write some programs to make your computer do exactly what you want it to do. You may even be able to share or sell your ideas, and turn your computer into a business, as thousands of other people have in the past few years.

So what are we waiting for? Let's get started!

# GETTING STARTED

In addition to your VIC or 64, there are several items you will need in order to use the computer. The essential items are discussed in this chapter. Other equipment that you eventually may want to have, but that is not necessary for just starting out, is discussed in Chapter 4, "Peripherals."

### **YOU NEED A TV OR A MONITOR**

When you use your computer, you need a screen on which to view your messages to the computer and the computer's messages to you. If you are using a television set, you can use either a black-and-white or color set. Or, you may prefer to use a special type of TV called a *monitor*. For just starting out, however, you may want to use your family TV set, since this means one less item to purchase.

Whether you use a black-and-white or color screen should depend on your needs. Since one of the nicest features of the VIC and 64 is their use of color, many people prefer using a color TV or monitor—especially for the variety of games and other programs that use color. On the other hand, if most of your work is with text and figures, you may want a black-and-white TV or a *monochrome* (single-color) monitor. If you need to display up to 80 columns on the screen instead of the usual 22

columns (on the VIC) or 40 columns (on the 64), you will have to use a black-and-white or monochrome monitor, since a TV or color monitor cannot display more than 40 columns. For monochrome monitors, the most readable colors are amber and green.

## YOU NEED SOFTWARE

When you use your VIC or 64 by itself, you are using the computer's *hardware*. As soon as you turn on your computer, you can communicate with it by typing messages in its language, Microsoft BASIC, which is built right into the computer.

When you use a program that is outside of the computer, you are using *software*. Software programs come in three formats for the VIC and 64: cartridges, cassettes, and diskettes. In addition, when you create your own programs or type letters and reports, you can store your work on a blank cassette or diskette.



Software formats for the VIC and 64: cartridges, cassettes, and diskettes.

### Cartridges: Self-Contained Software

Cartridges are programs stored inside small

boxes that plug into the large expansion slot of your VIC or 64. These programs are completely self-contained and usually cannot be altered. When you turn on your computer, the instructions in the program are automatically *loaded* (entered) into the computer. You may find that cartridges are the easiest way to start using your computer. However, cartridge programs are relatively expensive (about \$25 per program for most games).

The computer must be turned off when a cartridge is put in or taken out. When you plug in the cartridge of your choice and turn on your VIC or 64, the computer is automatically turned over to the cartridge's program—the computer cannot do anything else.

When you want to save your own work for later use, however, your best bet is a cassette or a diskette. This is because you cannot buy blank cartridges to store information or programs. And if you *are* allowed to save your work on a program cartridge, there usually is not much storage space available.

### **Cassettes: For Commercial Programs and Your Own Work**

When buying commercial software programs, cassettes are the least expensive type of software to buy, ranging in price from about \$5 to \$30 per cassette. You will need a cassette player to use cassettes. The cassette player lets you load programs from a cassette into the

If you already have a good cassette recorder and you don't mind connecting a few extra cables, you can get an *interface* to connect your recorder to your VIC or 64. The cassette interface is a cable that serves as an adapter between the computer and a standard cassette player. It changes the type of electrical impulse so that the two pieces of equipment can communicate. Suitable adapters are sold at most stores that sell computer equipment.

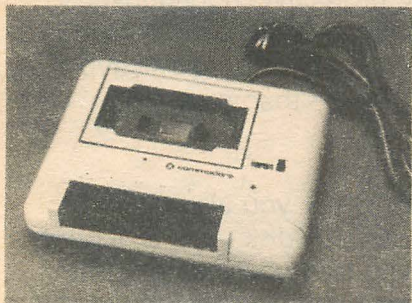
### **Diskettes: More Storage, Higher Cost**

Diskettes (sometimes called *floppy disks* or simply *disks*) look like thin stereo records. Programs are stored on the magnetic surface of the disk inside the protective, nonremovable jacket. When you buy commercial software programs on diskettes, these programs typically cost about \$5 more than cassette programs.

If you are using diskettes, you also need a Commodore *disk drive*. A disk drive is like the stereo on which you play your records. The disk head inside the drive goes directly to the program that you want to run—much like a stereo needle. Loading a program into the computer from a disk drive is much faster than loading a program from a cassette player.

computer. It also lets you record information you've put into the computer onto a cassette.

If you are using cassettes, you will most likely want to get Commodore's Model 1530 Datasette tape recorder. Although it works like an ordinary cassette recorder, the Datasette records information *digitally*, which prevents any kind of electronic interference (radio waves or microwaves, for example) from altering your programs when you send them from the cassette to the computer. It also sends your programs at a greater speed than a regular cassette player, and it tends to be much more precise.



Datasette recorder, to be used with cassettes for the VIC and 64.

A Datasette recorder costs approximately \$75, as compared to the \$35 to \$45 cost for a regular recorder. However, because of its advantages, many people consider a Datasette worth the investment. You can purchase a Datasette at most computer stores.



Commodore disk drive, to be used with diskettes for the VIC and 64.

Although blank diskettes (for storing your own data and programs) are relatively inexpensive, blank diskettes still cost about three times as much as blank cassettes. The disk drive itself costs hundreds of dollars. In the long run, however, diskettes may save you money.

Disk programs certainly have their advantages. First, they are much faster to load into the computer. Second, they are more reliable: every program saved on a diskette is automatically verified, to make sure that the copy matches the original. (Doing this with a cassette takes extra steps.) And third, each diskette can hold twenty or more programs, as opposed to the recommended one program on each side of a cassette. Therefore you will need fewer diskettes because they can hold more. If you create a lot of your own programs or store a lot of information, diskettes may be cheaper and more manageable than cassettes in the long run.

## **Why Not Use Both Cassettes and Diskettes?**

Eventually, you may want to have both a disk drive and a cassette recorder. You can use the disk drive for your own programs and those sold or exchanged on diskette, but hang on to the cassette recorder for the many programs available only on cassette.

This ends our list of essential equipment for your computer. You'll read about other often-used gear in Chapter 4, "Peripherals." You'll also learn more about buying and using software programs in Chapter 5, "Software."

## **WHAT COMPONENTS COME WITH YOUR COMPUTER?**

Your computer comes with the following components:

- The *computer keyboard console*, which contains the keyboard and the circuitry that runs the computer.
- A *TV/game switch box*, which allows you to use the TV either as a TV or as a screen for your computer.
- A *modulator* (FOR THE VIC ONLY), which you connect to both the computer and the TV. The modulator converts the VIC's video output into a signal that most TVs can understand. (The modulator for the 64 is built into the computer.)
- A *hook-up cable*, which connects the TV/game switch box to the modulator (ON THE VIC) or to the computer (ON THE 64).

- A *power connector box*, which connects to the computer and an electrical outlet. This component gives the computer the power to run.
- An *instruction book* and some *important papers*. Don't lose any of these, especially the warranty card. If anything goes wrong with your computer during the first three months you have it, your dealer may give you another in trade, as long as you can prove when and where you bought it.

You will also need a *television* or *monitor*, which lets you view what you type into the computer, as well as the computer's responses to you.

Now it's time to get started. The next few pages will show you how to set up your computer.

## **HOOKING UP YOUR COMPUTER IS EASY**

Connecting your computer takes longer to describe than to do, and there is almost nothing you can do in the process that will hurt the computer. To connect your computer to a home TV, simply perform the steps shown in the photos and easy-to-follow instructions presented in this section. Where the instructions differ between the VIC and the 64, follow the instructions for the type of computer that you have. (If you are using a monitor instead, follow the directions that came with your computer.)

### **CONNECTING THE TV/GAME SWITCH BOX**

To hook either the VIC or the 64 to a TV, the only tool you'll need is a screwdriver that fits the screws on your TV's antenna connection.

Before you start, it is a good idea to write down exactly how the TV is connected to the antenna wire or cable. Then you can put things back as they were. Write down or draw a sketch of the TV antenna connections now.

IF YOUR TV HAS A FLAT ANTENNA WIRE, follow Steps 1–3.

IF YOUR TV HAS A ROUND ANTENNA CABLE, follow Steps 4–5.

### **STEP 1**

Disconnect the flat antenna wire from the VHF (Very High Frequency) connectors on the back of the television. This usually involves loosening two screws and sliding out two spade-shaped connectors attached to the flat antenna wire.

### **STEP 2**

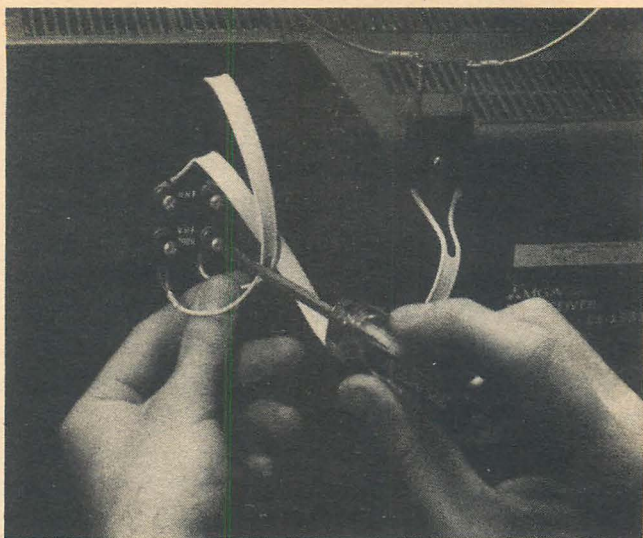
Attach these same two spade connectors under the two screws at the bottom of the TV/game switch box.

### **STEP 3**

Then, attach the spade connectors on the similar wire that comes out of the side of the TV/game switch box to the VHF antenna screws on the back of the TV. This puts the switch box in line with the original antenna hookup so all VHF antenna signals go first through the switch box, then into the TV.

### **STEP 4**

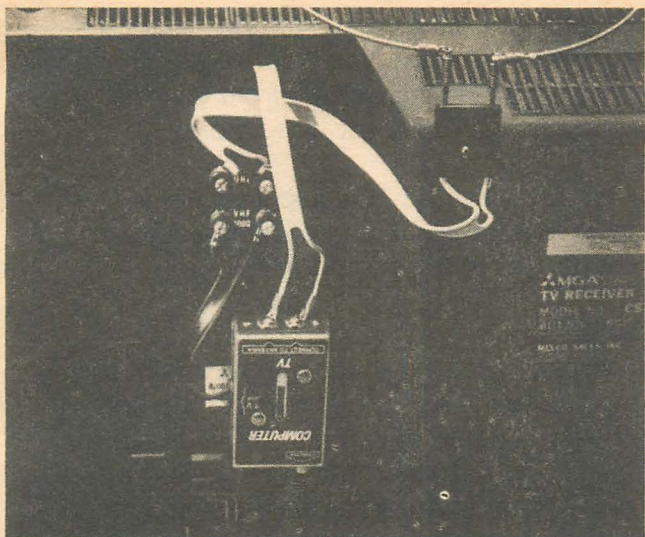
For a TV with a direct 75 ohm connector cable, there are different steps to perform.



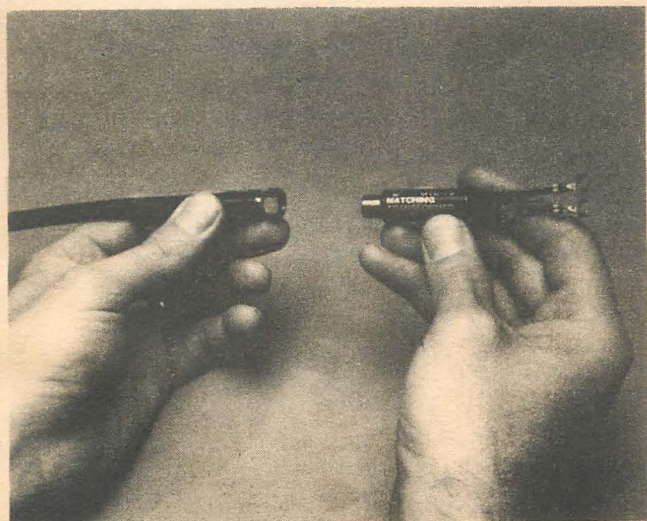
**STEP 1**



**STEP 2**



STEP 3



STEP 4

Unless your TV/game switch box already has a 75 ohm connector, you will need a 75–300 ohm *transformer*, available from your cable TV company or from most video stores.

First, unscrew the TV cable from the TV, and then screw the cable into the threaded end (F connector) of the transformer.

### **STEP 5**

Then, connect the spade connectors of the transformer under the screws on the bottom of the TV/game switch box. Then attach the spade connectors on the wire coming out of the TV/game switch box to the VHF antenna screws on the back of the TV.

If you have this type of TV cable and the TV does not work with the computer after you've completed all the steps in this chapter, you also may need to change a switch or connect a jumper wire on the back of the TV. Your TV manual should tell you if you need to do this, or the store where you bought the TV or computer can probably help.

## **HOOKING UP THE MODULATOR—VIC 20 ONLY**

IF YOU ARE CONNECTING A 64 COMPUTER TO A TV, the modulator is already built into the computer's case. Skip to Step 10 in the next section, "Making the Cable Connections—Commodore 64."

IF YOU ARE CONNECTING A VIC 20 TO A TV, follow Steps 6–9.

### **STEP 6**

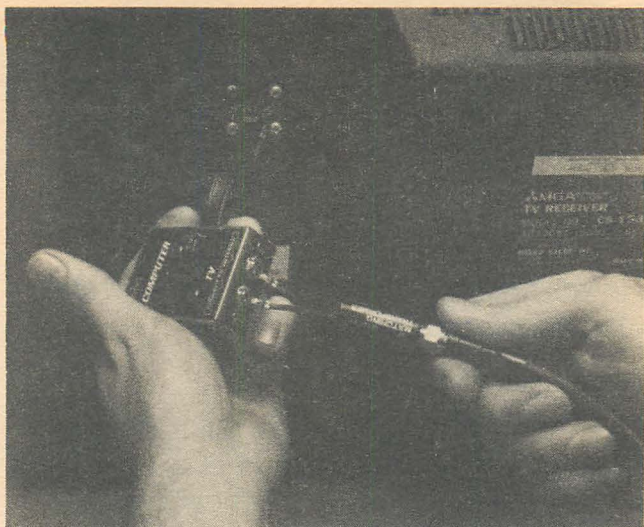
Turn the VIC so you can see the back clearly. Notice that the back has several slots, one on your left and two on your right. Between these slots are two holes for circular connectors. The *TV output* hole is the one to the left (the one with five pins). This is where you attach the cable from the modulator, through its five-pin connector (often called the *DIN connector*).

### **STEP 7**

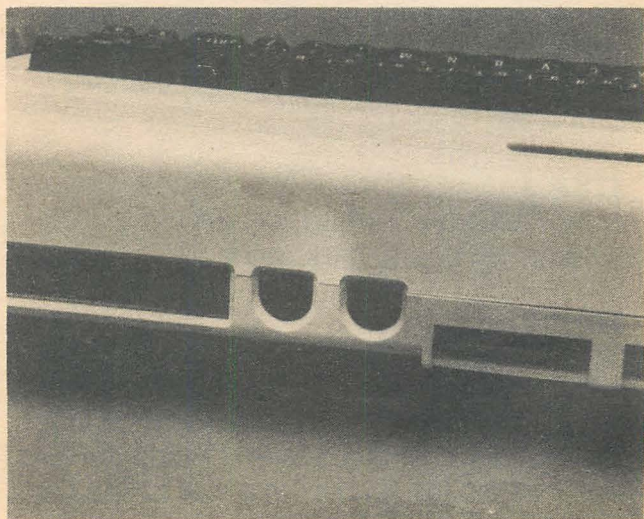
Now attach the modulator cable to the TV output hole on the back of the VIC.

### **STEP 8**

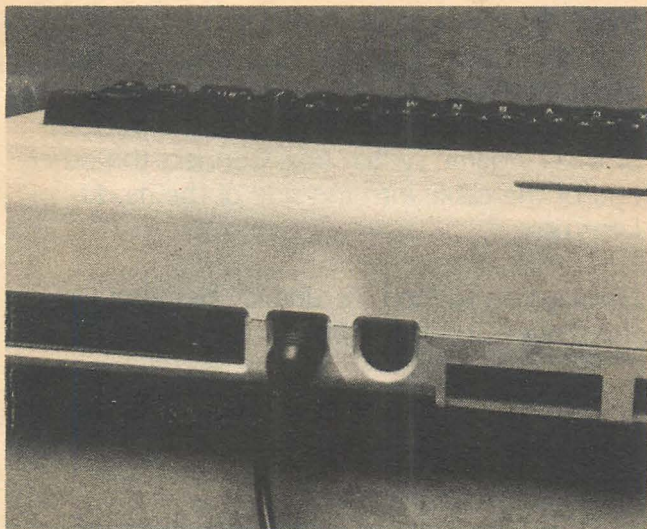
Next, find the small slide switch marked CH3 and CH4, located at the end of the modulator box closest to the cord. These marks stand for TV Channels 3 and 4. Slide the switch toward the mark for the channel that is least used in your area. Even if both are local stations, the computer will still work.



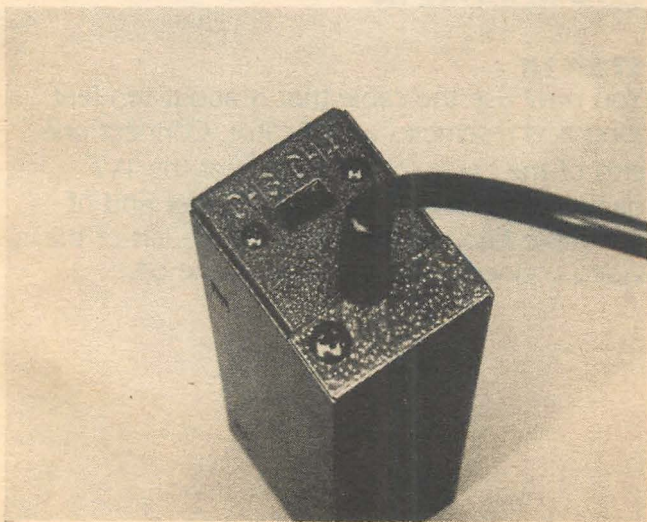
**STEP 5**



**STEP 6**



**STEP 7**



**STEP 8**

## **STEP 9**

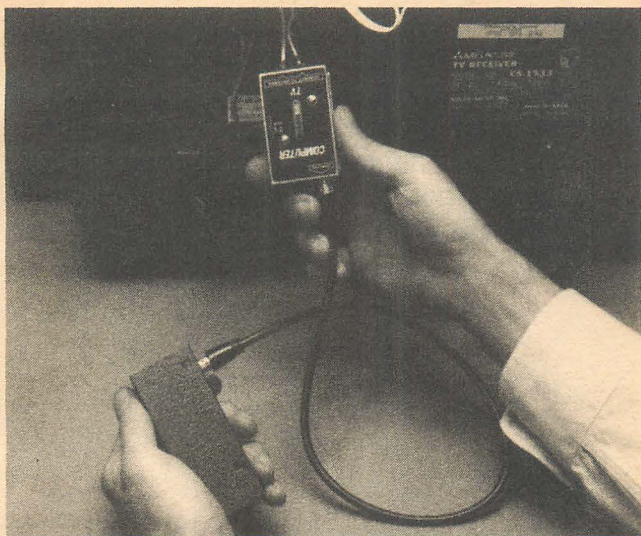
You now have one cable left, which is about three feet long and resembles a hi-fi cable. Connect one end of the cable to the bottom of the TV/game switch box. Connect the other end of the cable into the side of the modulator box.

Now go on to Step 12, under "Hooking Up the Power Connector Box."

## **MAKING THE CABLE CONNECTIONS— COMMODORE 64**

### **STEP 10**

You now use the cable that is about ten feet long and resembles a hi-fi cable. Connect one end of the cable to the bottom of the TV/game switch box. Connect the other end of the cable into the small hole to the left of the video connector on the back of the 64.



STEP 9



STEP 10

## **STEP 11**

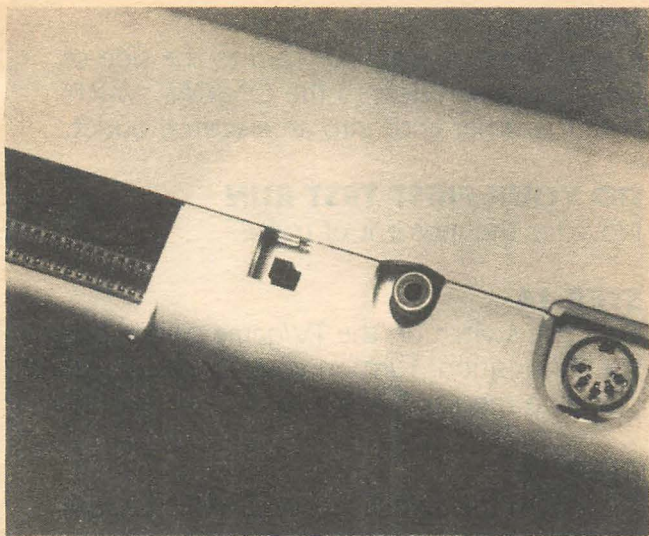
Now locate the slide switch on the back of the 64 that selects either Channel 3 or Channel 4 on the TV. Slide the switch toward the mark for the channel that is least used in your area. Even if both are local stations, the computer will still work.

## **HOOKING UP THE POWER CONNECTOR BOX**

Once you hook up the power connector, your computer should be ready to work.

## **STEP 12**

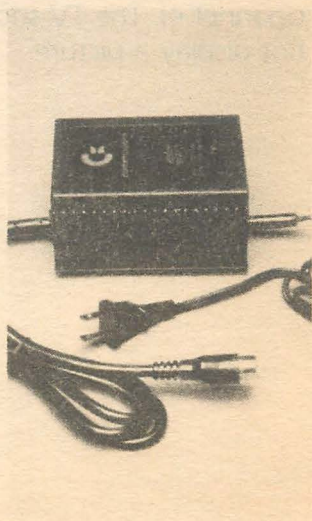
First, locate the power connector box, which has a cord attached to each end. One of the cords is an ordinary electrical outlet plug. The other end has a small connector that goes into the side of the computer.



STEP 11



STEP 12-VIC 20



STEP 12-COMMODORE 64

### **STEP 13**

Connect the appropriate cord to the side of your computer, next to the ON/OFF switch. Plug the other cord into an electrical outlet.

### **DO YOUR FIRST TEST RUN**

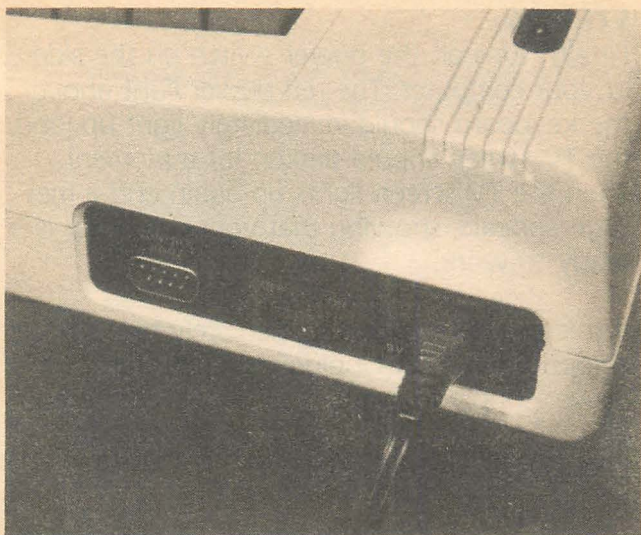
Now for the moment of truth.

### **STEP 14**

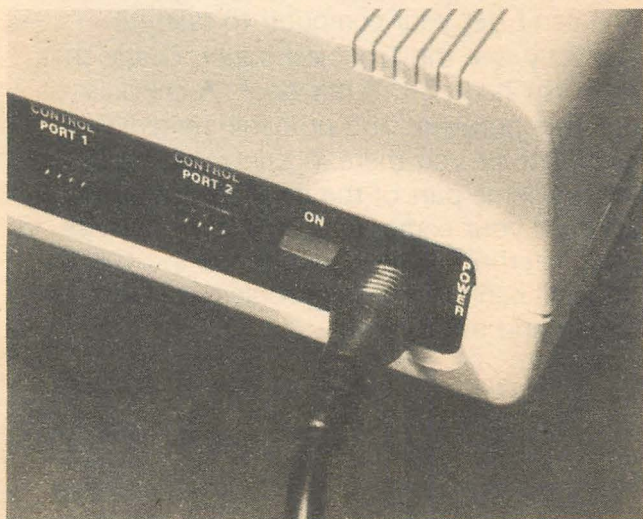
Turn the switch on the TV/game switch box to the TV position. Turn on your TV set. It should display a regular TV picture.

### **STEP 15**

Now turn the switch to the GAME position. Change the TV channel to the channel on which the modulator slide is set (Channel 3 or Channel 4). The TV should stay on, but it will not display a picture.



STEP 13—VIC 20



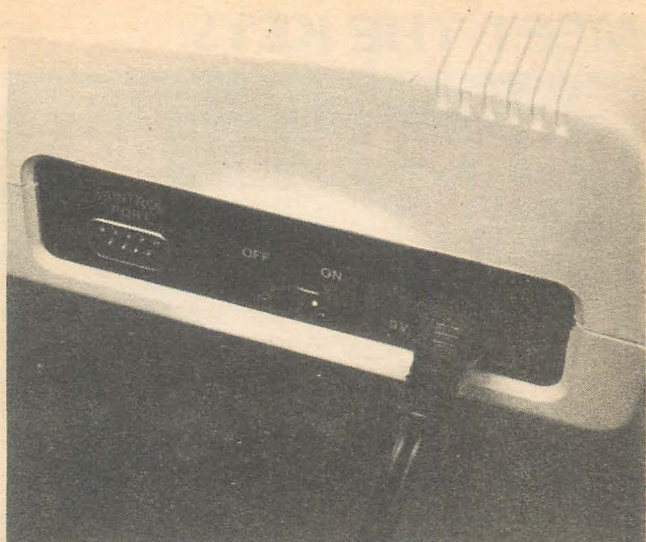
STEP 13—COMMODORE 64

## **STEP 16**

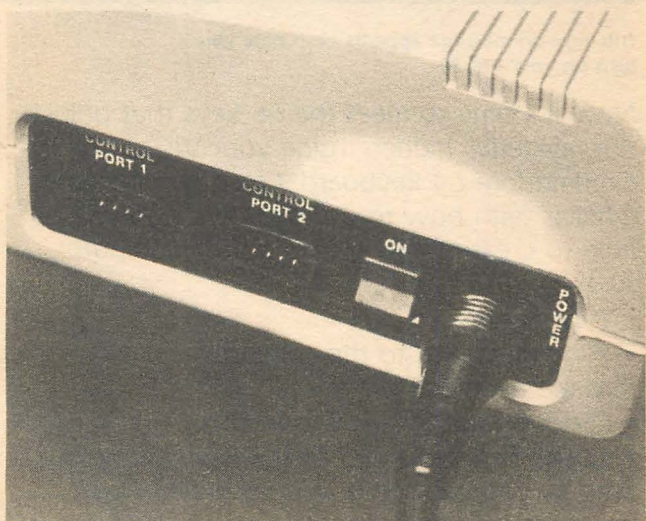
Finally, turn on the power switch on the side of your computer. The red power light above the keyboard should immediately light up, and the TV screen should darken for a moment. Then the TV screen lights up again and a message appears, showing that your computer is ready to work.

If this doesn't happen, immediately turn off the computer and TV. Unplug the computer power supply from the wall outlet. Before you plug it in again, be sure to check all of your connections very carefully.

If you don't find anything wrong, try plugging in and turning on the computer again. If you still can't get your computer to operate correctly, see the Troubleshooting Guide that follows Chapter 4 of this book. A checklist of possible problems and probable remedies is provided for you there. Possibly you have missed some part of the necessary setup, or perhaps your computer is in need of service. If after referring to the Troubleshooting Guide, you still cannot find the problem, call your dealer and ask for help.



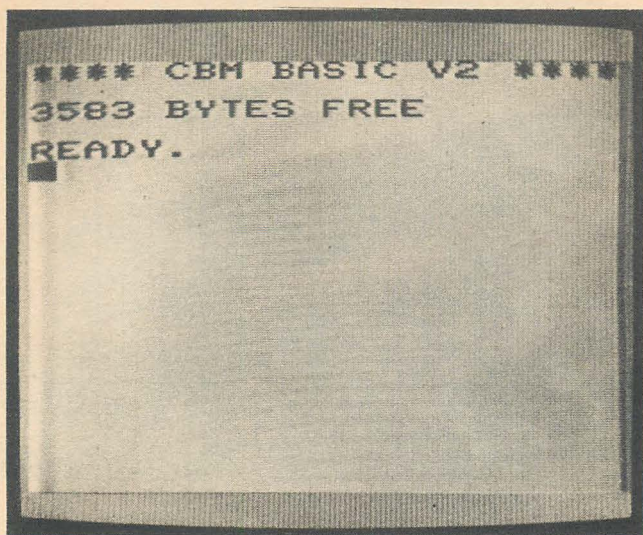
STEP 16—VIC 20



STEP 16—COMMODORE 64

## CHAPTER 3

# MEET THE KEYS



This sign-on message appears each time you turn on your VIC 20.

Now it's time to meet the 66 keys that unlock the mysteries hidden inside your VIC 20 or Commodore 64 keyboard. Once you become familiar with how to use the keys, you will be able to create many things on the computer, such as:

- Type words
- Type messages to the computer
- Make pictures
- Perform mathematical functions

You will be introduced to the keys a few at a time so you can see how they work. Once you complete this chapter, you will be familiar with *all* of the keys on the keyboard.

## **KEY COMBINATIONS: THE HELPER KEYS**

Each key can perform at least three different chores, with the help of some silent partners: the SHIFT key, the C= key, and the CTRL key.

For now, try not to touch the keys that carry out the more difficult chores. Do not push the following keys until you've been shown how to use them:

- RUN/STOP
- RETURN
- INST/DEL
- Any key pushed at the same time as the SHIFT key, CTRL key, or C= key
- The number keys
- The function keys (f1, f3, f5, and f7)

## **YOUR COMPUTER'S VOCABULARY: BASIC COMMAND WORDS YOU SHOULD LEARN**

Your computer has been programmed to understand approximately 70 words, called *commands*. These commands instruct your computer system to perform certain tasks or run any programs that you buy. When you want to type a command, you'll find the letters arranged exactly as they are on a standard typewriter keyboard (called the *QWERTY* keyboard, because the top row of alphabet keys begins with the letters Q, W, E, R, T, and Y).

As you practice the exercises in this chapter, you will learn some of the commands and all of the punctuation symbols that have special meaning to your VIC 20 or Commodore 64 computer. A list of some of the most frequently used commands follows Chapter 4 of this book.

## **AND NOW: TIME TO BEGIN!**

The keyboard exercises in this chapter should be done in the order in which they are presented. Some exercises are intended to be done as a group. If you are directed not to clear the screen at the end of an exercise, you should go on to do all the exercises in that group before clearing the screen or turning off the computer. At other places, you will be directed to clear the screen at the end of an exercise. These are the best places for you to take a break or to turn off the computer and stop for the day.

If you aren't sitting in front of your computer, go over to it now. Then, turn on your computer and TV so you can practice using the keyboard.

## **CURSOR CONTROL KEYS: MOVING EDITORS**

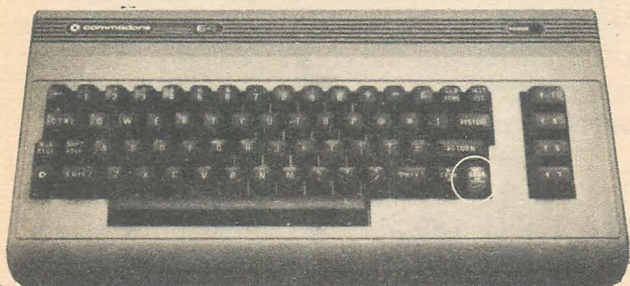
Every time you turn on the computer and TV, a sign-on message appears on the screen to tell you that the computer is working. Notice the small block of light that flashes on and off.

This block, known as the *cursor*, is your blinking "magic place marker." The cursor tells you exactly where you are in the messages that you send to or receive from your computer. Whenever you type, the characters will appear on the screen at the cursor position. The blinking cursor will always be your guide, showing what your computer has understood.

The CURSOR LEFT/RIGHT key and the CURSOR UP/DOWN key can move the cursor on the screen to any position you want. If there is a letter or number anywhere on the screen, the cursor just passes over it, without disturbing a thing. If you let the cursor rest on a letter already on the screen, that letter will also blink on and off, just like the cursor does. If you want to change the blinking letter to another letter, you can, just by pressing the new letter. Instantly, the old letter will be replaced by the new one.

NOTE: When you use the cursor movement keys, you will also use either of the SHIFT keys, located on both sides of the keyboard. Just as with a typewriter keyboard, the SHIFT key, when used with any key that has two symbols on its face, performs the function on the upper part of the face. When pressed by themselves, the SHIFT keys do nothing at all. You will learn more about the SHIFT keys later in this chapter. But for now, learn to use SHIFT with the cursor movement keys as you try these exercises.

# CURSOR LEFT/ RIGHT KEY



**CURSOR LEFT/RIGHT** key



This is the key with the letters CRSR and the arrows pointing right and left, located at the lower right side of the keyboard. Now let's move the cursor to the right on the screen. To do this, press the **CURSOR LEFT/RIGHT** key nine times. The blinking cursor should now appear two lines below the S in the word BYTES.

**SCREEN 1**

Now, hold the same key down. What happens when it gets to the end of the line? It jumps over to the left side of the screen and down one line to continue merrily on its way. This is called *wrap-around*, meaning that the cursor wraps around the back of the screen and starts at the beginning of the next line.

## **SCREEN 2**

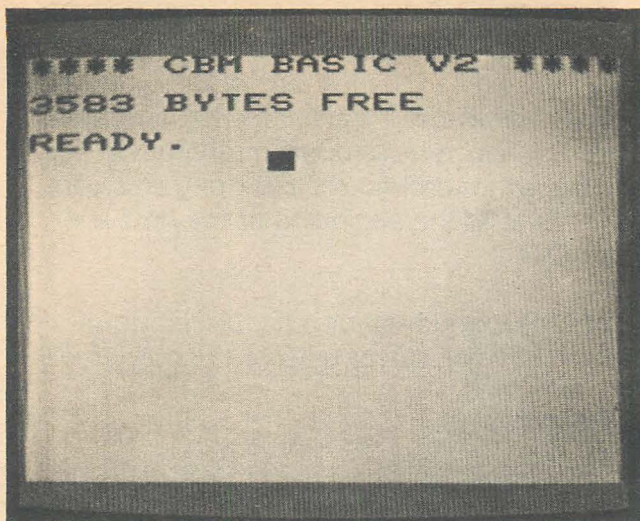
Hold the key down for a bit, but let go of the key before the cursor reaches the bottom of the screen.

## **SCREEN 3**

(NOTE: If you have accidentally made the cursor go to the bottom of your screen and watched in horror as the sign-on message scrolls off the top of the screen and disappears, don't panic. Just turn your computer off and back on again. The sign-on message will reappear, and you can do the exercise again.)

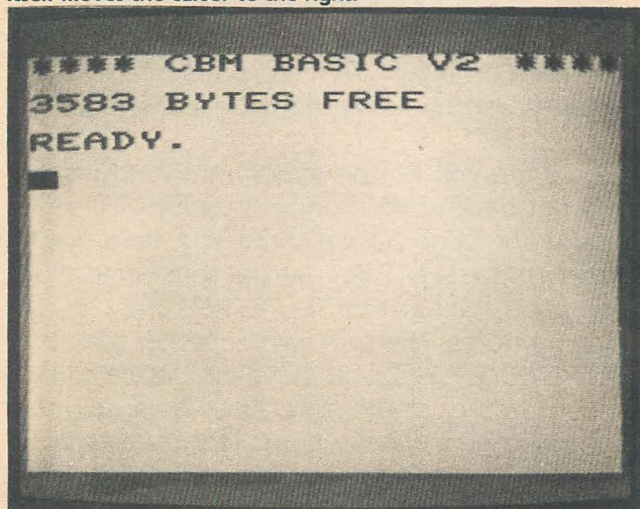
Where are you on the screen now? How can you get back to your original position? If you only want to go back a short way, hold down either of the SHIFT keys at the same time that you press the CURSOR LEFT/RIGHT key. Each time you press the two keys together (called *shifted cursor left*), you move one space to the left, instead of to the right. Now hold down both keys and watch your cursor retrace its steps to the left and back up the screen, line by line.

## **SCREEN 4**



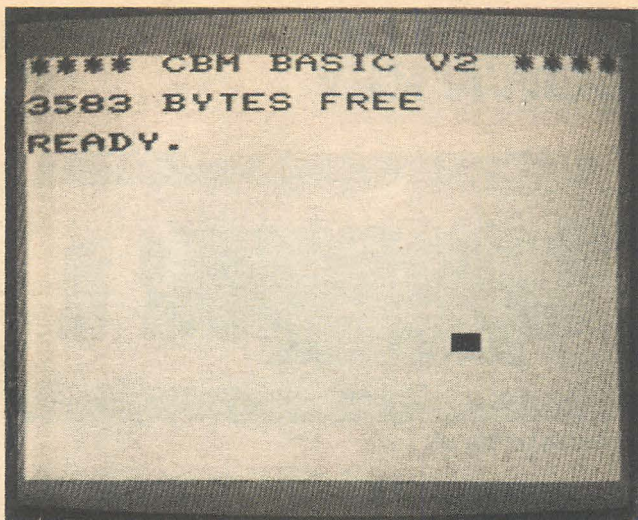
#### SCREEN 1

Pressing the CURSOR LEFT/RIGHT key by itself moves the cursor to the right.



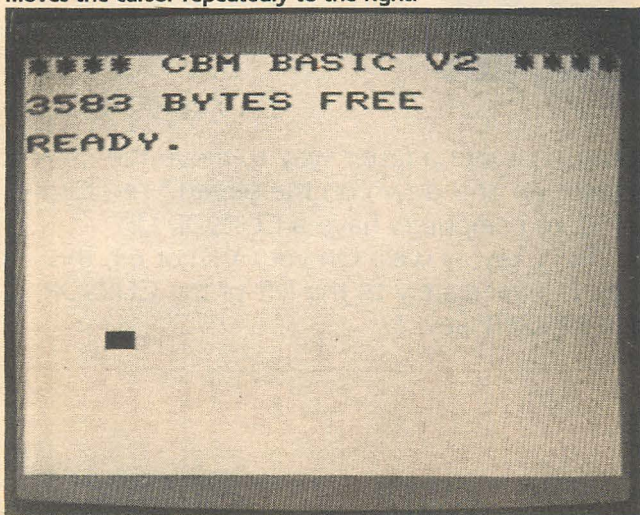
#### SCREEN 2

Once the cursor reaches the end of a line, it wraps to the beginning of the next line.



**SCREEN 3**

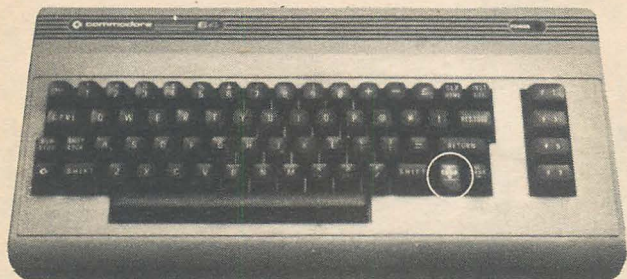
Holding down the CURSOR LEFT/RIGHT key moves the cursor repeatedly to the right.



**SCREEN 4**

SHIFT plus the CURSOR LEFT/RIGHT key moves the cursor to the left.

# CURSOR UP/ DOWN KEY



**CURSOR UP/DOWN key**



But isn't there a faster way to move the cursor up and down on the screen? Yes, Commodore computers have a CURSOR UP/DOWN key as well. On your VIC or 64, this key is immediately to the left of the CURSOR LEFT/RIGHT key.

Start by holding down the CURSOR LEFT/RIGHT key to put the cursor somewhere in the middle of the screen.

### **SCREEN 1**

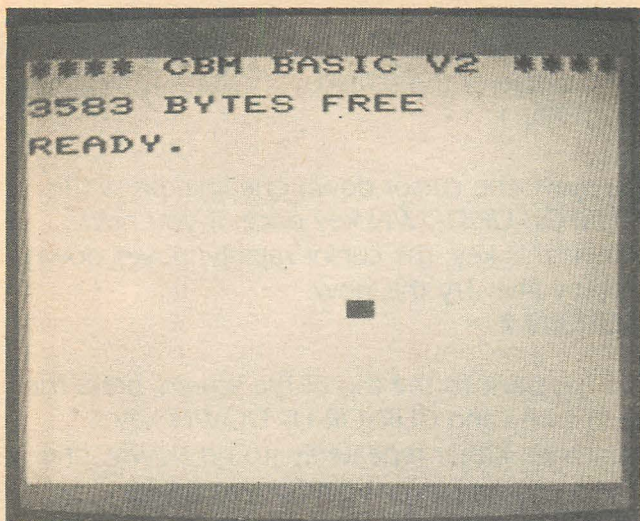
To move the cursor down one line, press the CURSOR UP/DOWN key once. If you hold down this key, the cursor rapidly moves down line by line. Try this now.

### **SCREEN 2**

To get back to the top of the screen, press the SHIFT key and CURSOR UP/DOWN key together, either repeatedly (to go slowly, one line at a time) or just held down (to go quickly).

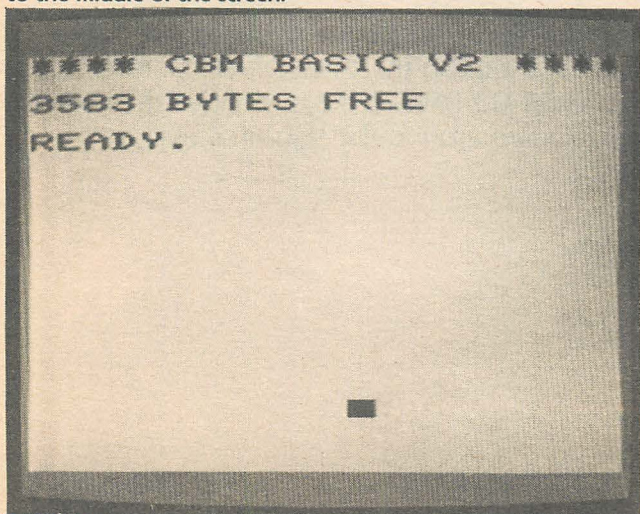
### **SCREEN 3**

When the cursor is back at the top of the screen, try using the CURSOR UP/DOWN and CURSOR LEFT/RIGHT keys to move the cursor in a square around the sign-on message.



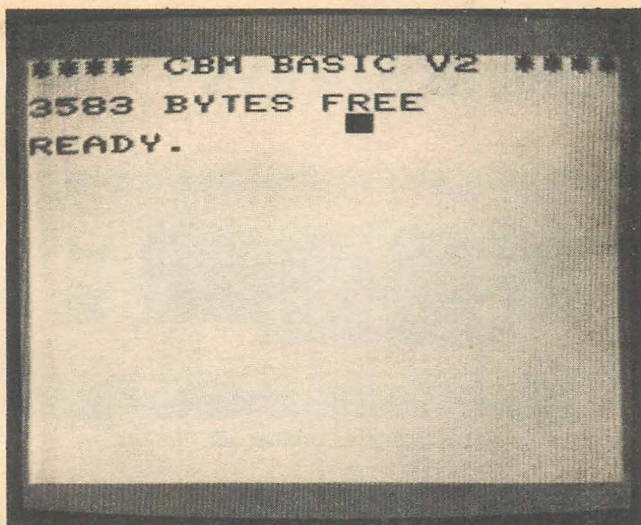
#### SCREEN 1

Use the CURSOR LEFT/RIGHT key to move to the middle of the screen.



#### SCREEN 2

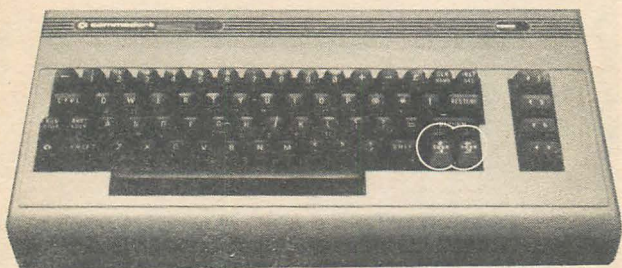
Pressing the CURSOR UP/DOWN key by itself moves the cursor down.



**SCREEN 3**

SHIFT plus the CURSOR UP/DOWN key  
moves the cursor up the screen.

# EDITING WITH CURSOR CONTROL KEYS



**CURSOR UP/ DOWN keys • CURSOR LEFT/RIGHT**



Another easy thing to do with the cursor keys is to change a specific letter or number anywhere on the screen. For example, let's change the word FREE to UNUSED. First, use the CURSOR UP/DOWN key to get to the correct line, then, the CURSOR LEFT/RIGHT key until the cursor is blinking on top of the letter F in the word FREE.

#### **SCREEN 1**

Now, press the U key. You have just erased the F and replaced it with a U, and the cursor has moved one space to the right to blink on top of the R.

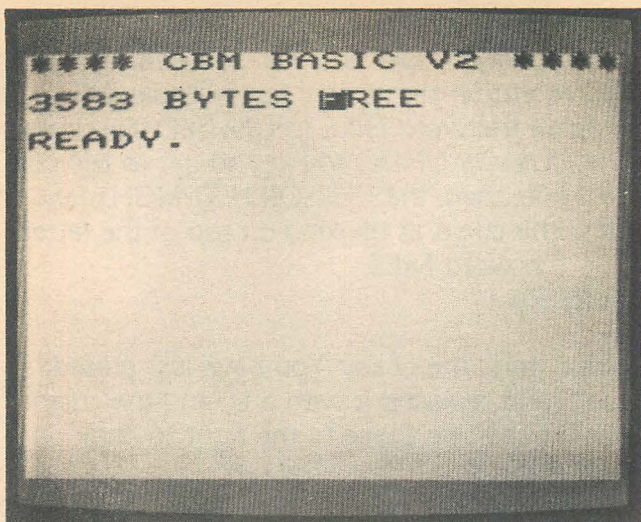
#### **SCREEN 2**

Press the N key to replace the R. The cursor now rests over the first E.

#### **SCREEN 3**

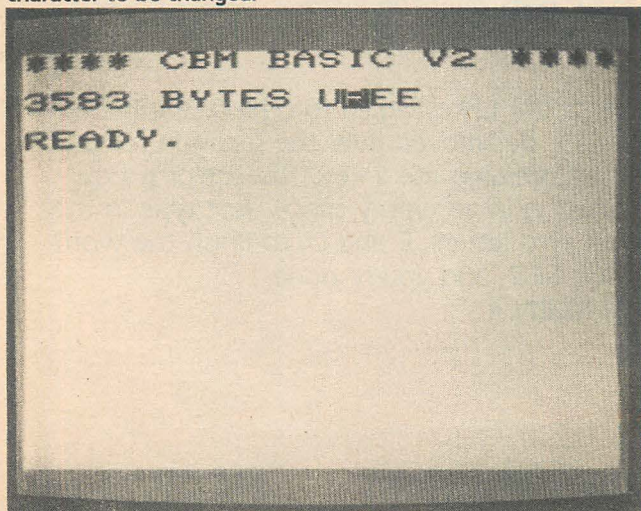
Press the U key again to replace the E. The cursor has moved over the second E. Replace it by pressing the S key. The cursor is now blinking in an empty space. Just type in the last two letters, E and D, to finish the word UNUSED, and you're done.

#### **SCREEN 4**



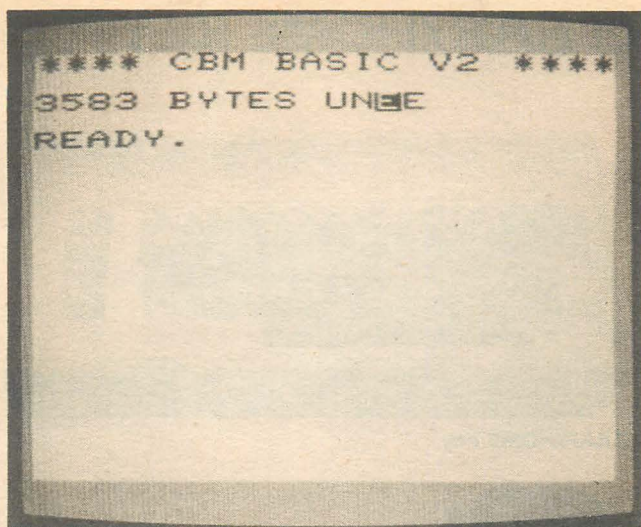
**SCREEN 1**

To edit, position the cursor over the first character to be changed.



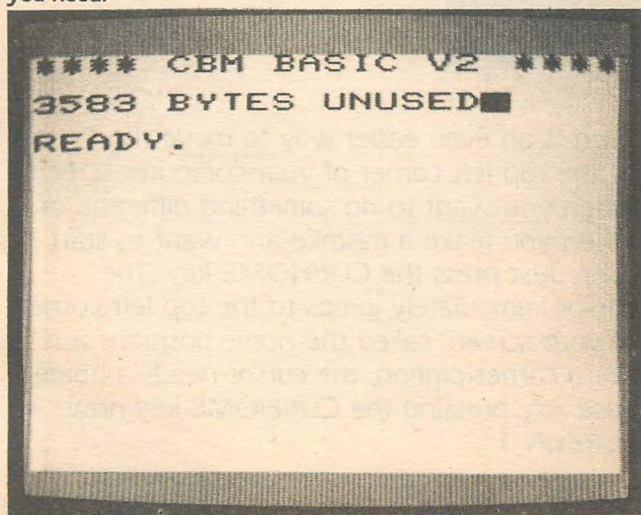
**SCREEN 2**

Once a character has been changed, the cursor moves to the right.



### SCREEN 3

You can type over as many characters as you need.



### SCREEN 4

Type characters over blank spaces, too, to complete the new word.

# CLEAR/HOME KEY



**CLEAR/HOME key**



There's an even easier way to move the cursor to the top left corner of your computer screen when you want to do something different, or when you make a mistake and want to start over. Just press the CLR/HOME key. The cursor immediately jumps to the top left corner of your screen, called the *home* position. Just like a carrier pigeon, the cursor needs a home base. Try pressing the CLR/HOME key now.

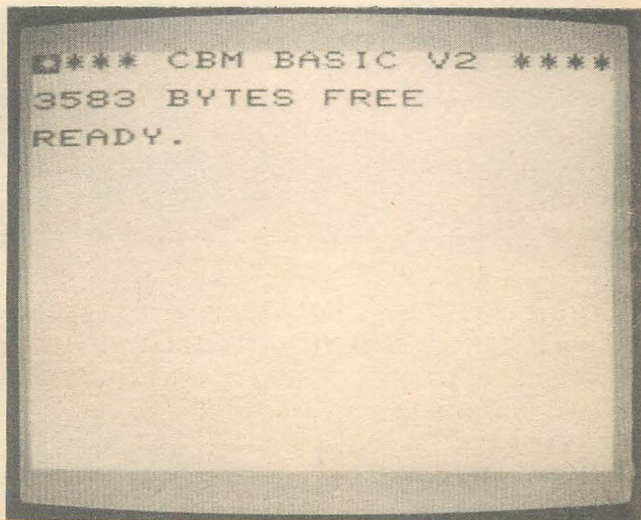
**SCREEN 1**

Now move the cursor down to the center of your screen and type in a few letters.

## SCREEN 2

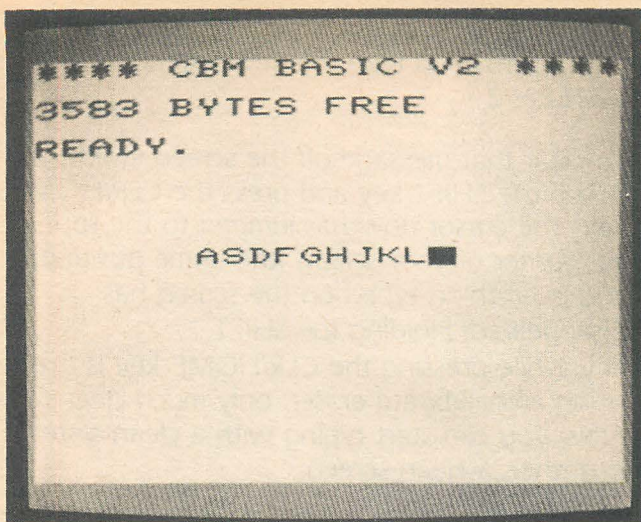
To clear that message off the screen, hold down the SHIFT key and press the CLR/HOME key. The cursor now has jumped to the top left corner of your screen (the home position) and everything typed on the screen has disappeared! Holding the SHIFT key while pressing the CLR/HOME key is like using a chalkboard eraser, only much cleaner. Now you can start typing with a clean slate—or rather, a clean screen.

## SCREEN 3



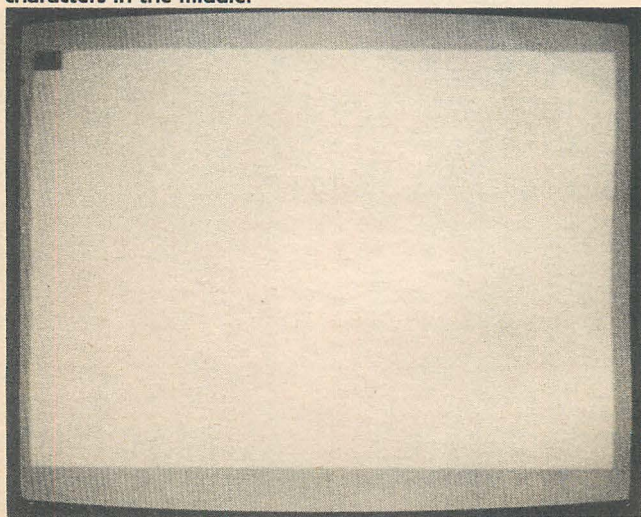
## SCREEN 1

Pressing CLR/HOME by itself moves the cursor to its *home* position.



### SCREEN 2

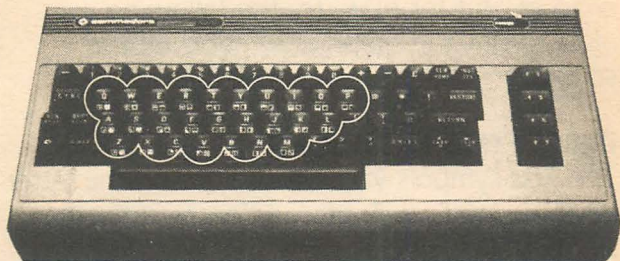
Before clearing the screen, type some characters in the middle.



### SCREEN 3

Pressing SHIFT and CLR/HOME together wipes everything off the screen.

# LETTER KEYS



## LETTER keys

### GRAPHICS MODE: MAKING PICTURES

Take a look at the keys on your keyboard. You have already seen that some keys have two symbols printed on their top faces, such as the CURSOR LEFT/RIGHT and UP/DOWN keys and the CLR/HOME key. Notice that many of the keys also have one or two pictures printed on the front side of the key cap. These symbols, called *graphics symbols*, let you print pictures on the screen. You can do this when you use the SHIFT or SHIFT LOCK key in combination with any key that has a graphics symbol printed on it—as long as you are using the computer's Graphics Mode. You also can use the C= key with other keys to produce graphics symbols, even if you are not in the Graphics Mode.

Whenever you turn on your VIC or 64, the computer is automatically in the Graphics Mode. You will learn about the other modes, Text Mode and Quote Mode, later in this chapter. But for now, try the following exercises to put the graphics symbols on the screen.

### **FIRST, THE LETTER KEYS**

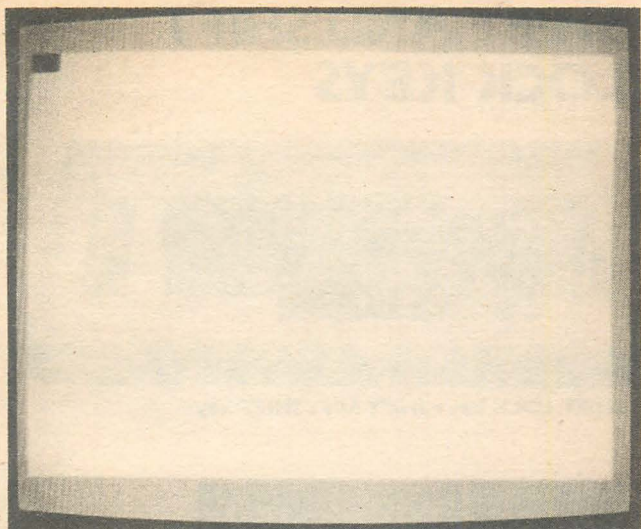
The first symbols you will use are on the letter keys (Q, W, E, R, T, etc.). Before you try the symbols, first see how the letters appear on the screen when you press each letter key by itself. If your screen is not already clear, clear the screen by holding down the SHIFT key and pressing the CLR/HOME key.

#### **SCREEN 1**

Now press each letter key by itself, starting with the top row of letter keys. When you are done, your screen displays all uppercase letters.

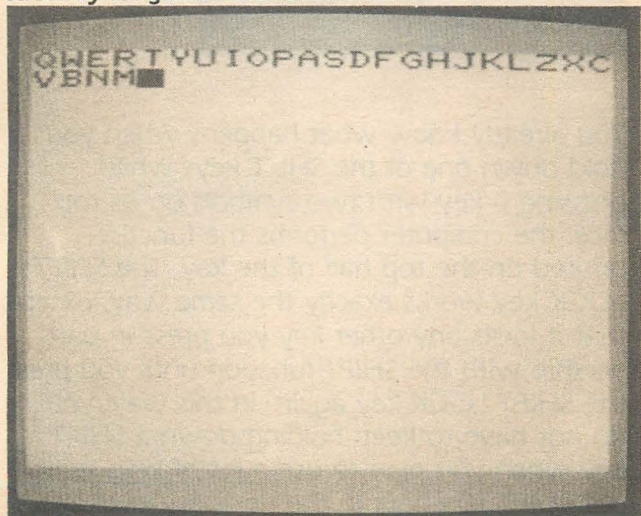
#### **SCREEN 2**

*Do not clear the screen and do not turn off the computer before going on to the next exercise.*



**SCREEN 1**

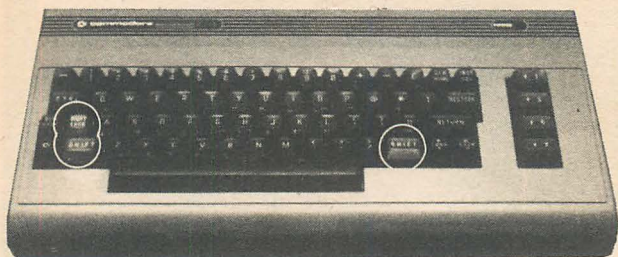
To begin this exercise, start with a clear screen by using SHIFT with CLR/HOME.



**SCREEN 2**

The letters you type appear as capital letters.

# SHIFT AND SHIFT LOCK KEYS



SHIFT LOCK key • SHIFT key • SHIFT key



You already know what happens when you hold down one of the SHIFT keys while pressing a key with two symbols on its top face: the computer performs the function printed on the top half of the key. The SHIFT LOCK key works exactly the same way, except that it locks any other key you press in partnership with the SHIFT function until you press the SHIFT LOCK key again. In this way, you do not have to keep holding down a SHIFT key when you plan to use a lot of keys with the SHIFT function. In the next few exercises,

you will use a SHIFT key or the SHIFT LOCK key in combination with the letter keys to display the graphics symbol on the right side of each key.

## **USING SHIFT**

The letter S key has a picture of a heart on its right-hand side. To place this picture on the screen, hold down either SHIFT key and press the letter S now. A heart appears.

### **SCREEN 1**

Now, hold down a SHIFT key and press the letters A, Z, and X. The graphics symbols of a spade, diamond, and club appear on the screen next to the heart.

### **SCREEN 2**

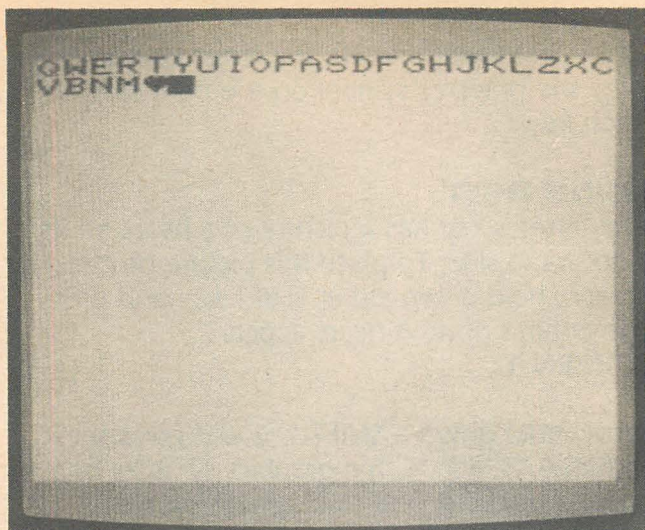
## **USING SHIFT LOCK**

To display the other right-hand graphics symbols on the letter keys, first press the SHIFT LOCK key to lock the SHIFT function into action. Then, press each of the letter keys, beginning with the top row. *Press only the letters for now, and press each letter only once.* Watch as many different symbols appear.

### **SCREEN 3**

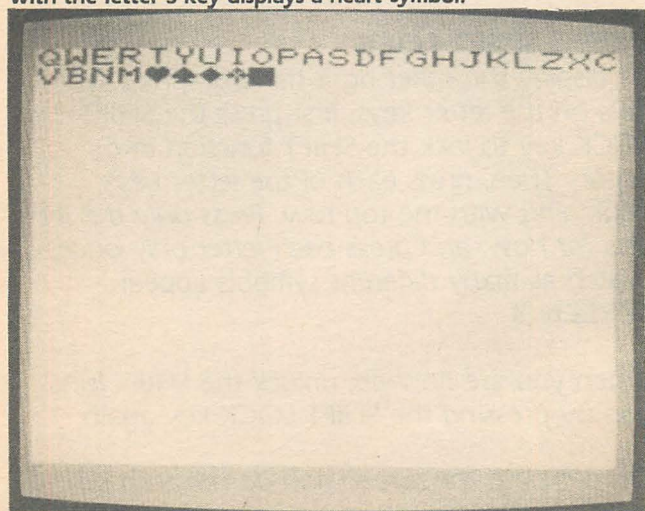
When you are finished, unlock the SHIFT function by pressing the SHIFT LOCK key again.

*Do not clear the screen and do not turn off the computer before going on to the next exercise.*



**SCREEN 1**

In the Graphics Mode, pressing a SHIFT key with the letter S key displays a heart symbol.

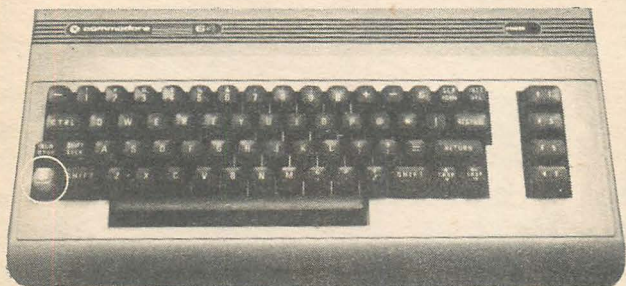


**SCREEN 2**

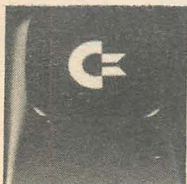
SHIFT plus a letter key displays the graphics symbol on the right-hand side of the key.



# C= KEY



C= key



## C= PLUS THE LETTER KEYS

How do you display the symbols that appear on the left side of the letter keys? This is easily done by holding down the C= key while pressing each letter key. The C= key is popularly called the *bird* key because it resembles a bird's head and beak. If you use the C= key with a key that doesn't have graphic symbols, you get the same symbol as if you had held down the SHIFT key. The C= key has other functions as well, which you will learn about soon.

For now, hold down the C= key and press each of the letter keys. (Be sure *not* to hold SHIFT and *not* to have the SHIFT LOCK key down.) Watch as the left-hand graphics symbols appear on the screen, following the right-hand symbols you typed before.

## **SCREEN 1**

Previously, when you pressed a letter key by itself, the letter appeared in uppercase on the screen. There may be times, however, when you will want to use both upper- and lowercase letters. You can do this by entering the Text Mode.

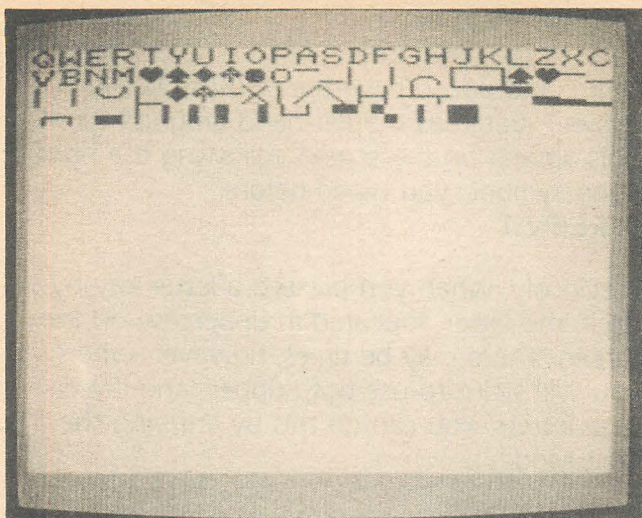
## **USING SHIFT AND C= KEYS TOGETHER**

To turn on the Text Mode, you hold down a SHIFT key and press the C= key. Try this now.

- The uppercase letters have turned into lowercase letters.
- The graphics symbols that appeared when you used SHIFT plus a letter key have turned into uppercase letters.
- The graphics symbols created by pressing the C= key with a letter key remain unchanged.

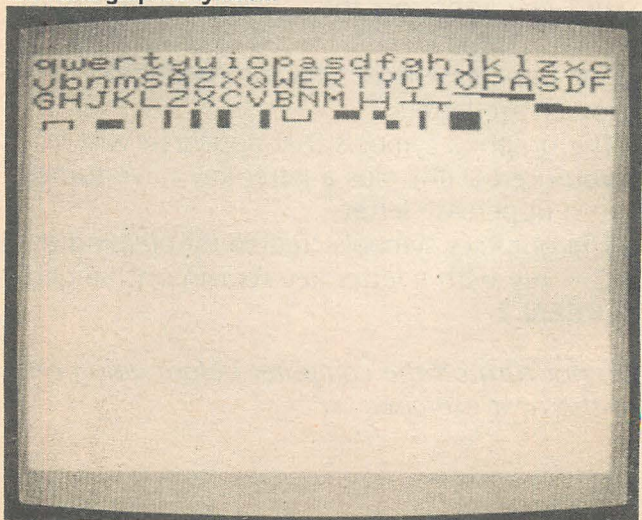
## **SCREEN 2**

*Do not turn off the computer before going on to the next exercise.*



**SCREEN 1**

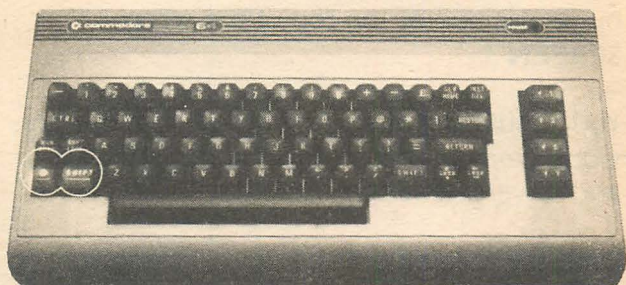
Use C= with a letter key to display the left-hand graphics symbols.



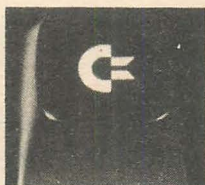
**SCREEN 2**

Use both SHIFT and C= to enter the Text Mode, and watch as some characters change on the screen.

# USING TEXT MODE



**SHIFT key • C= key**



Whenever you enter the Text Mode, the letter keys function like those of a regular typewriter: they will appear in the lowercase unless you use them with the SHIFT or SHIFT LOCK key. When used with the C= key, the symbol remains the same, whether in Text Mode or Graphics Mode.

Before trying the next exercise, it's time to clear the screen. To do this, hold down the SHIFT key and press the CLR/HOME key. The screen will clear, and the cursor returns to its home position at the top of the screen.

### **SCREEN 1**

You should still be in Text Mode from the previous exercise, ready to use both uppercase and lowercase letters.

Type the following name now, making sure to hold a SHIFT key at the same time as the first letter in each word:

Samuel Andrews

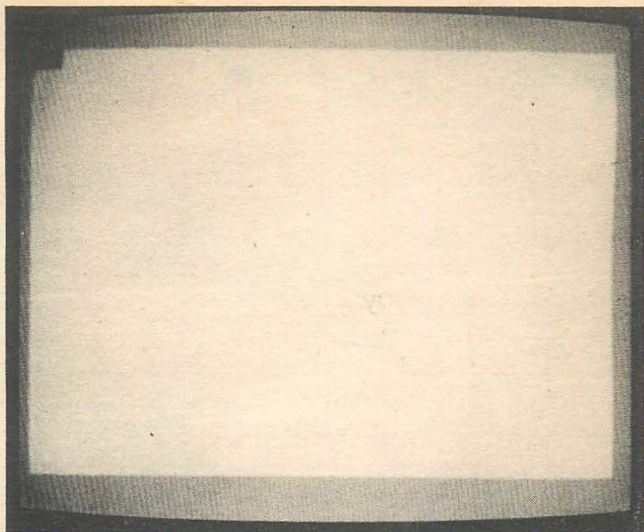
The first letter in each word appears in the uppercase, while the other letters appear in the lowercase.

### **SCREEN 2**

Now, re-enter the Graphics Mode by again pressing a SHIFT key and the C= key at the same time. The lowercase letters on the screen become capital letters once more, and the capital letters S and A have turned into graphics symbols.

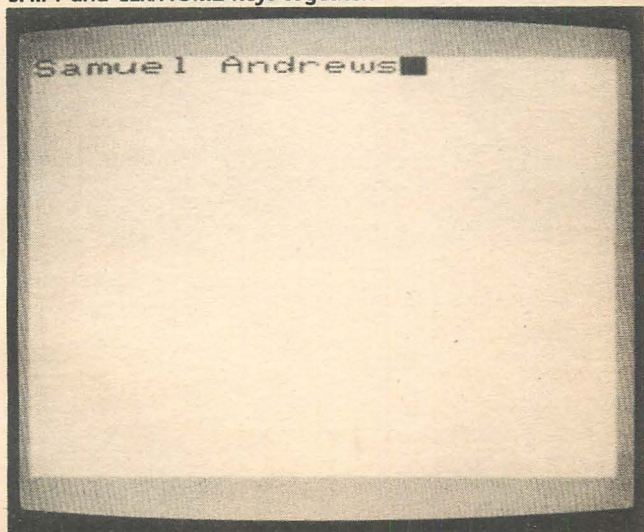
### **SCREEN 3**

*Before going on to the next exercise, clear the screen by holding down a SHIFT key and pressing the CLR/HOME key.*



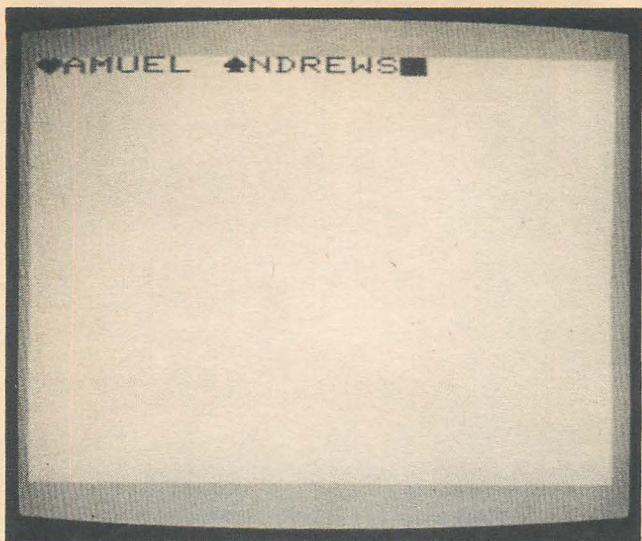
**SCREEN 1**

To begin, clear the screen by using the SHIFT and CLR/HOME keys together.



**SCREEN 2**

In the Text Mode, use SHIFT plus a letter key to display an uppercase letter.



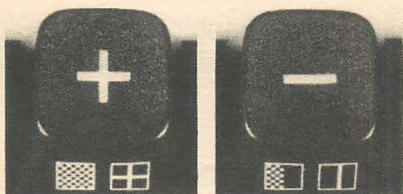
**SCREEN 3**

Re-entering the Graphics Mode changes all uppercase letters to graphics symbols.

# PLUS AND MINUS KEYS



**PLUS key • MINUS key**



You've probably noticed that some other keys, in addition to the letter keys, have graphics symbols printed on their side faces. Some of these keys appear the same in either the Graphics Mode or the Text Mode; other keys will change when the mode is changed.

## **THE + AND - KEYS: KEYS THAT DON'T CHANGE**

The + (plus) and - (minus) keys appear the same on the screen, no matter which mode is used. To see this, perform the following steps:

First, press the + and - keys by themselves.

### **SCREEN 1**

Next, hold down the SHIFT key at the same time as the + and - keys. The graphics symbols on the right-hand side of each key appear.

### **SCREEN 2**

Then, hold down the C= key and press the + and - keys. The symbols on the left-hand side display.

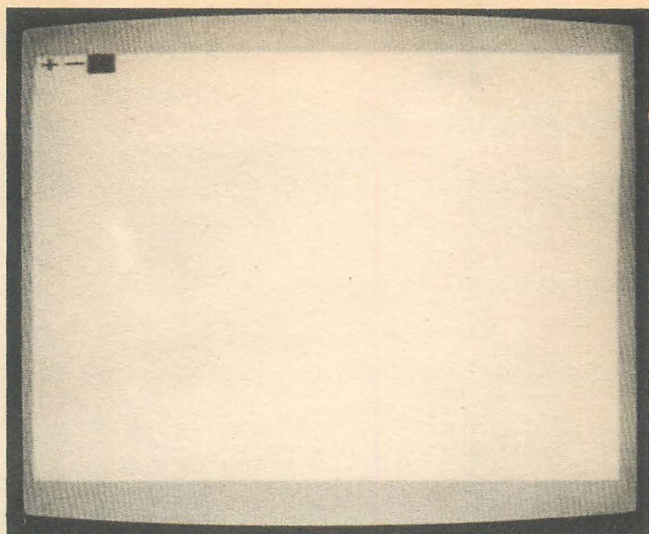
### **SCREEN 3**

Notice that sometimes two graphics symbols blend together to form one large symbol when they are placed together.

Now, enter the Text Mode by pressing SHIFT and C= at the same time. When you look at the screen, nothing has changed. This is because the + and - keys are the same in both upper- and lowercase.

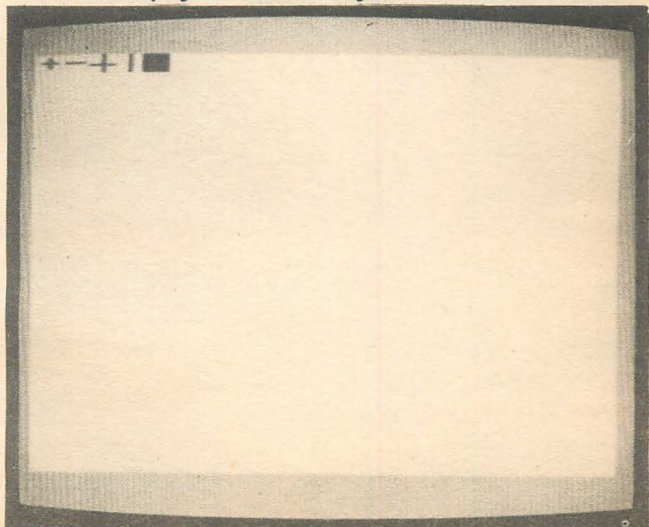
Return to the Graphics Mode now by using the SHIFT and C= keys together.

*Before going on to the next exercise, clear the screen by holding down a SHIFT key and pressing the CLR/HOME key.*



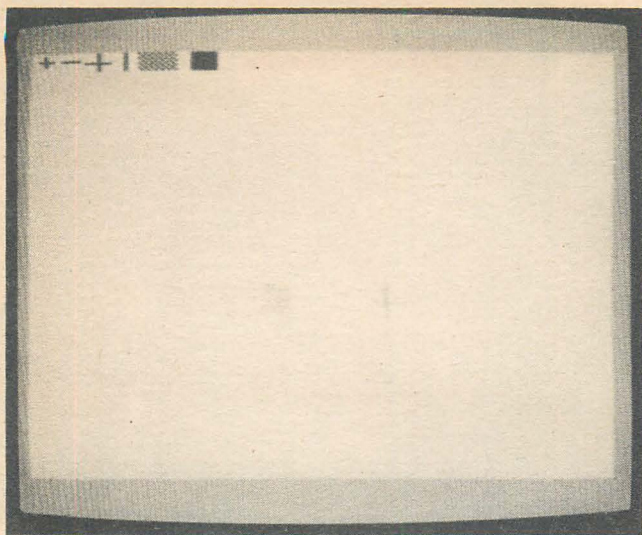
**SCREEN 1**

Typing the plus and minus keys by themselves displays the + and - symbols.



**SCREEN 2**

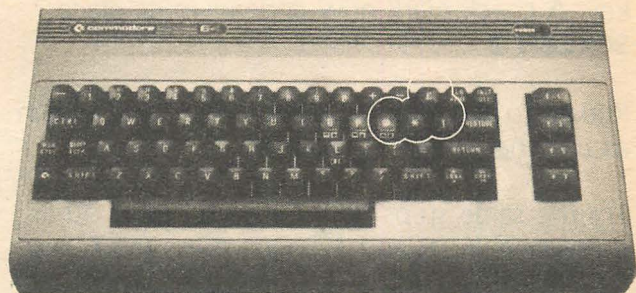
Use SHIFT with the plus and minus keys to display the right-hand graphics symbols.



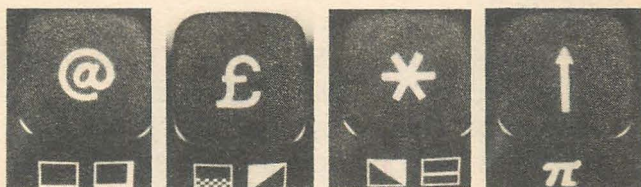
**SCREEN 3**

Using C= with the plus and minus keys displays the left-hand graphics symbols.

# @, £, \*, and ↑ KEYS



@ key • £ key • \* key • ↑ key



## KEYS THAT CHANGE IN TEXT MODE

There are four keys that display special symbols not marked on your keyboard when the Text Mode is in use: the @ (AT symbol), £ (British pound symbol), \* (asterisk), and ↑ (UP ARROW) keys. Try using these keys now to see the different symbols each can produce.

First, the @ key: press the @ key by itself, then with the SHIFT key, then with the C= key. Notice the symbols that appear.

**SCREEN 1**

Now, change to the Text Mode (use SHIFT and C=). One of the symbols changes—the symbol created by holding SHIFT plus the @ key. A check mark now appears in its place.

## **SCREEN 2**

Return to the Graphics Mode now, and watch as the check mark is replaced.

Try the same steps now for each of the other three keys (£, \*, and ↑). First press the £ key by itself, then with SHIFT, and then with C=. Do the same with the \* key and the ↑ key.

## **SCREEN 3**

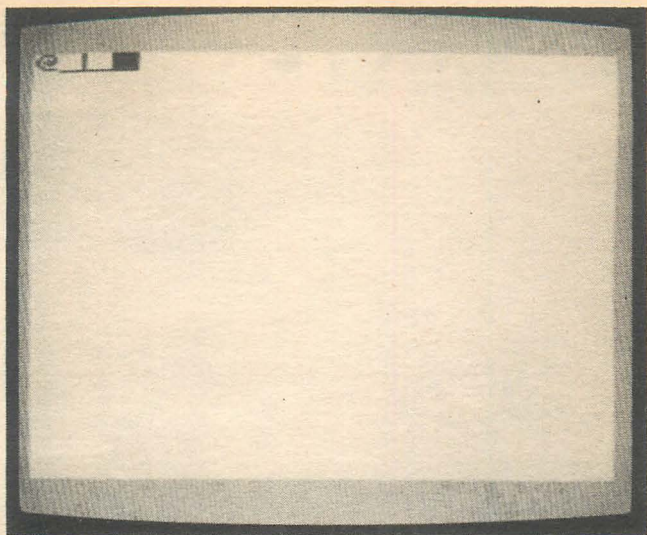
Once this is done, use SHIFT plus C= to enter the Text Mode. You will find changes:

- The symbol created by using SHIFT plus the £ key has changed from a triangle to a series of diagonal lines.
- The symbol created by using C= with the \* has changed from a triangle to diagonal lines.
- The π symbols, created by using the UP ARROW key with both the SHIFT and C= keys, have changed to checkerboards.

## **SCREEN 4**

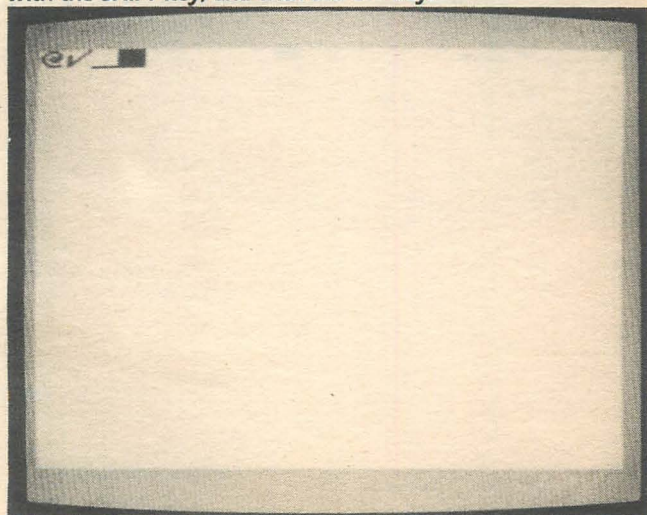
Now, re-enter the Graphics Mode and watch as the original symbols return.

*Before going on to the next exercise, clear the screen by holding down a SHIFT key and pressing the CLR/HOME key.*



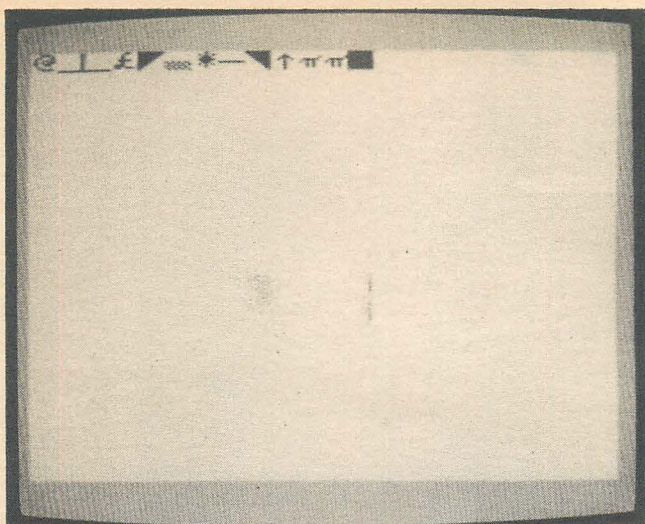
### **SCREEN 1**

Type the *at* symbol three ways: by itself, with the **SHIFT** key, and with the **C=** key.



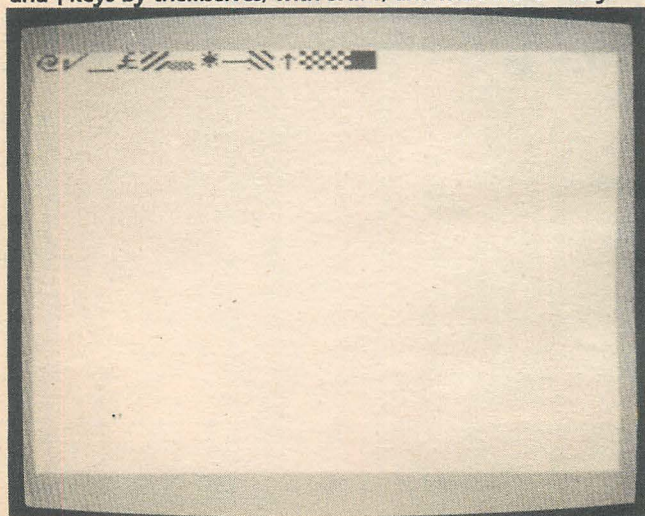
### **SCREEN 2**

In the **Text Mode**, the right-hand symbol changes to a symbol not shown on the key.



### SCREEN 3

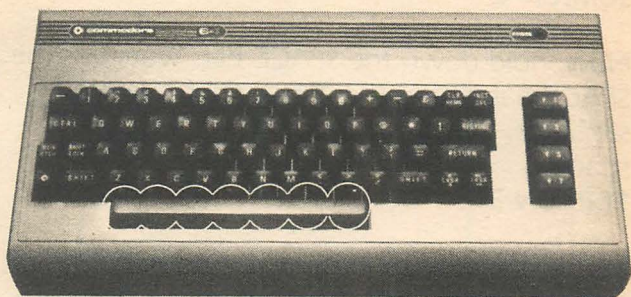
In the Graphics Mode, press the £, \*, and ↑ keys by themselves, with SHIFT, and with the C= key.



### SCREEN 4

When you re-enter the Text Mode, some symbols change back to symbols not shown on the keys.

# SPACE BAR



## SPACE BAR

The SPACE bar works just like a regular typewriter by pushing the cursor on to the next horizontal position on a line, leaving a blank space in the spot just left. It can go one space at a time, or scurry along at highway speeds when held down with your thumb. If you use the SPACE bar over characters already typed, it simply erases them—like a steam roller clearing the road of debris before the following army of words. You might think of it as an erase key that goes from left to right.

For example, type the following sentence, pressing the SPACE bar once between each word to create a blank space.

I LIKE MY COMPUTER.

Your sentence appears on the screen.

**SCREEN 1**

Then, using SHIFT plus the CURSOR LEFT/RIGHT key, reposition the cursor at the beginning of the sentence, directly over the I.

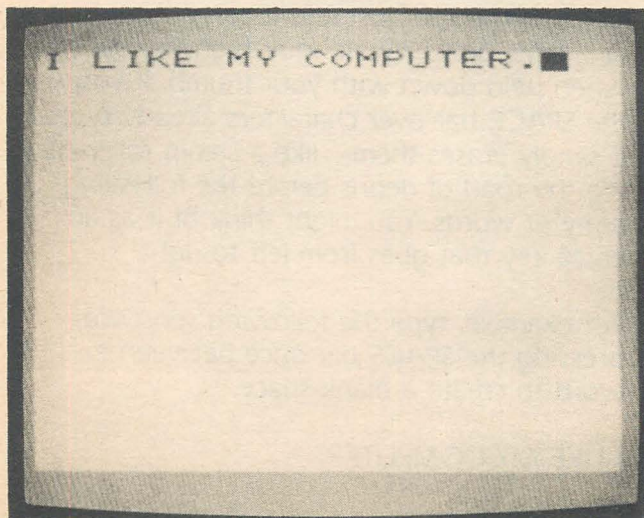
## **SCREEN 2**

Now, hold down the SPACE bar. Watch as the SPACE bar moves the cursor right over your sentence, wiping out your words with blank spaces.

## **SCREEN 3**

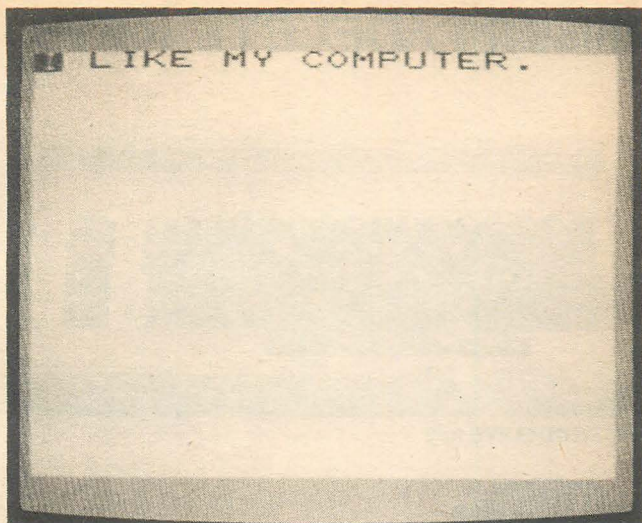
This is one way to erase text. Another way is to use the INST/DEL key, which you will learn about next.

*Before going on to the next exercise, clear the screen by holding down a SHIFT key and pressing the CLR/HOME key.*



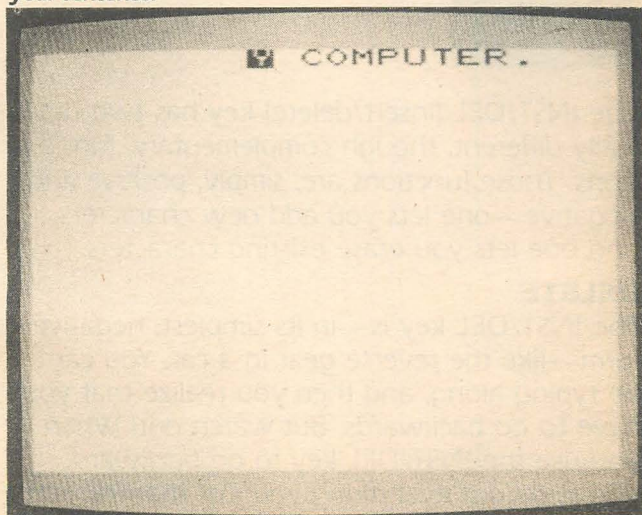
## **SCREEN 1**

As you type, use the SPACE bar to create a blank space between each word.



**SCREEN 2**

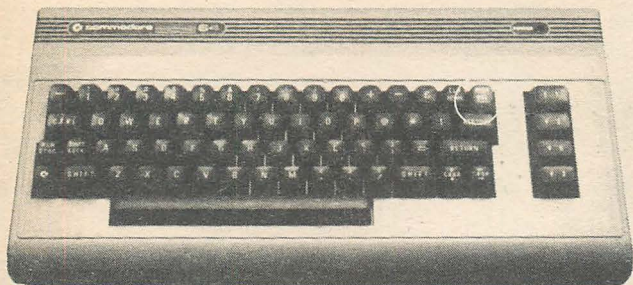
Move the cursor back to the beginning of your sentence.



**SCREEN 3**

The SPACE bar can be used to erase text that already appears on the screen.

# INSERT/DELETE KEY



**INSERT/DELETE key**



The INST/DEL (insert/delete) key has two radically different, though complementary, functions. Those functions are, simply, positive and negative—one lets you add new characters, and one lets you erase existing characters.

## **DELETE**

The INST/DEL key is—in its simplest, negative form—like the reverse gear in a car. You can be typing along, and then you realize that you have to go backwards. But watch out! When you use the INST/DEL key to go backward, you wipe out everything you just did. You run over it and erase it—just as you do with the SPACE bar, but in the opposite direction.

For example, type your full name on the screen now.

### **SCREEN 1**

Then, tap the INST/DEL key three or four times. Each time you press the INST/DEL key, you erase one of the letters in your name.

### **SCREEN 2**

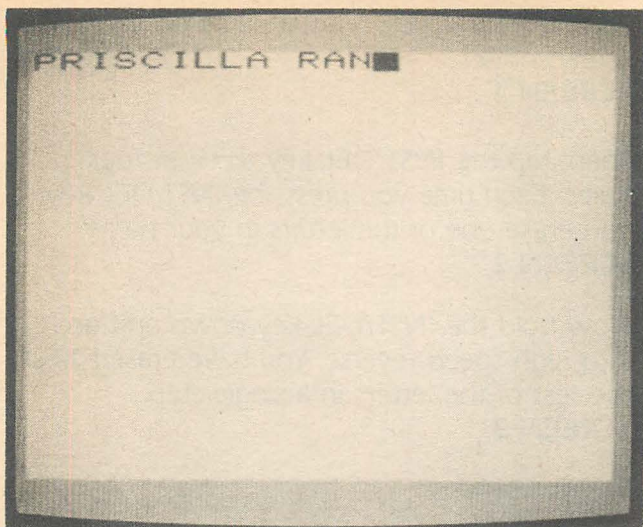
Now hold the INST/DEL key down and go into high-speed reverse. You have erased all of the rest of the letters in a single step.

### **SCREEN 3**



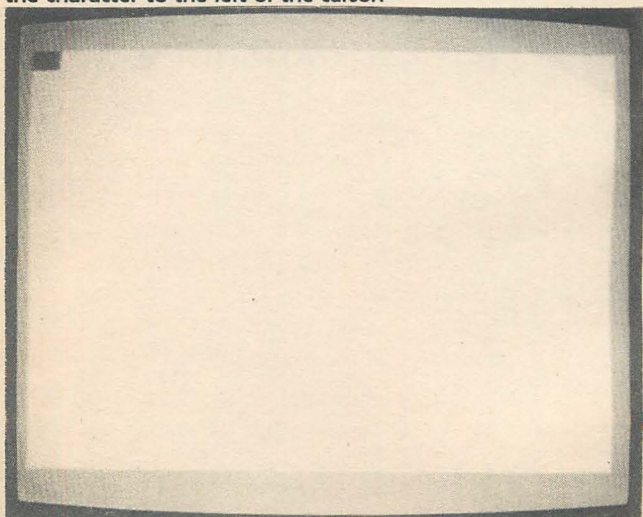
### **SCREEN 1**

To see the effect of the DELETE function, first type your name on the screen.



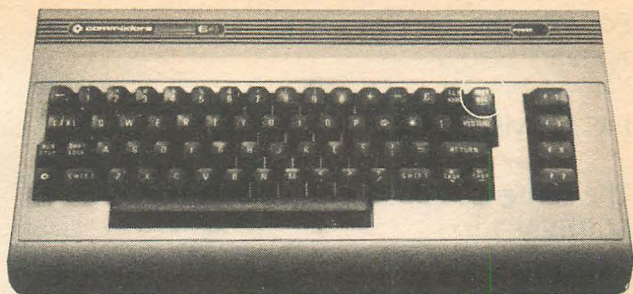
**SCREEN 2**

Pressing the INST/DEL key by itself erases the character to the left of the cursor.



**SCREEN 3**

Hold down the INST/DEL key until all the letters in your name are erased.



**INST/DEL key**



When you hold down the SHIFT key and press the INST/DEL key at the same time, you get the positive aspect of the INST/DEL key: instead of erasing characters, you can now add characters. This is called *inserting* because you can add characters between existing text without typing over and erasing anything. You would want to insert characters if you left out some letters in a word or if you wanted to add a word in the middle of a sentence.

For example, type this sentence, exactly as it appears below:

HIS NAME IS FED.

The sentence appears on your screen.

### **SCREEN 1**

This sentence doesn't make much sense, does it? But it will—as soon as you insert the missing letter, R, in the word FRED.

First, position the cursor on the character *to the right* of the missing letter—on the E in the word FED.

### **SCREEN 2**

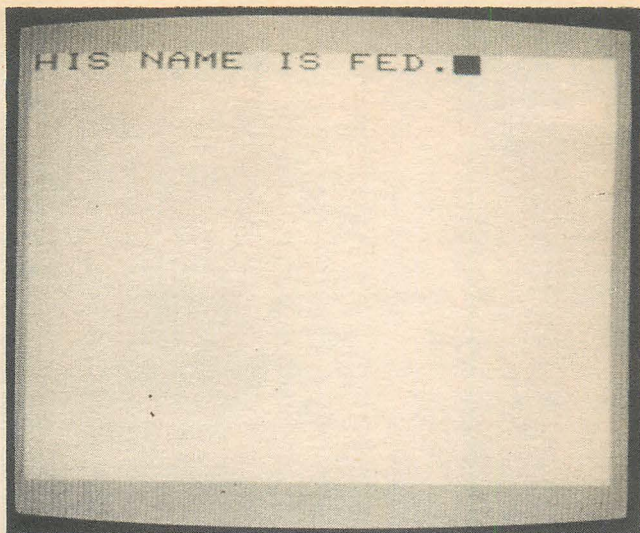
Then, hold down the SHIFT key and press the INST/DEL key at the same time. This adds a space where the missing letter should be inserted, by bumping the rest of the word one space to the right.

### **SCREEN 3**

Now, type the missing letter, R. You have corrected the sentence.

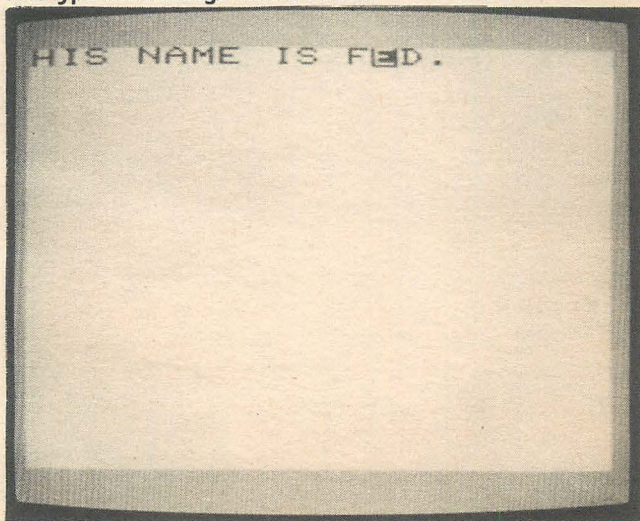
### **SCREEN 4**

*Before going on to the next exercise, clear the screen by holding down a SHIFT key and pressing the CLR/HOME key.*



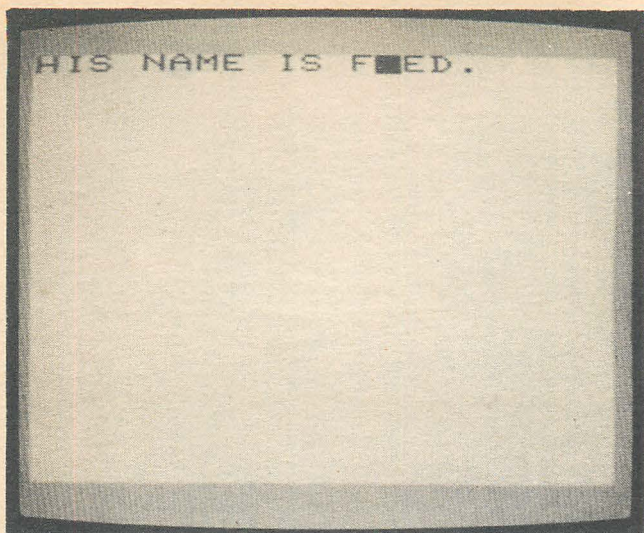
**SCREEN 1**

To see the effect of the INSERT function, first type this message on the screen.



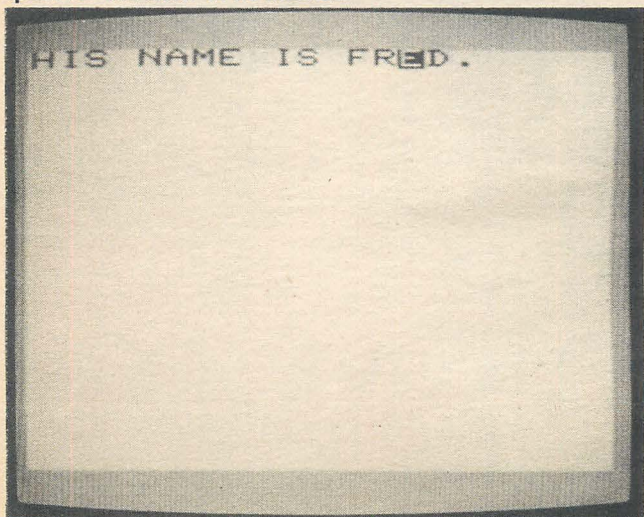
**SCREEN 2**

Position the cursor on the character to follow the letter to be inserted.



**SCREEN 3**

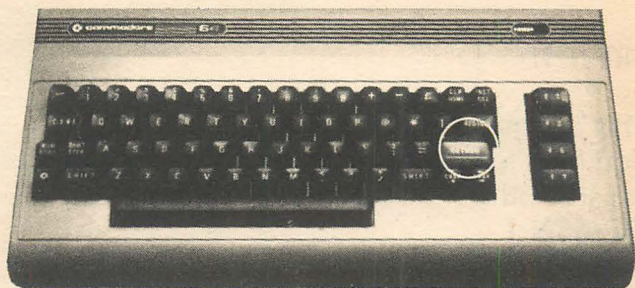
Using SHIFT plus INST/DEL together leaves a space for the letter to be inserted.



**SCREEN 4**

Once you insert the missing letter, your sentence is corrected.

# RETURN KEY



**RETURN** key



The RETURN key serves a much more critical function on your VIC or 64 computer than it does on a typewriter. It is, literally, the only way for the computer to understand what you want it to do. Once you type a command on the screen, you press the RETURN key, which tells the computer that you are finished typing and sends the message to the computer. Until you press RETURN, the computer has no idea of what you are typing, if anything.

## **RETURN KEY BY ITSELF: COMMUNICATION "ON"**

To see how the RETURN key works, type this simple command:

PRINT TI

This command instructs the computer to tell you how long your computer has been turned on, in  $\frac{1}{60}$ ths of a second (called *jiffies*).

### **SCREEN 1**

Now, press the RETURN key, and watch the answer appear.

### **SCREEN 2**

Each time you type a command that you want the computer to be aware of, you must press the RETURN key. Try an experiment now.

Move the cursor back up to the PRINT TI line.

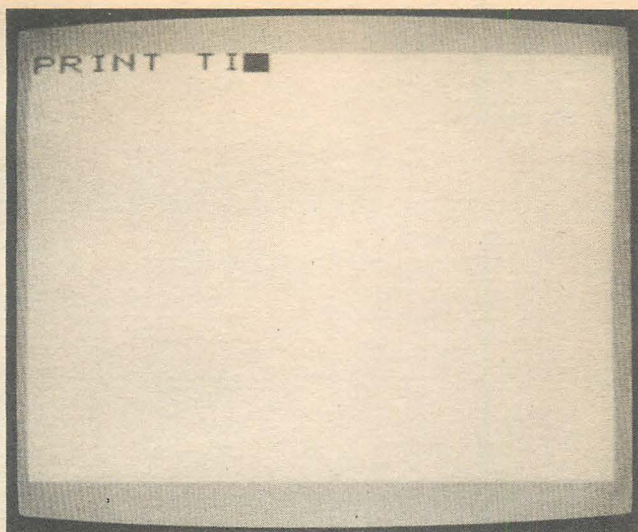
### **SCREEN 3**

Then, press RETURN again. Watch as the previous answer changes to a new number.

### **SCREEN 4**

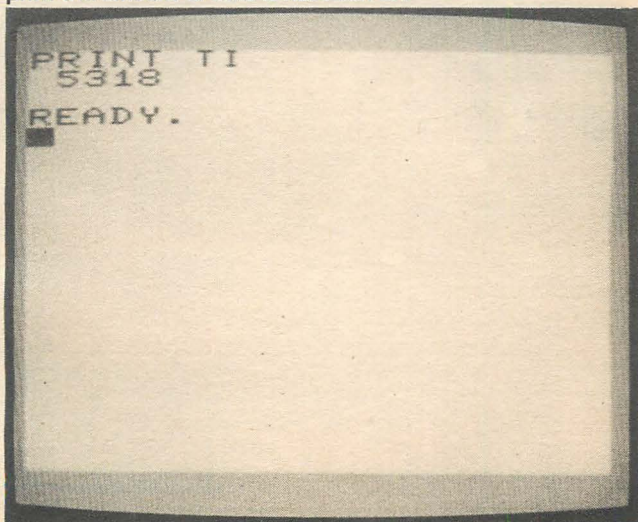
Each time you place the cursor on a command line and press RETURN, the computer puts the command into its memory, and if the answer to your command changes, it will display the new answer.

*Do not clear the screen and do not turn off the computer before going on to the next exercise.*



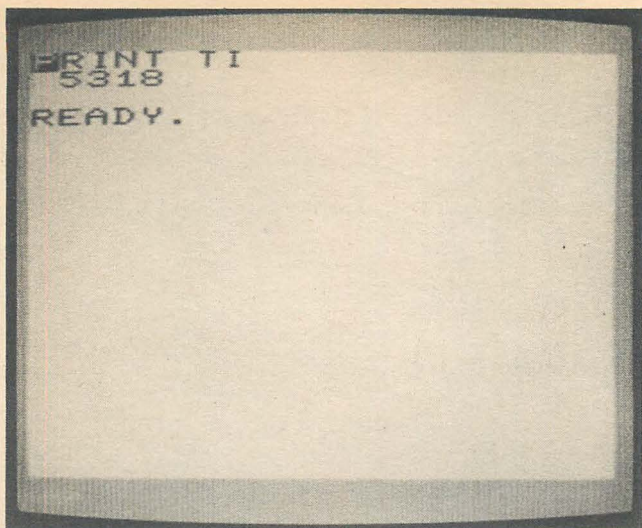
**SCREEN 1**

The *Ti* command instructs the computer to print the amount of time it has been on.



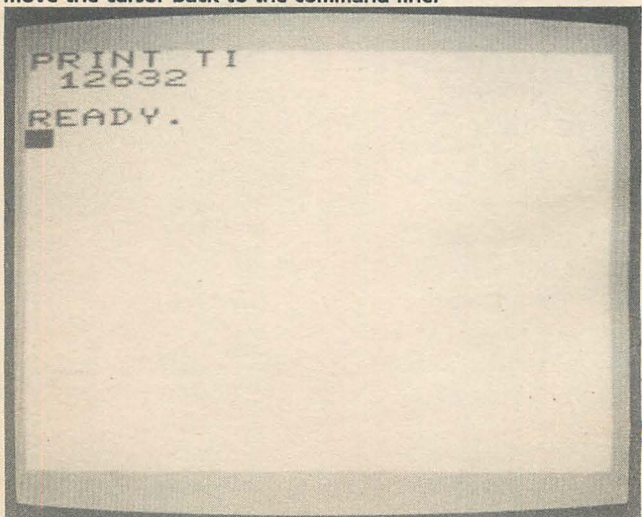
**SCREEN 2**

Pressing RETURN by itself sends your command to the computer.



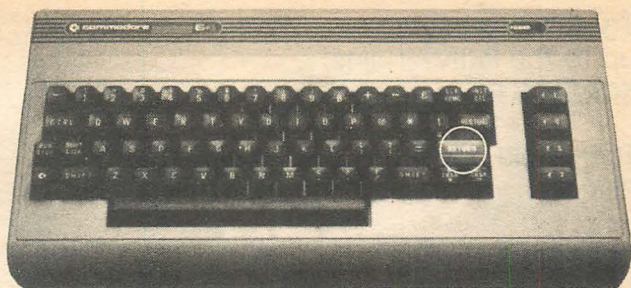
### SCREEN 3

To see the effect of the RETURN key, first move the cursor back to the command line.



### SCREEN 4

Pressing RETURN sends the command back to the computer, and the number changes.



**RETURN key**



### **RETURN WITH SHIFT: COMMUNICATION BLOCKED**

Pressing the RETURN key while holding down the SHIFT key has a different effect. This combination of keys moves the cursor to the beginning of the next line without telling the computer that the previous line is ready to be interpreted. In other words, the message is not sent to the computer. You might want to do this when you are experimenting with different graphics characters to draw a picture and haven't changed some of the lines into BASIC commands yet for your computer to understand. Use SHIFT plus RETURN whenever you wish to move to the beginning of the next line without the previous line being sent to the computer.

Try this procedure now. Move the cursor back up to the PRINT TI line.

### **SCREEN 1**

Then, hold down the SHIFT key and press RETURN. The answer does not change this time.

### **SCREEN 2**

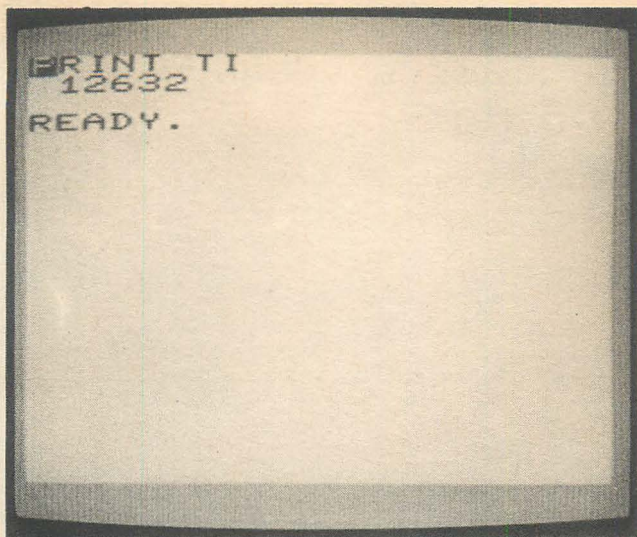
Now, type your name and press only the RETURN key. An error message appears on the screen, indicating that the computer didn't understand your name as one of the commands it knows.

### **SCREEN 3**

Try typing your name again, but this time, hold down the SHIFT key while you press RETURN. The cursor moves to the beginning of the next line, and no error message appears.

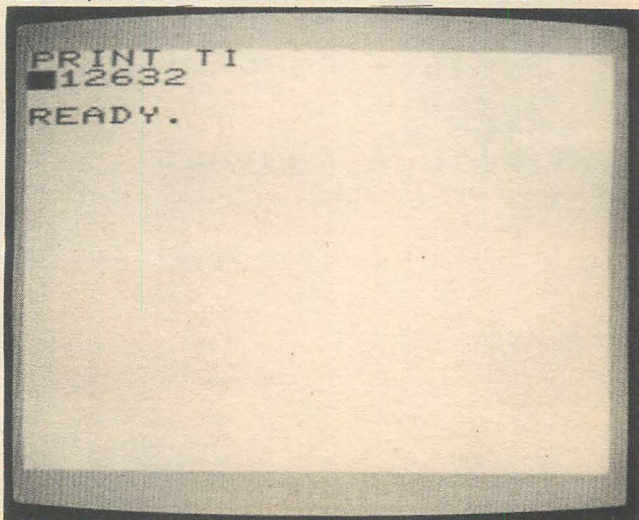
### **SCREEN 4**

*Before going on to the next exercise, clear the screen by holding down a SHIFT key and pressing the CLR/HOME key.*



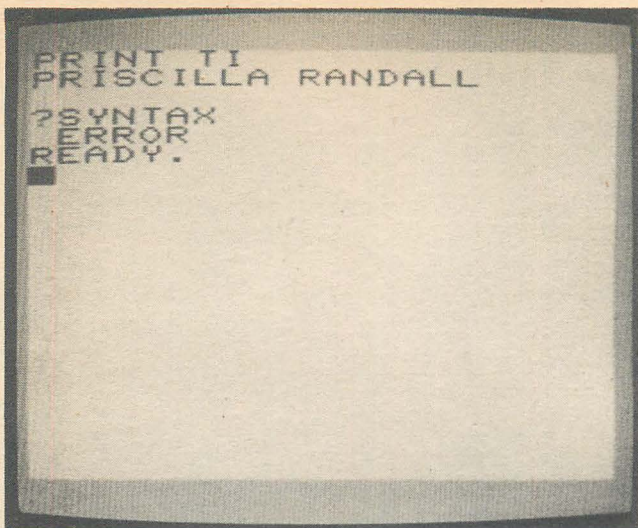
**SCREEN 1**

To see the effect of using SHIFT with RETURN, first move the cursor back to the command line.



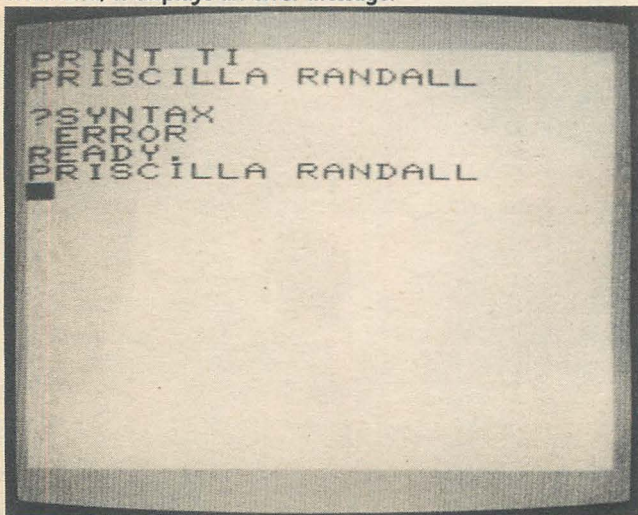
**SCREEN 2**

SHIFT plus RETURN does not send the command to the computer.



**SCREEN 3**

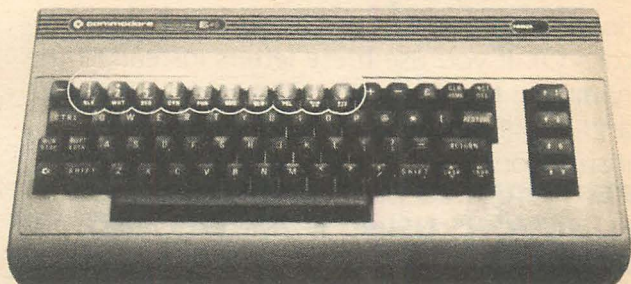
When the computer receives an unfamiliar command, it displays an error message.



**SCREEN 4**

Use SHIFT with RETURN to move down a line without sending a command.

# NUMBER KEYS



## **NUMBER keys**

The number keys are found in the row above the letter keys. Not only do you use these keys to type any numbers needed in a message, but you use the number keys for the following purposes:

- To perform mathematical functions
- To begin each line when creating your own programs
- To type the punctuation that appears on the top half of the number keys
- To change the color of text on the screen

In the next series of exercises, you will learn to use the number keys for each of these purposes.

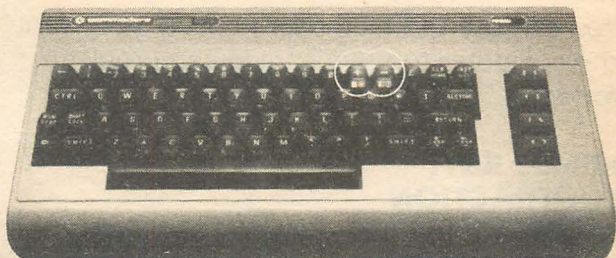
An important thing to remember: On your computer, the numbers 1 and 0 (one and zero) are *not* interchangeable with the letters l or I (lowercase L and uppercase I) and O (uppercase O). If you use these letters instead of the numbers, the computer will become confused, and it will not be able to perform your instructions.

## **PERFORMING MATHEMATICAL FUNCTIONS USING NUMBERS AND SYMBOLS**

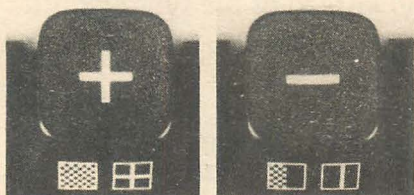
Recall that one of your computer's primary functions is to calculate. This means that your computer can add, subtract, multiply, and divide, as well as perform other, more complex mathematical functions.

First you tell your computer to print the answer on the screen for you, either by typing the word PRINT or by pressing the QUESTION MARK/SLASH key (with the SHIFT key held down). Then you type the desired mathematical equation. When you are ready for the calculation to begin, you press the RETURN key—*not* the = (equals sign) key. Try performing a few simple equations on your computer now.

# PLUS AND MINUS KEYS



**PLUS key • MINUS key**



## **PLUS KEY: ADDITION**

To add, use the + (plus) key by itself. You don't even need to hold down the SHIFT key. Type:

PRINT 4 + 3

Your addition problem appears on the screen.  
**SCREEN 1**

Then, press the RETURN key. The computer prints the answer.

## **SCREEN 2**

You can use this method whenever you want the computer to solve an addition problem for you.

### **MINUS KEY: SUBTRACTION**

To subtract, use the – (minus) key. Type the following equation, only this time, type a question mark (SHIFT plus the QUESTION MARK/SLASH key) instead of the word PRINT:

?5 – 2

Your subtraction problem appears on the screen.

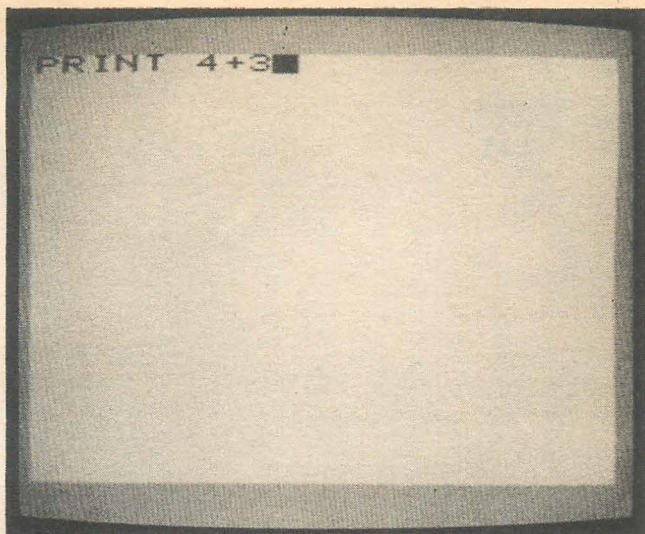
## **SCREEN 3**

Then, press RETURN to see the results.

## **SCREEN 4**

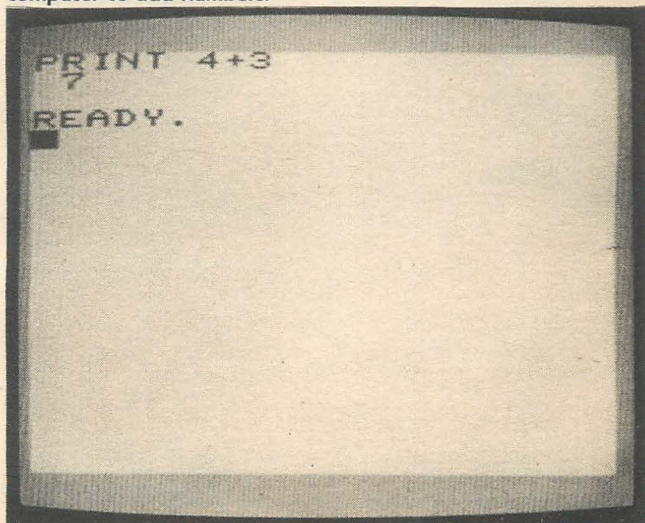
The word PRINT and the ? (question mark) can be used interchangeably. They are just two different ways to give the same command to your computer.

*Do not clear the screen and do not turn off the computer before going on to the next exercise.*



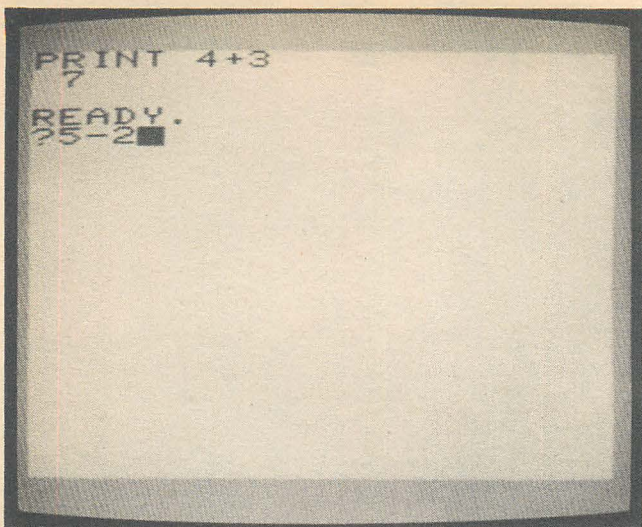
**SCREEN 1**

use the plus key (+) when you want the computer to add numbers.



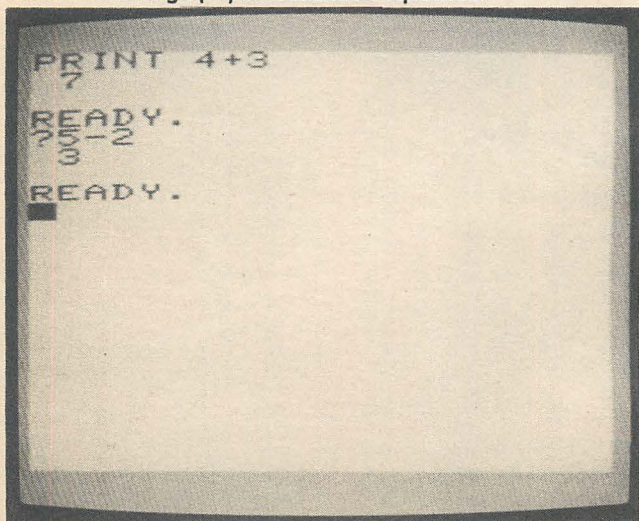
**SCREEN 2**

When you press RETURN, the computer adds the numbers and displays the answer.



**SCREEN 3**

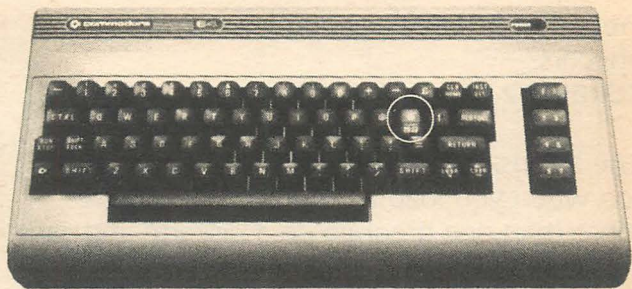
Use the minus sign (-) in subtraction equations.



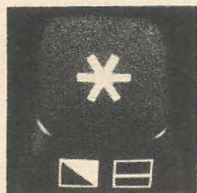
**SCREEN 4**

The computer calculates your equation and displays the answer.

# ASTERISK KEY



**ASTERISK key**



## **ASTERISK KEY: MULTIPLICATION**

To multiply, use the \* (asterisk) key. The asterisk is used on computers instead of the normal  $\times$  (multiplication) sign because the computer thinks of  $\times$  as a letter and cannot combine letters and numbers when doing straight arithmetic problems. Type the following command now:

756\*81

Remember to use the number 1 here instead of the letter I.

### **SCREEN 1**

Press the RETURN key and your answer appears.

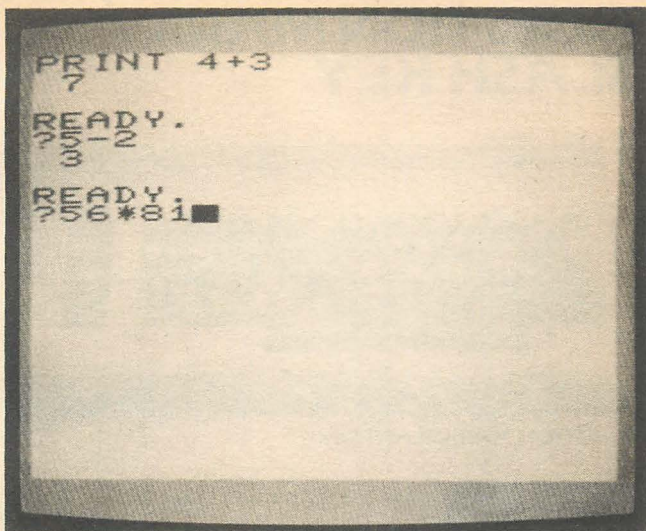
### **SCREEN 2**

The asterisk carries out one more important job when you load a program. If you have more than one program on a diskette and cannot remember the full title of the program you want, type just the first few letters of the title, enough to distinguish it from other programs. For example, you could then type an asterisk, instead of the last letters of the title, as shown below. (NOTE: This is just an example. Do *not* type the following command now!) For the title FROGGER, you could type in:

```
LOAD"FR*",8,1
```

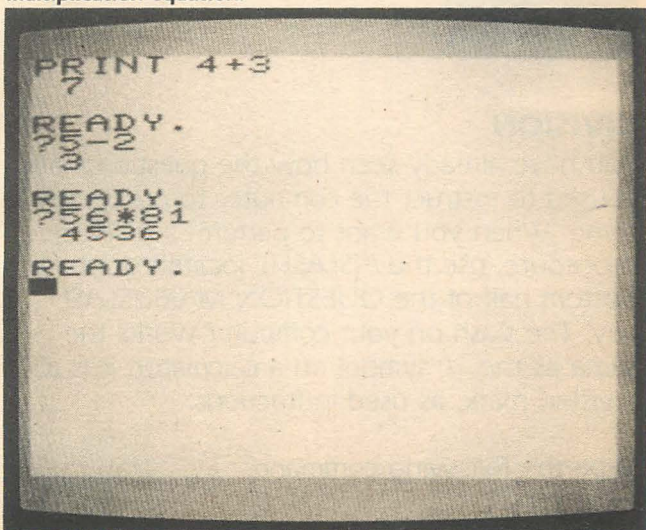
instead of typing out the entire word FROGGER. (The same idea works on cassette, but without even using the asterisk.)

*Do not clear the screen and do not turn off the computer before going on to the next exercise.*



**SCREEN 1**

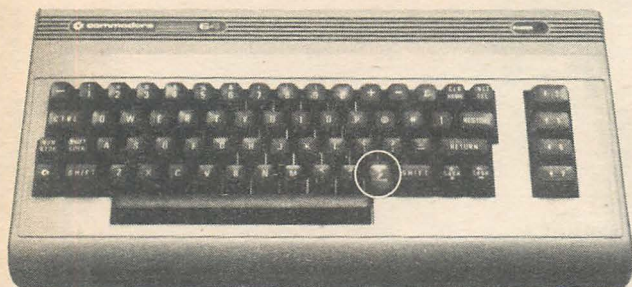
The asterisk (\*) is used to indicate a multiplication equation.



**SCREEN 2**

Pressing RETURN sends your equation to the computer, and the answer appears.

# QUESTION MARK / SLASH KEY



**QUESTION MARK/SLASH key**



## **DIVISION**

You have already seen how the question mark is used to instruct the computer to print something. When you want to perform a division procedure, use the / (SLASH), located on the bottom half of the QUESTION MARK/SLASH key. The slash on your computer works the same as the  $\div$  symbol on a calculator: it is a division mark, as used in fractions.

Type the following command:

?9/3

Your division problem appears on the screen.

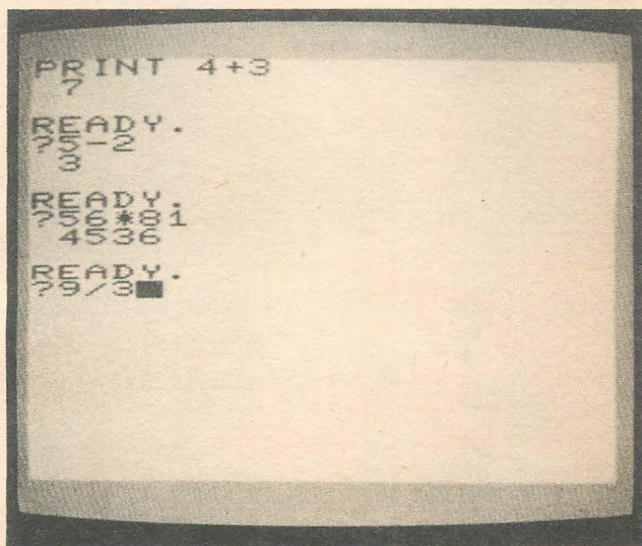
### SCREEN 1

Now press RETURN for the answer. Your answer appears directly below the equation: 3.

### SCREEN 2

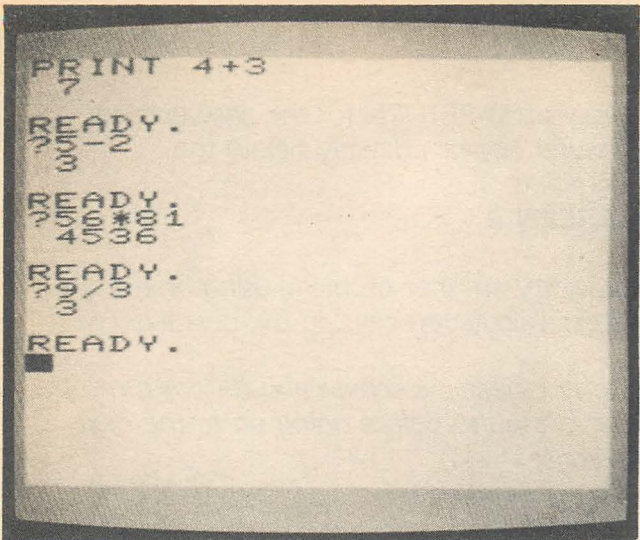
Now try another problem, using one of the other calculation keys, in the next exercise.

*Do not clear the screen and do not turn off the computer before going on to the next exercise.*



### SCREEN 1

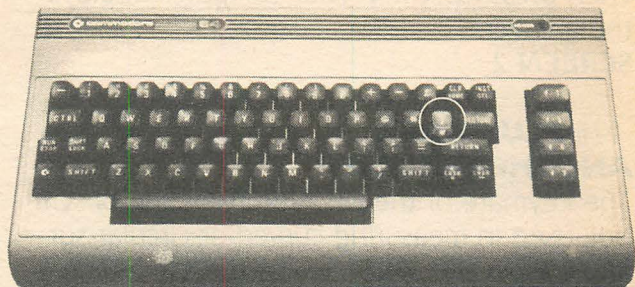
Use the slash (/) as a division sign, as shown in this equation.



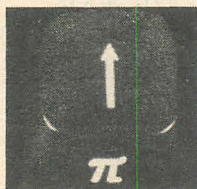
**SCREEN 2**

The computer performs the division operation and displays the answer.

# UP ARROW/ $\pi$ KEY



UP ARROW/ $\pi$  key



## $\uparrow$ / $\pi$ KEY WITHOUT SHIFT: EXPONENTATION

In order to multiply a number times itself several times (called exponentiation), you use the  $\uparrow$  (UP ARROW) key between the number to be multiplied and its exponent. For example, what you would normally write in math class ( $5^3$ ) is typed on your computer as:

?5  $\uparrow$  3

Type the above command now.

### SCREEN 1

Then press RETURN. Your computer displays the answer.

### SCREEN 2

#### ↑ / $\pi$ PLUS SHIFT: ANOTHER NUMBER

The keymate of the UP ARROW is the pi symbol, used in measuring curved or circular surfaces. Press the SHIFT key at the same time that you press the UP ARROW key to get the pi sign value (in Graphics Mode only). Since the value pi is not an exact number (that is, it never repeats any series of decimal values), your VIC and 64 use the value of 3.14159265 for its calculations. Type the following command:

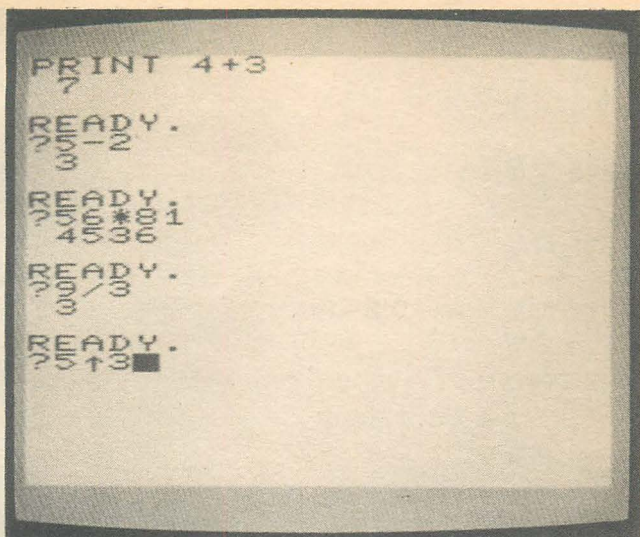
? $\pi$

Now press the RETURN key.

Your computer has given you the value of pi. Also notice that some lines at the top of the screen automatically *scrolled* up off the screen to make room to display more lines at the bottom.

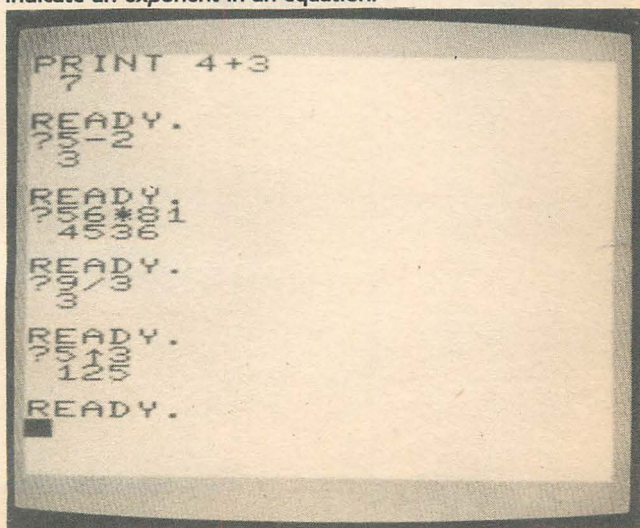
### SCREEN 3

*Before going on to the next exercise, clear the screen by holding down a SHIFT key and pressing the CLR/HOME key.*



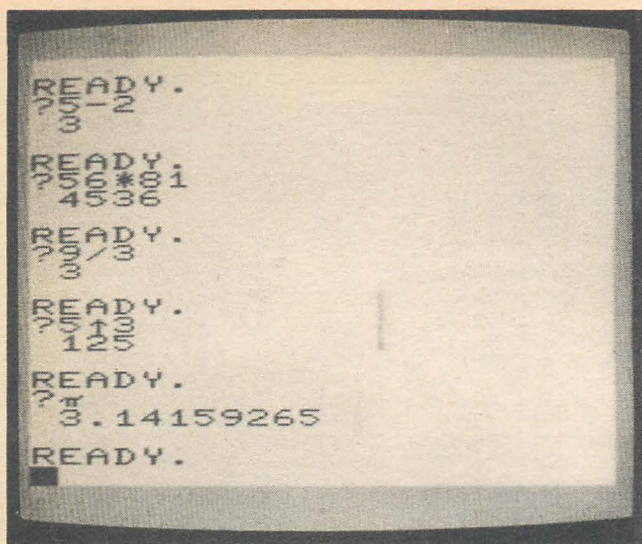
#### SCREEN 1

Use the UP ARROW key (↑) by itself to indicate an *exponent* in an equation.



#### SCREEN 2

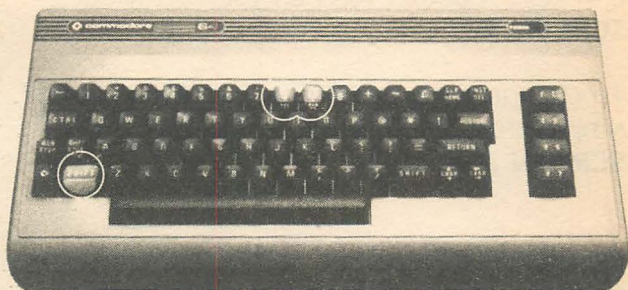
The computer raises the number to the power of the exponent and displays the answer.



### SCREEN 3

The computer displays the value of pi ( $\pi$ ). Since the screen is full, it *scrolls* some lines off the screen.

# PARENTHESES KEYS



**PARENTHESES keys • SHIFT key**



Numbers 8 and 9 on your computer keyboard also give you the standard parentheses signs when you press these keys at the same time as a SHIFT key. In sentences, the parentheses are used as regular punctuation (to set off a phrase that further explains something). When used in a BASIC command, they enclose numbers or letters that have a predetermined value. For instance, type in the following line:

```
PRINT CHR$(14)
```

The number 14 stands for a specific keyboard character (which changes the case this time).

**SCREEN 1**

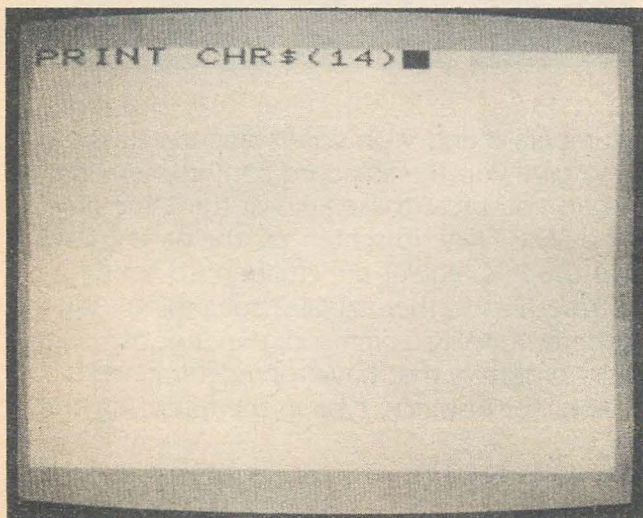
Press the RETURN key now, and the letters on the screen change from uppercase to lowercase—just as if you had pressed the SHIFT and C= keys together to enter the Text Mode.

## SCREEN 2

To change back to the Graphics Mode now, simply press SHIFT and C= together.

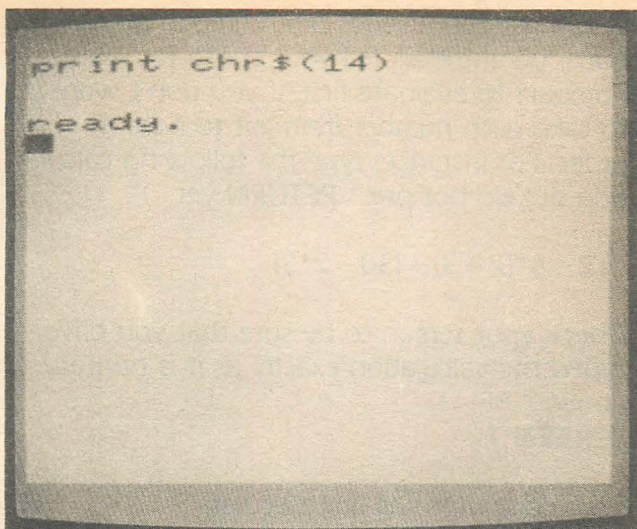
## SCREEN 3

*Do not clear the screen and do not turn off the computer before going on to the next exercise.*



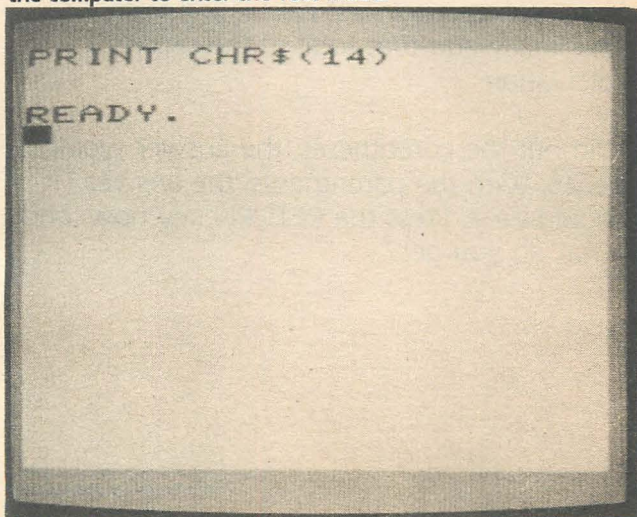
## SCREEN 1

Use parentheses to enclose numbers or letters that have predetermined values.



**SCREEN 2**

The value of this particular number (14) tells the computer to enter the Text Mode.



**SCREEN 3**

Using the SHIFT and C= keys together returns the computer to the Graphics Mode.

When used in a series of arithmetic calculations, parentheses tell your computer which numbers to evaluate first, if you don't want it to take each number from left to right in order. For instance, type the following calculation but do not press RETURN yet:

$$?12 - 5*(2 + 3) + (30 - 2*5)$$

Check your screen to be sure that you have typed the calculation exactly as it is printed above.

### **SCREEN 1**

Your computer will first calculate  $2 + 3$  and multiply this sum by 5, then multiply 2 times 5 and subtract that from 30. Next it will subtract the first calculation from 12, and finally add that total to the second calculation.

Without the parentheses, the answer would be 25. With the parentheses, the answer should be 7. Press the RETURN key now, and what do you get?

?12 - 5\*(2 + 3) + (30 - 2\*5)

7

READY.

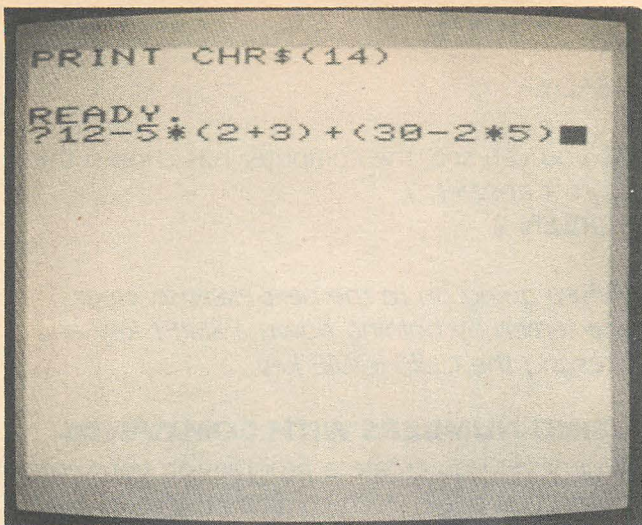
As you can see, the computer has chosen the correct answer, 7.

## SCREEN 2

*Before going on to the next exercise, clear the screen by holding down a SHIFT key and pressing the CLR/HOME key.*

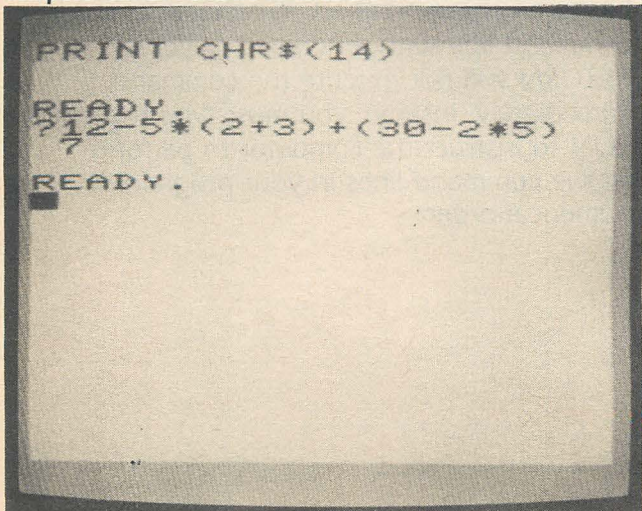
## USING NUMBERS WITH COMMANDS

Whenever you create a program on your computer, you begin each command with its own, unique number. The computer will obey each command in your program in numerical order, based on these numbers. When you precede a command line with a number, pressing RETURN will not execute the command immediately. Instead, you must type the word RUN to instruct the computer to perform all the command lines in your program, in numerical order.



**SCREEN 1**

Parentheses used in equations tell the computer which numbers to calculate first.



**SCREEN 2**

The computer performs the calculations and displays the answer.

# NUMBERS IN PROGRAMS

Try this procedure now by creating your own simple program. First, type the following line and press RETURN. (Although the command won't be executed immediately, you still need to press RETURN to send the command into your computer's memory.) Do not worry if your words wrap onto the next line; just press RETURN at the end of the sentence.

```
10 REM NUMBER KEYS HAVE MANY USES.
```

The sentence now appears on your screen.

## SCREEN 1

The 10 is the number now assigned to this command line. It will be obeyed after any program line numbered 0 through 9, and before any program line beginning with a larger number. REM is an abbreviation of the word REMARK, which tells the computer that this line is extra information—a comment for your benefit only.

Now, add the following two lines to your program. Be sure to use the letter I, not the number 1.

```
20 I = 8 - 4 (press RETURN)  
30 PRINT I (press RETURN)
```

Now your screen shows three program lines.  
**SCREEN 2**

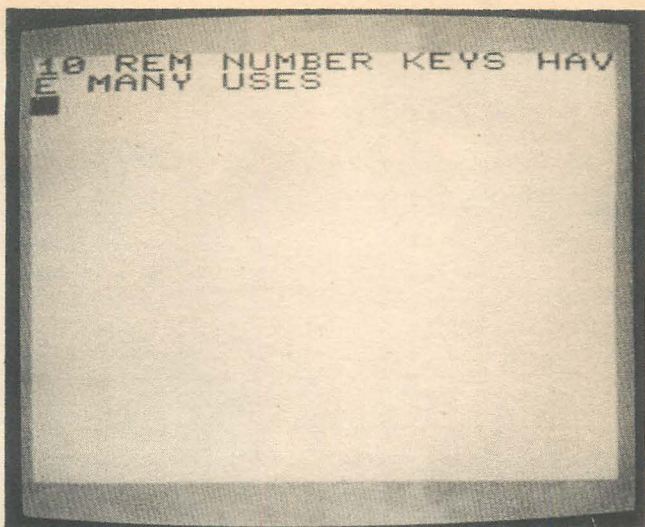
You are now ready to run your first program! To do this, type the word RUN and then press the RETURN key.

What has happened? The computer read the three program lines it had stored in its memory. The first line is only a comment and does not do anything. The next line tells the computer the value of I (8 - 4). The last line instructs the computer to print the value of I, which is 4.

### **SCREEN 3**

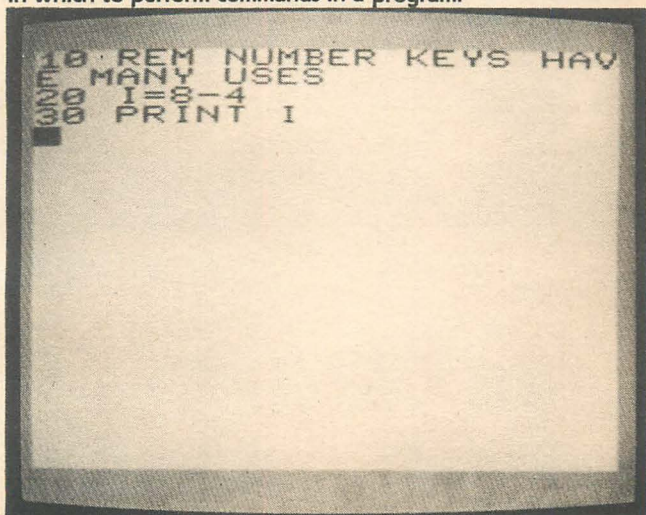
A note to remember: If you were to create a new program using the same line numbers as a program you previously created—in this case, 10, 20, and 30—each new program line would take the place of the old one, wiping the old line out of its memory. Also, if you were to create a program and turn off the computer without saving the program on a cassette or diskette, the program would be gone until you created it again. Once you turn off the computer, any program in its memory is erased.

*Before going on to the next exercise, clear the screen by holding down a SHIFT key and pressing the CLR/HOME key.*



#### SCREEN 1

Use numbers to tell the computer the order  
in which to perform commands in a program.



#### SCREEN 2

Give each command line in your program its  
own unique number.

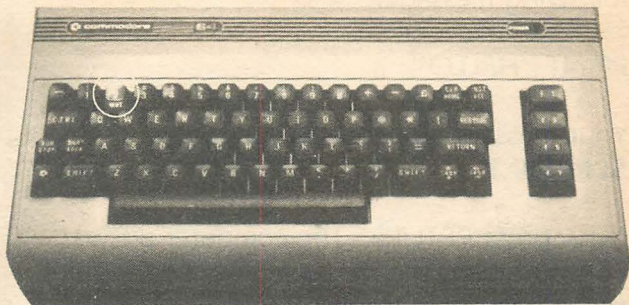
```
10 REM NUMBER KEYS HAV  
20 MANY USES  
30 I=8-4  
40 PRINT I  
RUN  
4
```

```
READY.  
■
```

### SCREEN 3

When you type RUN and press RETURN, the computer performs the commands and displays the answer.

# QUOTATION MARK KEY



QUOTATION MARK/2 key



## HOW TO PRINT MESSAGES

Whenever you want your VIC or 64 to answer you on the screen, put quotation marks around whatever you want typed. The information between the quotation marks is called a *string constant* because it doesn't change. In other words, there is no calculation involved, as with the mathematical commands you recently tried.

To display a quotation mark, you hold down the SHIFT key and press the number 2 key. Try using the quotation mark now by typing the following message:

PRINT "HELLO"

Your message appears on the screen.

### **SCREEN 1**

Now press RETURN. The computer answers you by typing the message enclosed within the quotation marks: HELLO.

### **SCREEN 2**

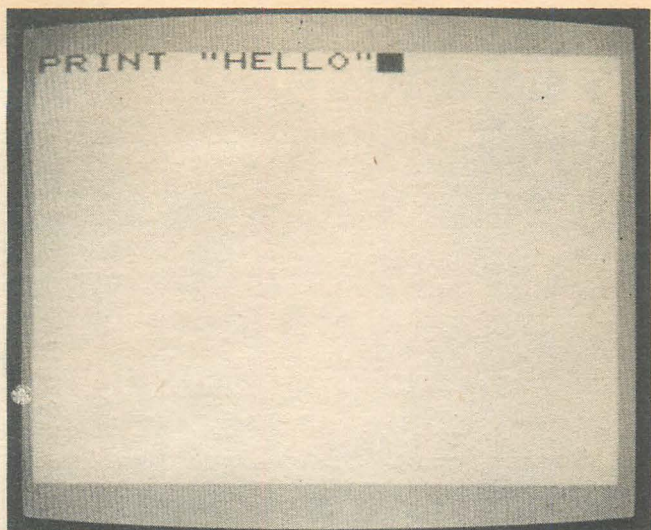
Remember that the question mark does the same thing as the word PRINT. Type the following message and press RETURN:

? "HELLO"

The computer again answers with HELLO.

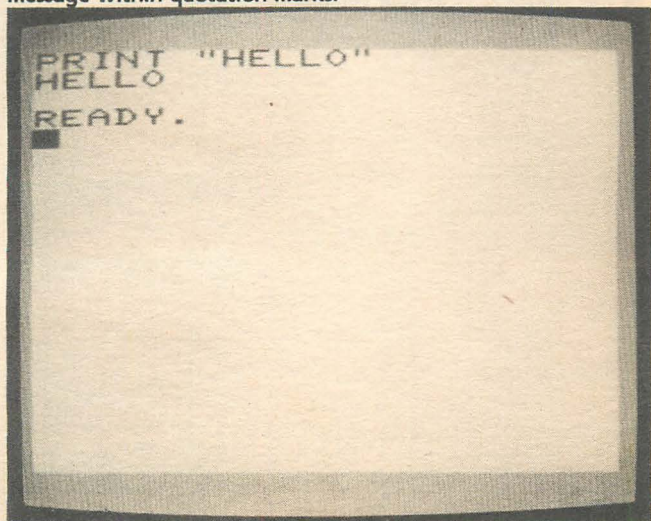
### **SCREEN 3**

*Do not clear the screen and do not turn off the computer before going on to the next exercise.*



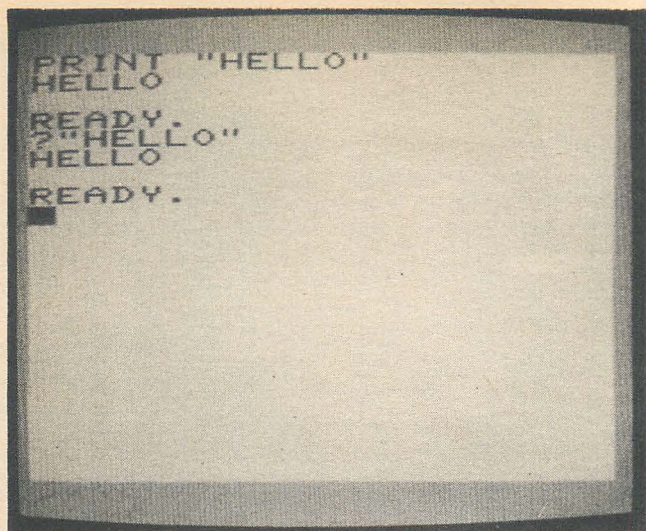
**SCREEN 1**

When typing a *string constant*, enclose your message within quotation marks.



**SCREEN 2**

Once you press the RETURN key, the computer prints your message on the screen.



### SCREEN 3

You can use the question mark (?) in place of the word PRINT in your commands.

# USING THE QUOTE MODE

The Quote Mode was briefly mentioned when you learned about the Graphics Mode and the Text Mode. To enter the Quote Mode, all you need to do is type one quotation mark. Then, certain keys will display symbols that would not appear otherwise.

Try using the Quote Mode now. (Do not press RETURN until you are instructed to do so.)

First, type:

PRINT “

Now, press the following keys to see the symbols that appear on the screen:

- Press the CRSR UP/DOWN key by itself (symbol: reverse Q)
- Hold SHIFT and press CRSR UP/DOWN (symbol: reverse solid circle)
- Press the CRSR LEFT/RIGHT key by itself (symbol: reverse right bracket)
- Hold SHIFT and press CRSR LEFT/RIGHT (symbol: reverse right line)
- Press the CLR/HOME key by itself (symbol: reverse S)
- Hold SHIFT and press CLR/HOME (symbol: reverse heart)
- Hold SHIFT and press INST/DEL (symbol: reverse left line)

All these symbols are now on your screen.

### **SCREEN 1**

Now, to see these symbols change in the Text Mode, press the SHIFT and C = keys at the same time.

### **SCREEN 2**

Then, return to the Graphics Mode by pressing SHIFT and C = again.

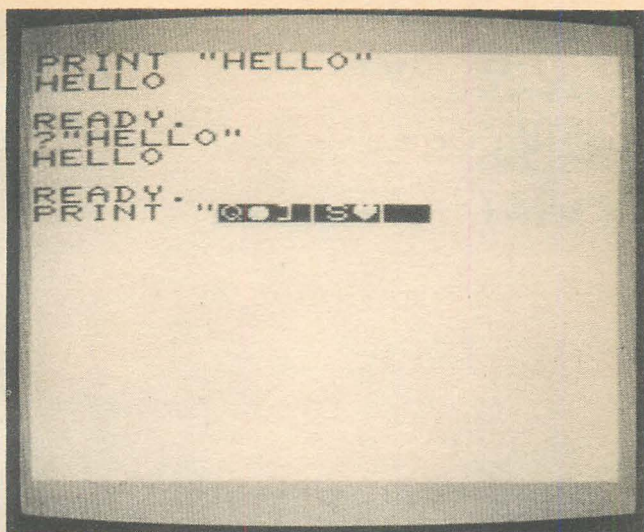
### **SCREEN 3**

At this point, press the RETURN key. Watch as the screen clears except for the READY message.

### **SCREEN 4**

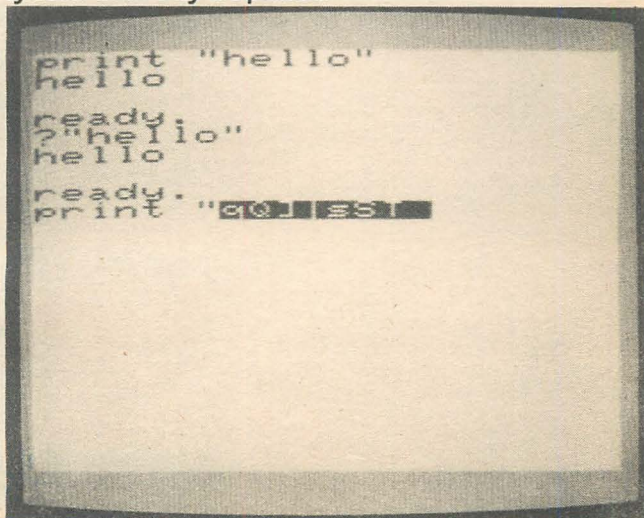
This is because these symbols are *place markers only*. Had you used these symbols in a program line, the cursor would have performed the function (such as move the cursor left or right, up or down) when the program was run. There are additional keys that leave symbols during the Quote Mode, which you will learn about later in this chapter.

*Before going on to the next exercise, clear the screen by holding down a SHIFT key and pressing the CLR/HOME key.*



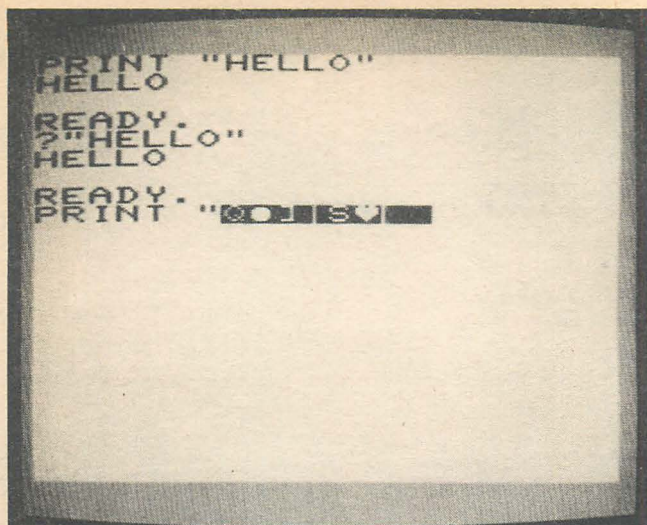
**SCREEN 1**

In the Quote Mode, certain keys will display symbols when they are pressed.



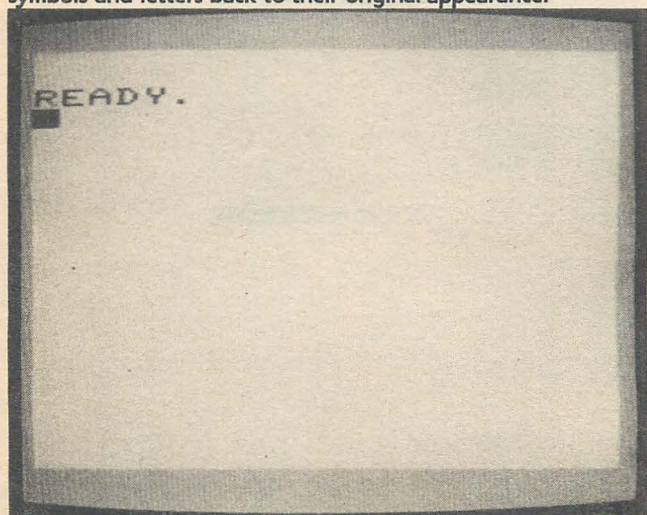
**SCREEN 2**

In Text Mode, the Quote Mode symbols change and letters become lowercase.



### SCREEN 3

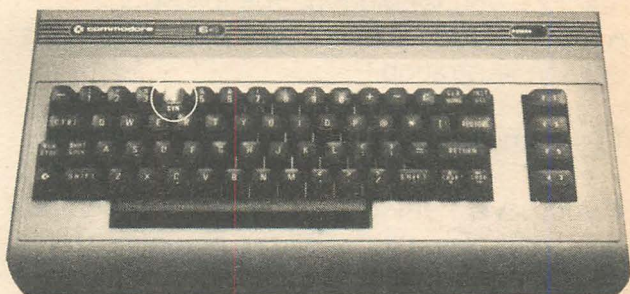
Re-entering the Graphics Mode changes the symbols and letters back to their original appearance.



### SCREEN 4

Pressing RETURN clears the Quote Mode symbols from the screen, and the message *READY* appears.

# \$, £, AND % KEYS



**DOLLAR SIGN/4 key**



The \$ and £ signs are used to tell what kind of money units are involved when you have a series of numbers. The dollar sign and the percent sign have additional uses as well.

## **\$/4 KEY**

One of the special uses of the dollar sign is to indicate a *character string*. You have already learned that character strings, also known as *string constants*, are always enclosed within quotation marks and do not change their value or location within these marks. When numbers are included within quotation marks

as characters, rather than as numeric values, you can use the dollar sign to indicate this. For example, if you wanted A to have the value of ABC123, you would type the following:

A\$ = "ABC123" (Do not type this now; this is only an illustration.)

This is known as identifying a *string variable*.

If you have a disk drive, you can use the dollar sign to display a list of all the programs stored on a specific diskette. Here is an example of this application (do not type this example, either): LOAD "\$",8

If you are using numbers in an equation, do *not* use the dollar sign, as the computer cannot recognize this character as a number. If you do use the dollar sign in an equation, you will get an error message.

You make the dollar sign appear by holding the SHIFT key while pressing the number 4 key. Practice using the dollar sign in a character string now by typing the following:

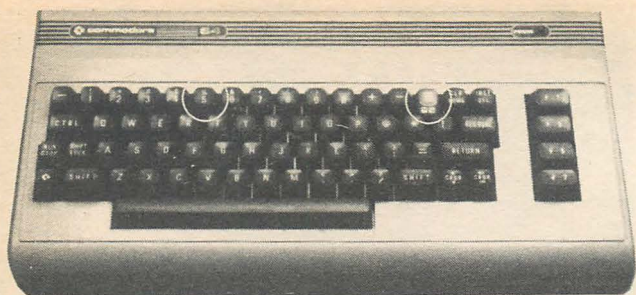
? "HAMBURGERS COST \$2 "

Now press RETURN. The computer prints:  
HAMBURGERS COST \$2.

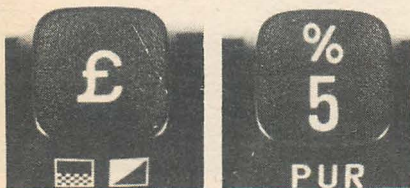
### **SCREEN 1**

*Do not clear the screen and do not turn off the computer before going on to the next exercise.*





**POUND key • PERCENT/5 key**



### **£ KEY**

The £ symbol stands for the British pound sterling. To make the pound sign appear, press the key by itself. Use this symbol now in the following command:

? "£2 FOR KIDNEY PIE"

Now press RETURN.

**SCREEN 1**

## **%/5 KEY**

To make the % character appear, you hold down the SHIFT key while pressing the number 5 key.

The percent sign is also the abbreviation for a term in BASIC. It identifies a box in memory as a special type of number called an *integer*. This means that the number cannot be written as a fraction or a decimal, but can be worth less than zero (a positive or negative number that cannot be split into smaller parts). When you use the % sign to stand for an integer, the computer always takes a decimal number and rounds it *down* (truncates it) when it is converted to an integer (a whole number).

Try this now by typing the following:

```
A%=3.14
```

Now press RETURN.

## **SCREEN 2**

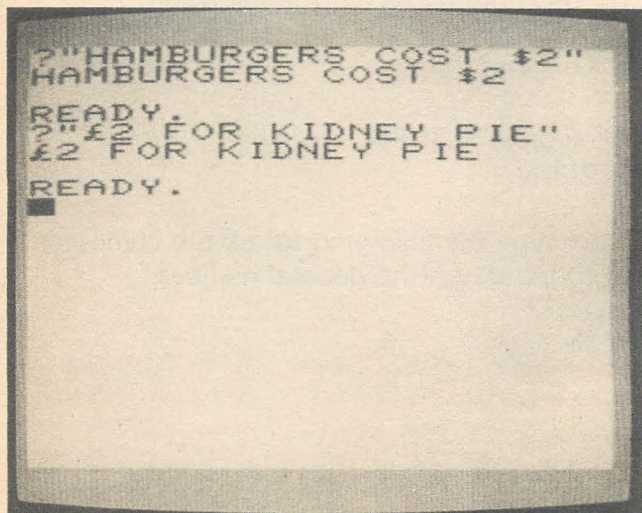
Now type the following to ask the computer to round down the decimal number.

```
?A%
```

Now press RETURN for your answer. The computer rounds down the number to 3.

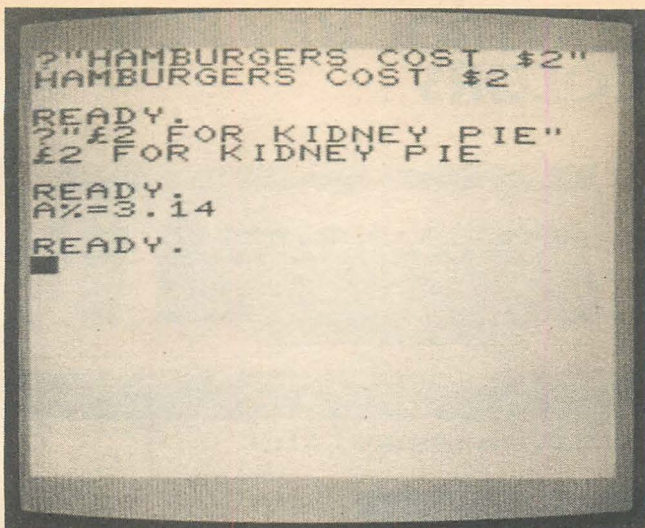
### SCREEN 3

*Before going on to the next exercise, clear the screen by holding down a SHIFT key and pressing the CLR/HOME key.*



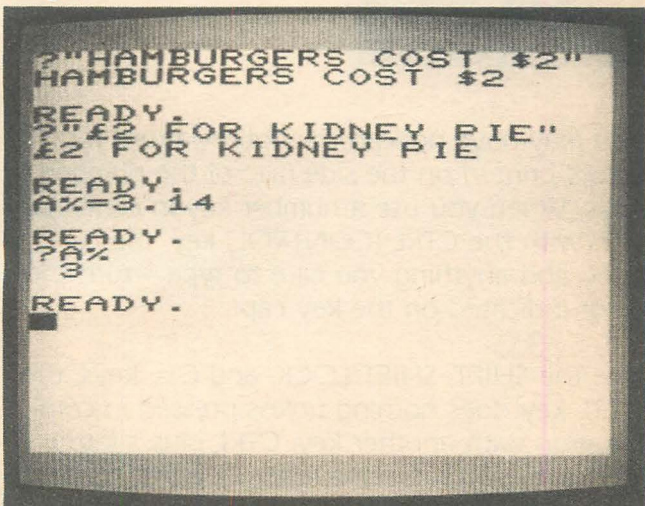
### SCREEN 1

The £ sign is used to indicate the British pound sterling.



### SCREEN 2

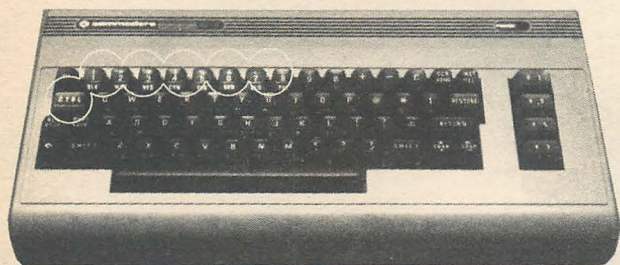
Used in this equation, the % sign stands for *Integer*.



### SCREEN 3

When the answer is printed, it is rounded off to an integer number.

# CONTROL KEY FOR COLORS



**CONTROL key • NUMBERS 1–8 keys**



You may have noticed the abbreviations for colors printed on the side face of the number keys. When you use a number key in combination with the CTRL (CONTROL) key, the cursor—and anything you care to type—turn the color indicated on the key cap!

Like the SHIFT, SHIFT LOCK, and C = keys, the CTRL key does nothing unless pressed in combination with another key. CTRL plus a letter key gives you the same letter as when the letter key is used by itself. CTRL plus a number key is where you can really see the effect.

## **CTRL PLUS NUMBERS 1-8: CHANGING COLORS**

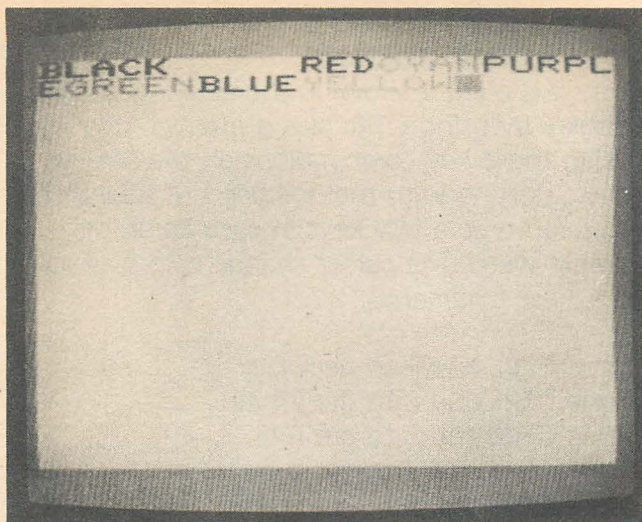
Below is a chart showing the colors you can display by using CTRL plus a number key. Try using these key combinations on the screen now, starting with the number 1. If you wish, you can type a few keys in each color; or, simply watch the cursor change colors as you try these commands.

Press CTRL and 1 to get black  
Press CTRL and 2 to get white  
Press CTRL and 3 to get red  
Press CTRL and 4 to get cyan  
Press CTRL and 5 to get purple  
Press CTRL and 6 to get green  
Press CTRL and 7 to get blue  
Press CTRL and 8 to get yellow

What happened when you pressed CTRL with the number 2 key on the VIC, or CTRL with the number 7 key on the 64? Did your cursor or letters disappear? No, they are still there, but they don't show because they are the same color as the background: white on the VIC and blue on the 64.

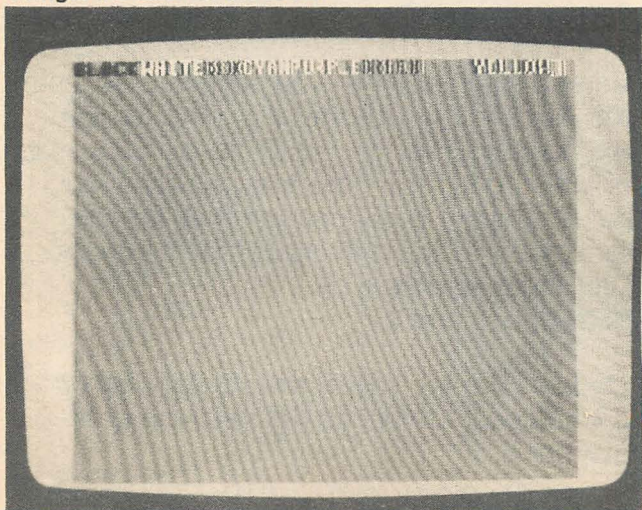
### **SCREENS 1 and 2**

*Do not clear the screen and do not turn off the computer before going on to the next exercise.*



**SCREEN 1**

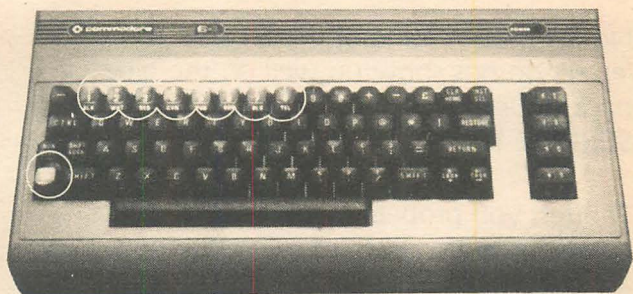
On the VIC, the CTRL key plus a number key changes the color on the screen.



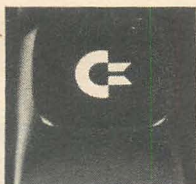
**SCREEN 2**

CTRL plus a number key changes color on the 64, too.

# C= KEY FOR COLORS



**C= key • NUMBERS 1-8 keys**



## **C = PLUS NUMBERS 1-8: MORE COLORS ON THE 64**

If you own a 64, you have eight other colors you can use. To do this, press the C= key with the same eight number keys. Try using these combinations now if you have a 64 computer.

- Press C = and 1 to get orange
- Press C = and 2 to get brown
- Press C = and 3 to get light red
- Press C = and 4 to get grey 1
- Press C = and 5 to get grey 2

Press C = and 6 to get light green

Press C = and 7 to get light blue

Press C = and 8 to get grey 3

Notice that in some of the 64's sixteen colors, letters do not show up well on the blue background.

### **SCREEN 1**

Though you probably won't use all these colors for typing in letters and numbers, they are used to make exciting pictures and graphics in many software programs.

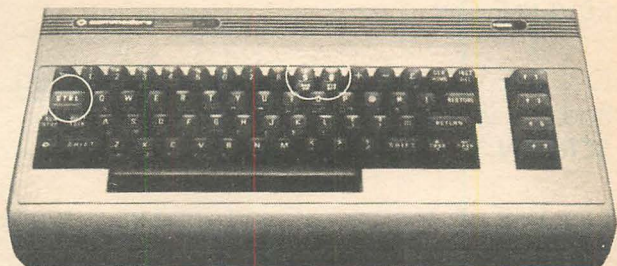
*Do not clear the screen and do not turn off the computer before going on to the next exercise.*



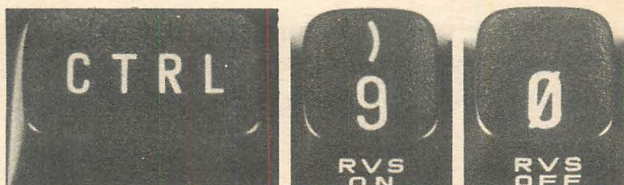
### **SCREEN 1**

The C = key and the numbers 1-8 give you eight additional colors on the 64.

# CONTROL WITH 9 AND 0 KEYS



**CONTROL key • 9/REVERSE ON key • 0/REVERSE OFF key**



## REVERSE ON AND OFF

You can use CTRL in combination with the number 9 key to turn on the computer's reverse feature and CTRL plus the number 0 key to turn this feature back off. When the reverse feature is on, the background becomes the color of the cursor as you type, and the characters appear in the background color.

IF YOU HAVE A VIC, first change the color to red by holding CTRL and pressing the number 3 key. IF YOU HAVE A 64, first change the color to white by holding CTRL and pressing the number 2 key.

Next, turn on the reverse feature by using CTRL plus the number 9 key. Now, type the following words, *without* pressing RETURN:

REVERSE ON

ON THE VIC, the background appears in red, and the words REVERSE ON in white.

**SCREEN 1**

ON THE 64, the background appears in white, and the words REVERSE ON in blue.

**SCREEN 2**

Turn off the reverse feature now by using CTRL plus the number 0 key. Then type this message, *without* pressing RETURN:

REVERSE OFF

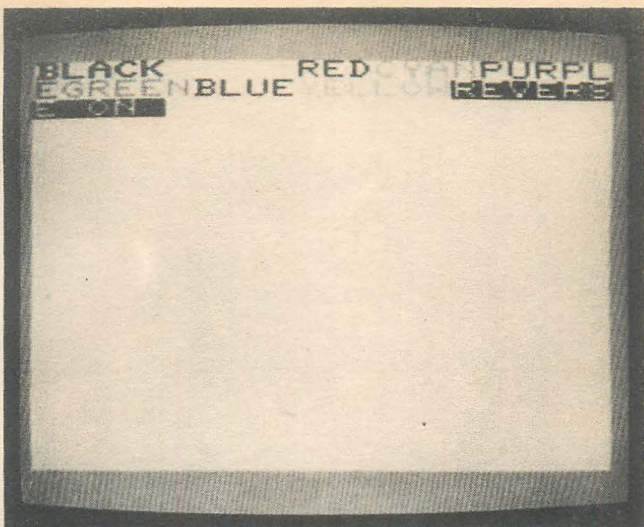
ON THE VIC, the letters now appear in red and the background in white.

**SCREEN 3**

ON THE 64, the letters now appear in white and the background in blue.

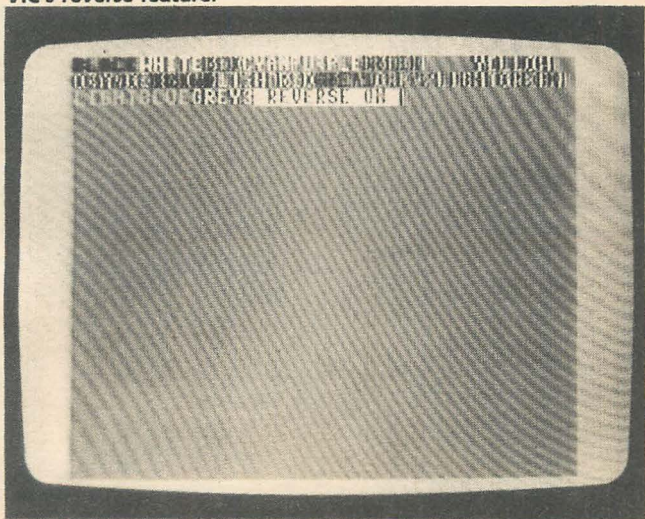
**SCREEN 4**

*Before doing the next exercise, turn your computer OFF then ON again. Clear the sign-on message from the screen by holding SHIFT and pressing the CLR/HOME key.*



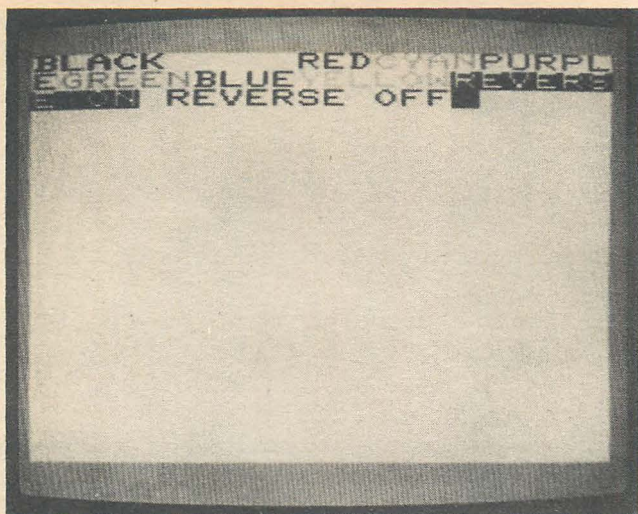
**SCREEN 1**

Pressing CTRL plus 9 together turns on the VIC's reverse feature.



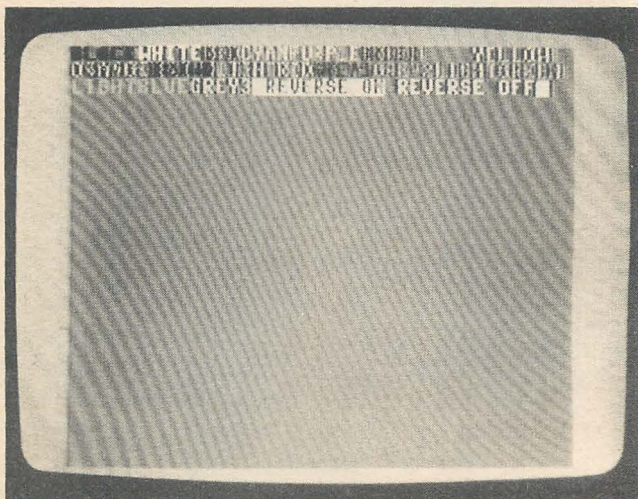
**SCREEN 2**

Reverse on changes the background color on the 64, also.



**SCREEN 3**

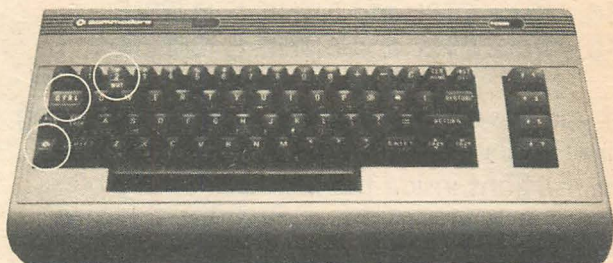
Pressing CTRL plus 0 turns the VIC's reverse feature back OFF.



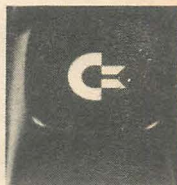
**SCREEN 4**

Reverse off returns the background to its original color on the 64, also.

# COLORS IN THE QUOTE MODE



**C= key • CONTROL key • QUOTATION MARK key**



As mentioned earlier in this chapter, certain keys will leave a symbol not otherwise displayed when typed after one (or an odd number of) quotation mark(s). Type the following program now to see some of these symbols display in the Quote Mode. Then, when you run the program, you will see the effect that these keys have. NOTE: Type the lines exactly as they are printed here, *except do not* type in the brackets or the instructions inside the brackets; when you get to the brackets, simply press the CTRL key with the number key indicated. Then finish typing the line. Be sure to press the RETURN key after you finish typing

each numbered command line.

```
10 ?"[use CTRL and 1]THIS IS BLACK"  
20 ?"[use CTRL and 3]THIS IS RED"  
30 ?"[use CTRL and 5]THIS IS PURPLE"  
40 ?"[use CTRL and 6]THIS IS GREEN"
```

If you have a 64 computer, add the following lines. Again, do *not* type the brackets or the instructions inside the brackets; simply press the C = key with the number key indicated. Press RETURN after each numbered line.

```
50 ?"[use C = and 2]THIS IS BROWN"  
60 ?"[use C = and 4]THIS IS GREY 1"  
70 ?"[use C = and 5]THIS IS GREY 2"
```

As you can see, although the *symbols* appear in the command lines, the text has not changed.

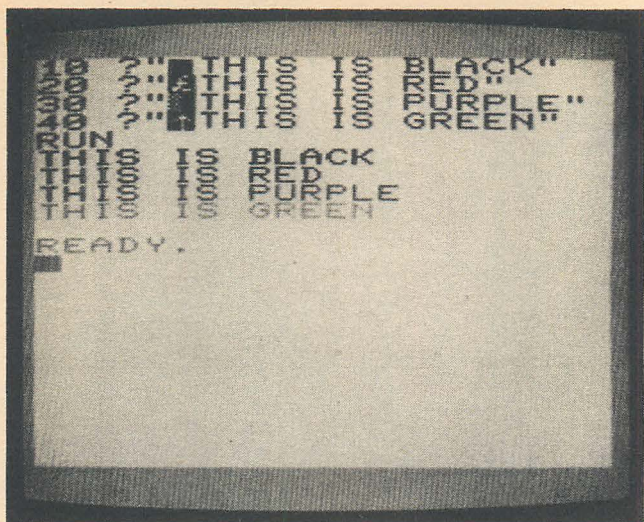
### **SCREENS 1 and 2**

However, as soon as you run the program, you will be in for a surprise. Run the program now by typing the word RUN and pressing the RETURN key. Each line has changed to the color whose combination you typed!

### **SCREENS 3 and 4**

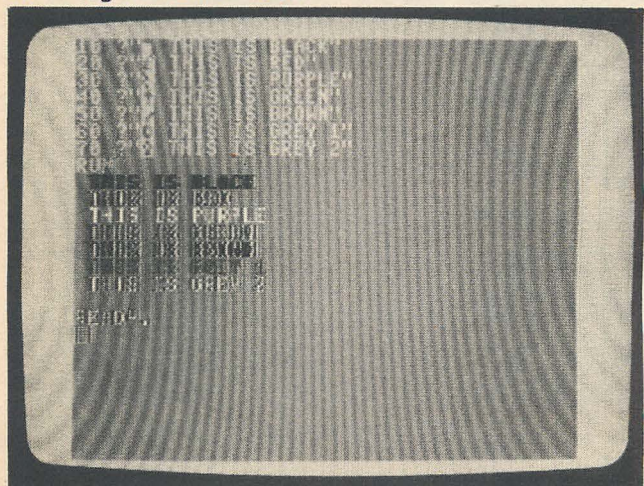
*To return to the computer's original color now and to wipe this program out of your computer's memory, turn your computer OFF and then back ON again. When the sign-on message appears, clear the screen by using SHIFT plus the CLR/HOME key.*





### SCREEN 3

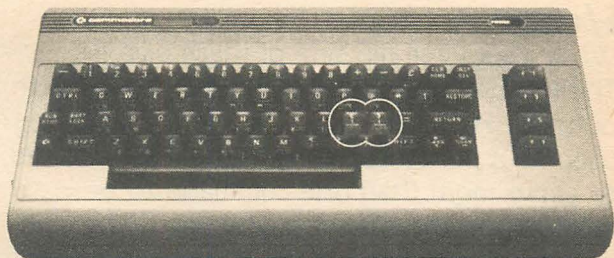
When you run the program on the VIC, each line changes to its new color.



### SCREEN 4

Running the program on the 64 displays lines of additional colors.

# BRACKETS, COLON, AND SEMICOLON



**LEFT BRACKET/COLON key • RIGHT BRACKET/SEMICOLON key**



## **USING THE BRACKETS [ ] KEYS**

Two more keys that work a bit like parentheses are the *brackets* keys. Though they are used to enclose remarks in regular sentences and character strings, they cannot group numbers like parentheses in BASIC commands or in long arithmetic calculations. You get the left and right brackets when you press the colon or semicolon key while holding down the SHIFT key. For instance, type this:

PRINT "[ ]"

Now press RETURN. The result looks a bit like a cursor, doesn't it?

## SCREEN 1

### [/: KEY

What about the flip side of these two keys? The left bracket is the *colon* when typed without the SHIFT key down. In addition to being used as a punctuation mark, the colon is used to allow more than one command to be included on the same program line. (The commands are still executed separately, from left to right.) An example of this would be to take the three separate commands used to send a message to your printer. (Do not type these commands—they are used for illustration only.)

```
OPEN4,4  
CMD4  
LIST
```

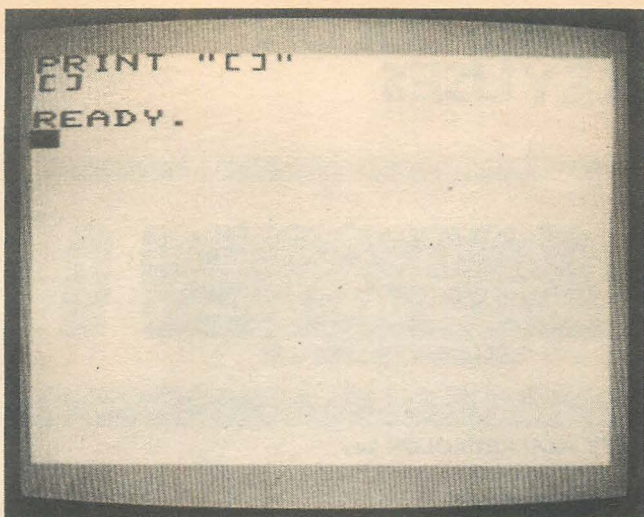
You could type all three commands on the same line, like this:

```
OPEN4,4:CMD4:LIST
```

and then, when the procedure is completed, type the last two commands like this:

```
PRINT#4:CLOSE4
```

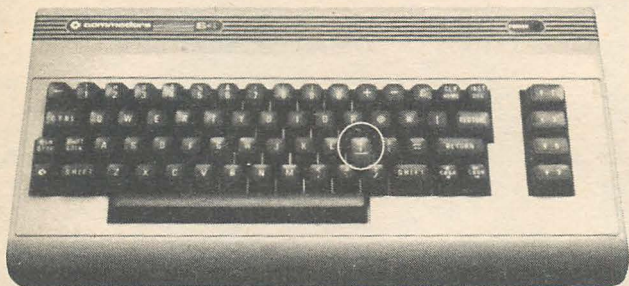
(The preceding commands work only if you have a printer attached to your computer.)



#### **SCREEN 1**

The brackets symbols can be used in sentences and within character strings.

# MORE COLON KEY USES



**LEFT BRACKET/COLON key**



One other neat trick of the colon is to save extra spaces in a BASIC command line where your computer would ordinarily take them out. This technique is primarily used by programmers to set subroutines apart. For instance, type in these three lines and press RETURN after typing each line.

```
100 FOR I= 1 to 400  
110 : ?I  
120 NEXT
```

Your program lines appear on the screen.

### **SCREEN 1**

FOR and NEXT used together is a quick way to repeat a command many times, such as line 100.

Here is what this program will do when run:

- The first line establishes the value of I, which starts at the number 1 and ends at 400
- The second line tells the computer to print the current value of I
- The last line tells the computer to increment the value of I by one (1, 2, 3, etc.).

To see how this program works, type the word RUN and press RETURN. You should see the numbers 1 through 400 rapidly appear on the screen in a single column.

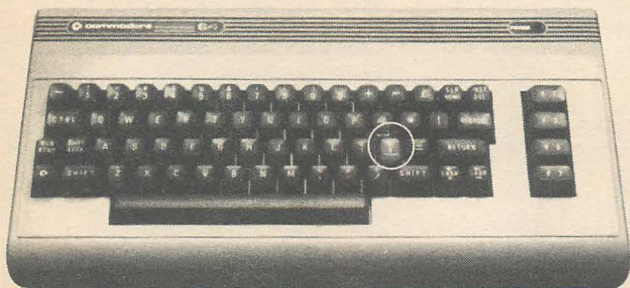
### **SCREENS 2 and 3**

*Clear the screen now by holding SHIFT and pressing CLR/HOME. (Do not turn off the computer before going on to the next exercise.)*





# SEMICOLON KEY USES



**RIGHT BRACKET/SEMICOLON key**



## **[/; KEY**

The right bracket has the semicolon as its flip side. This key, when used in a BASIC command, tells your computer to print a series of data or print statements immediately after each other on the same line when the program is executed.

To see the effect that the semicolon key can have, use it with the program you just created. First, display the program from your computer's memory by typing the word LIST and pressing RETURN. The program lines reappear.

### **SCREEN 1**

Now move the cursor to line 110 and type a semicolon after the I, like so:

```
110 : PRINT I;
```

Line 110 now looks like this.

### **SCREEN 2**

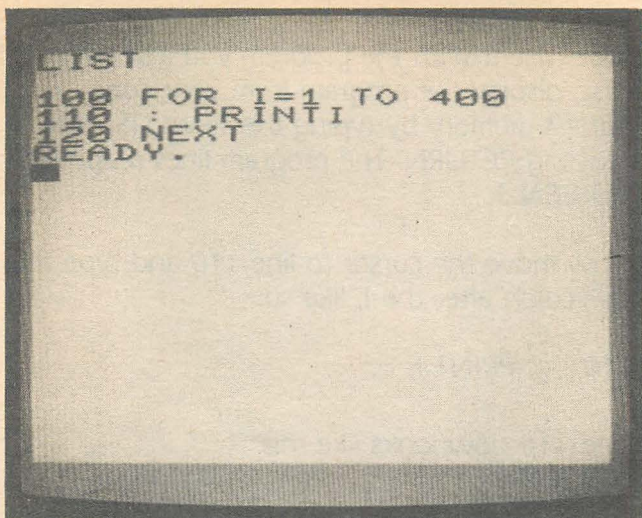
Be sure to press RETURN after adding the semicolon. Otherwise, the computer will not add the semicolon into its memory.

Then, move the cursor to the first blank line after the program, type RUN, and press RETURN.

What a difference the semicolon makes! This key told the computer to make the values of I appear next to each other when printed.

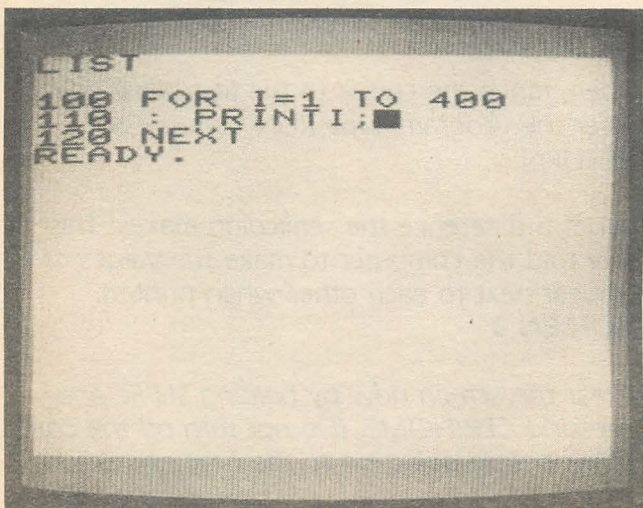
### **SCREEN 3**

*Clear the screen now by holding SHIFT and pressing CLR/HOME. (Do not turn off the computer before going on to the next exercise.)*



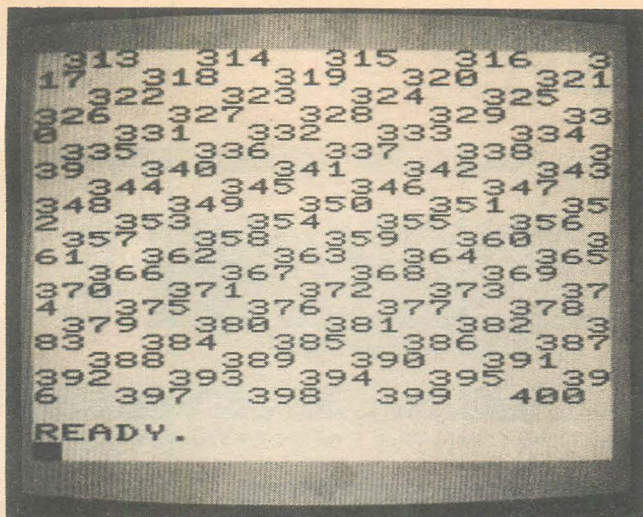
#### SCREEN 1

Typing *LIST* and pressing RETURN displays the previous program on the screen.



#### SCREEN 2

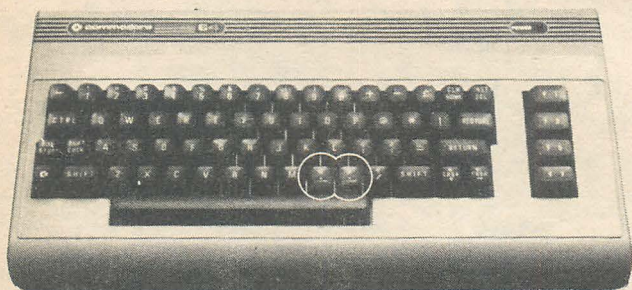
Add a semicolon and press RETURN to give your computer a new instruction.



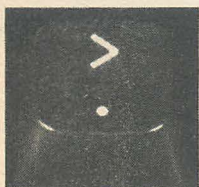
**SCREEN 3**

When you run the program again, more than one number appears on each line.

# PERIOD AND COMMA KEYS



**LESS THAN/COMMA key • GREATER THAN/PERIOD key**



In normal letter writing, the two most common punctuation marks are the *comma* (,) and the *period* (.). They are found on your keyboard in UNSHIFTED mode, paired with the LESS THAN (<) and GREATER THAN (>) signs. Whenever you include a comma or period in a string (in other words, within quotation marks), each has the same meaning as in a regular sentence.

### **>/, KEY**

When used in numbers, the period indicates that all numbers to the right of the period are decimals. For instance, type the following command which uses the period key:

?5.5 + 3.2

Your addition problem appears on the screen.

### **SCREEN 1**

Now press the RETURN key. The computer interprets the period as a decimal point and prints the number 8.7 as the answer.

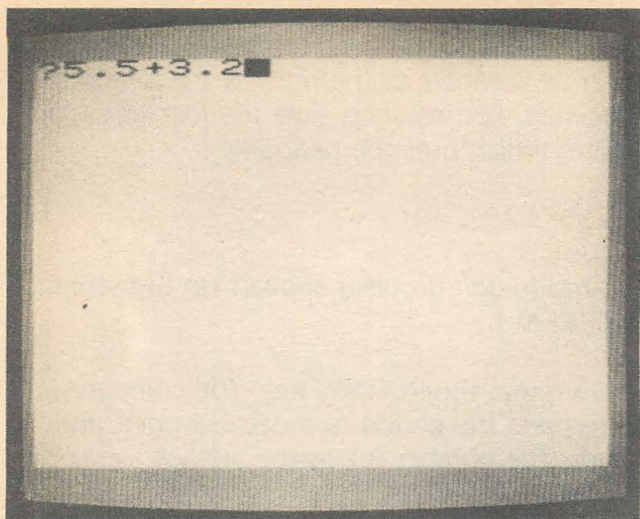
### **SCREEN 2**

### **</, KEY**

If you put a comma in a number to make the thousands and millions place values, your computer won't know how to read it. *Do not use commas inside numbers.* For instance, you should type:

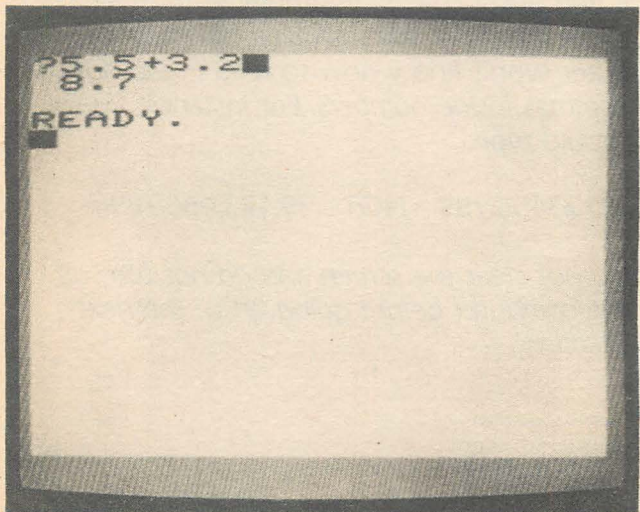
?9123456.789 NOT ?9,123,456.789

*Do not clear the screen and do not turn off the computer before going on to the next exercise.*



**SCREEN 1**

Use the period (.) as a decimal point when you type mathematical equations.



**SCREEN 2**

When your computer displays the answer, it uses the period as a decimal point, also.

In computer language, commas are used to separate each new item that your computer is supposed to check out before executing the command you have given it. The comma is used in such commands as:

```
LOAD" S",8  
OPEN1,8,15
```

Do *not* type these commands now.

In these examples, you want your VIC or 64 to look at several pieces of information. The first comma tells your computer where to look; 8 stands for the disk drive on all Commodore computers. The second and later commas mark off additional information needed by your computer system to complete this command.

Remember the program in which you recently used the semicolon?

```
100 FOR I= 1 TO 400  
110 : PRINT I;  
120 NEXT
```

To display this program on the screen again, type the word LIST and press RETURN. Again, unless you turned the computer off, the program will redisplay. If you did turn off your computer, type this program again, making sure to press RETURN after each line.

Now move the cursor back up to line 110, and replace the semicolon with a comma.

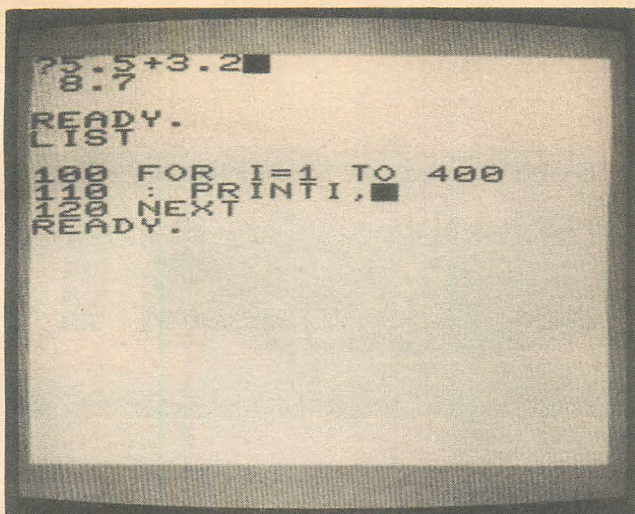
### **SCREEN 1**

Now press the RETURN key (to tell the computer to remember the new version, not the old one). Then, move the cursor below the last program line, type RUN, and press RETURN. Watch as your VIC or 64 prints the numbers again.

### **SCREEN 2**

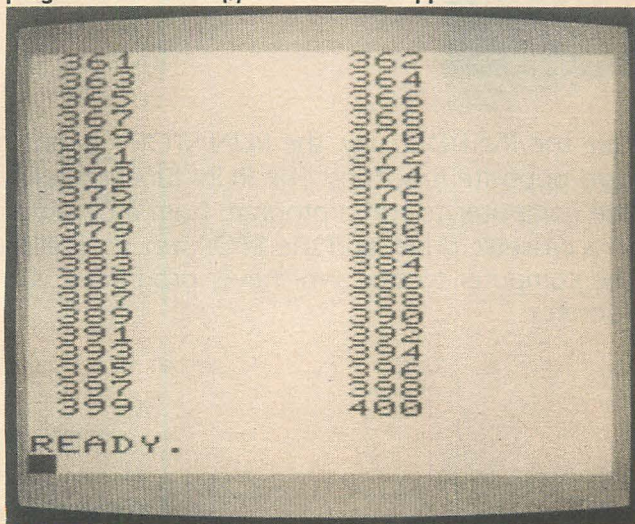
Notice that they are spread out into columns this time. When a comma follows a BASIC command, it tells your computer to execute the next command line in the next tabbed column (every 10th column) on your computer. On the 64, that makes the print statements appear in columns 0, 10, 20, and 30. On the VIC, you only have columns 0, 10, and 20. If a command takes more than 10 horizontal spaces, the program will skip to the next tabbed column.

*Before going on to the next exercise, clear the screen by holding down a SHIFT key and pressing the CLR/HOME key.*



### SCREEN 1

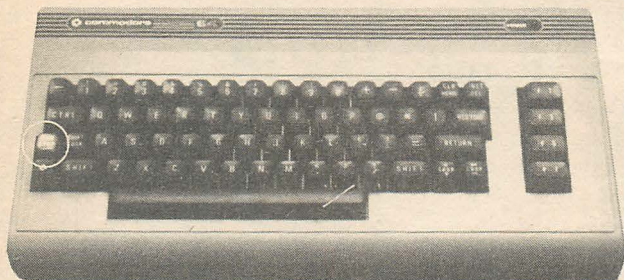
Change the semicolon (;) in your previous program to a comma (,) and see what happens next.



### SCREEN 2

The comma places the numbers in columns (in two columns on the VIC).

# RUN/STOP KEY



**RUN/STOP key**



Like the INST/DEL key, the RUN/STOP key has two opposite functions: The RUN function tells the computer to run a program from a cassette in a cassette drive, and the STOP function tells the computer to stop whichever program it is running.

## **SHIFT PLUS RUN/STOP: THE RUN FUNCTION**

Wouldn't it be nice to just press a key and let your VIC or 64 take over for you to load a program of your choice and let it run—an auto-pilot, of sorts? If you have a cassette drive, that is what the RUN/STOP key does for you. When you use this key along with the SHIFT key, you don't have to type the word RUN.

Try this now by holding the SHIFT key down and pressing the RUN/STOP key. Your computer should give you the message:

```
LOAD  
PRESS PLAY ON TAPE
```

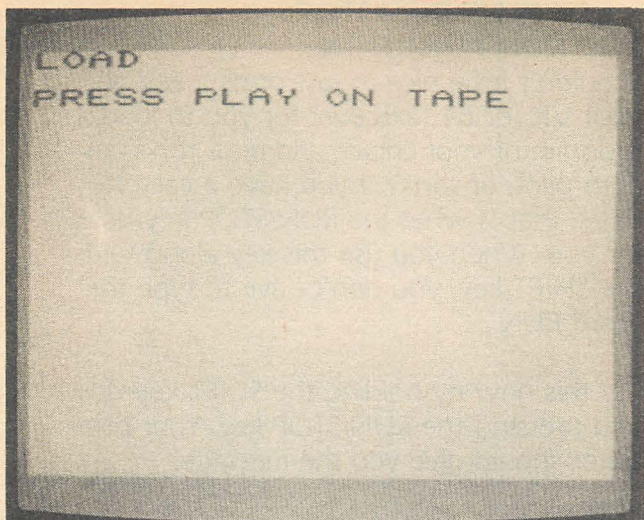
Notice that your blinking cursor has disappeared, and nothing is happening. This is because the computer is searching for a program on a cassette—which you are not using at this time!

**SCREEN 1**

## **RUN/STOP BY ITSELF: THE STOP FUNCTION**

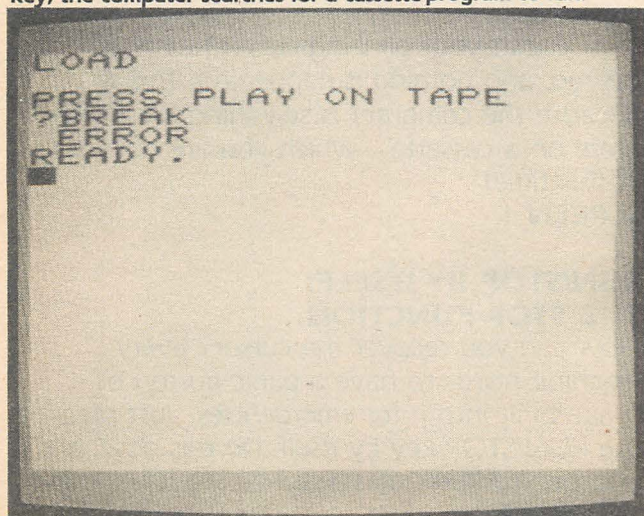
How can you recover the cursor? Every machine needs to have a panic button or brake built into it for emergencies. Just press the RUN/STOP key by itself. Do this now, and you get a BREAK message.

**SCREEN 2**



**SCREEN 1**

When you use SHIFT with the RUN/STOP key, the computer searches for a cassette program to run.



**SCREEN 2**

Pressing the RUN/STOP key by itself causes the computer to stop a procedure.

STOP is your first line of defense on your VIC or 64. Your program is halted until you tell the computer to do something else. If you want it to start running again, you would type the *continue* command, CONT, and press RETURN (*do not do this now*). The program should normally start up again until you either press the STOP key or turn off the computer.

You can write your own program and stop it. First, turn your VIC or 64 OFF and then ON again to clear its memory. Now type in the following program and be sure to press RETURN after each line:

```
10 PRINT "WHERE'S THE BRAKE?"  
20 GOTO 10
```

Your program now appears on the screen.  
**SCREEN 1**

Then type the word RUN and press the RETURN key. Uh-oh! The message keeps appearing on the screen and won't stop!

**SCREEN 2**

Now is the time to press the STOP key by itself. This will halt the following program and display the message BREAK IN 10.

The message says BREAK IN 10 because the command in line 10 was the one being executed when you stopped the program.

### **SCREEN 3**

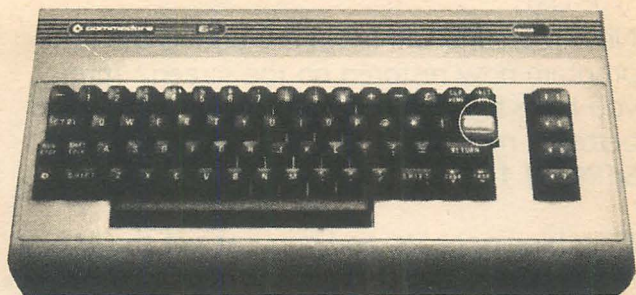
Remember, the STOP key is most useful if you have given your computer an instruction, such as to LOAD a program, or if you are in the middle of running a program that you bought or wrote and don't want to continue. This key is especially important if you have typed in something that contains a mistake, and you lose your cursor while nothing appears to be happening. Your computer has taken off into parts unknown—long enough that computer programmers say your VIC or 64 has *gone out to lunch*. Whenever this happens, press the STOP key and hope that you will get your blinking cursor to come back to your screen. If it doesn't, then you need to combine the RUN/STOP key with another most important key, the RESTORE key.

*Do not clear the screen and do not turn off the computer before going on to the next exercise.*





# RESTORE KEY



**RESTORE** key

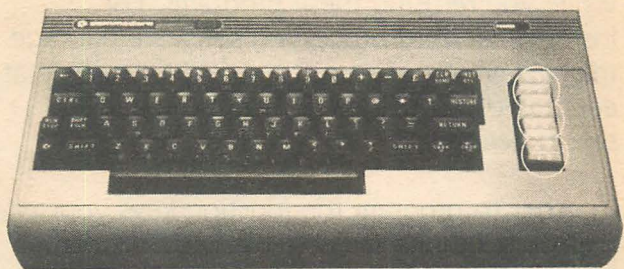


The RESTORE key almost always brings your blinking cursor back to the screen and leaves your program in memory. Let's try this now. First, hold down the RUN/STOP key and at the same time press the RESTORE key.

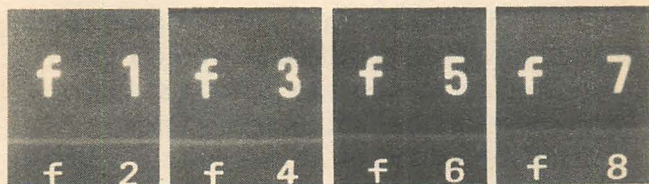
When you press RUN/STOP and RESTORE together, the program stops running and the screen clears and gives you the READY message. (If you had been working in other colors, the screen would return to the colors you get when you first turn on the computer.)



# FUNCTION KEYS



**FUNCTION** keys



The VIC and 64 have four keys that can be programmed to do a variety of different tasks. These keys are known as *dual function* keys because each key can be used for two different functions. For example, you can program the F1/F2 key so that your screen will clear when you use the F1 function and your text will be sent to the printer when you use the F2 function. These are just two examples of the many functions you could program these keys to perform. The advantage of these keys is that *you* choose the functions you want to assign to them.

In addition to programming the function keys yourself, many software programs that you can use with your computer have already programmed the keys to perform certain tasks while you're using these programs. For instance, a word processing software package might have programmed the F3/F4 key so that each time you use the F3 function, a line of text is deleted.

In order to program the function keys yourself, you must be familiar with many BASIC commands. Once you know the more advanced BASIC commands, you will find these keys very useful. Because these are advanced commands, however, and because you can program the function keys to perform so many different tasks, the procedures for programming the function keys are not covered in this guide.

Another key that is sometimes programmed to perform special functions in software programs is the ← key, located in the upper left corner of the keyboard. The only other use of the ← key is to display a graphic of a left arrow (in all modes).

## CHAPTER 4

# PERIPHERALS— EXPANDING YOUR SYSTEM

Your basic computer system (computer, TV or monitor, and software) can take you a long way. There are, however, many other components available for use with your VIC 20 or Commodore 64. In the computer world, any piece of equipment beyond the computer console itself is called a *peripheral*. Peripherals allow you to expand your computer system and use it for a variety of purposes.

### **EVALUATING YOUR NEEDS**

Once you are familiar with your keyboard and with using software programs on your VIC 20 or Commodore 64, you may start thinking about different ways you want to use your computer. Are you going to need a monitor to replace the home TV, a dot-matrix or letter-quality printer to print your pictures or letters, a modem to talk to other computer users, or a joystick for that favorite game? You'll need to decide how fancy a brand you want to buy. Do you need a cheaper one-color monitor (for word processing) or a more expensive full-color monitor (for those colorful games)?

### **BUYING PERIPHERALS**

Who makes peripherals that will work with your VIC or 64 computer? The most obvious

source is Commodore itself. The store where you bought your computer should carry Commodore peripherals, as well as the most popular software programs that Commodore makes.

Hundreds of independent companies specialize in peripherals for the VIC and 64, especially printers, modems, controllers, and memory expansion products. These companies advertise in computer magazines, such as those described in Chapter 6, "Your Computer's Network." Peripherals from independent companies may be available at stores that sell computer equipment, or by mail.

When buying peripherals for the VIC or 64, be sure that they will work with your computer. This may mean finding the right interface (adapter) and possibly the right software program to go with a peripheral.

To help you think about ways you may want to expand your system, let's look at some of the most commonly used peripherals for the VIC and 64.

### **ADDING A COLOR MONITOR**

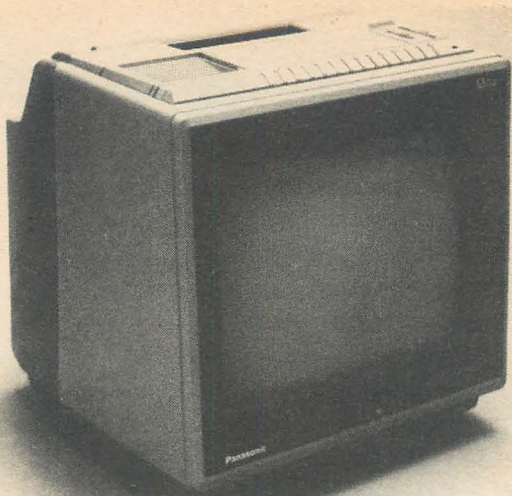
At some point, you may want to connect your VIC or 64 computer to a color monitor. While a TV screen is sufficient, the computer's picture quality on a TV is nearly always inferior to the picture quality possible on a monitor. This is because the computer generates a video signal that is correct for a monitor, but needs extra



**Commodore Model 1701 video monitor**

corrections, both by the modulator and the TV, before the signal can be displayed on an ordinary television.

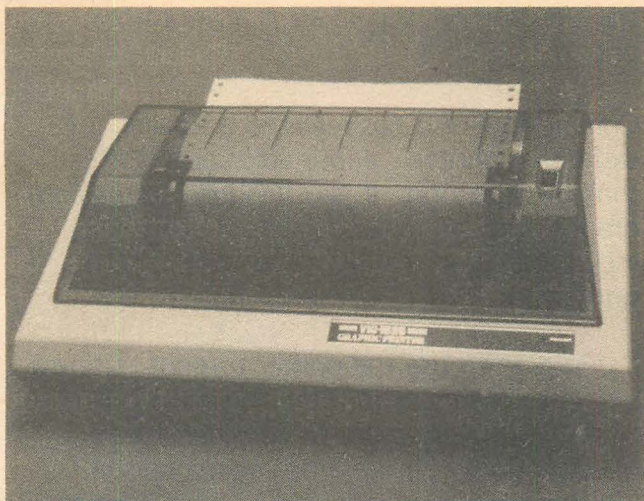
If you are shopping for a TV set to be used with your computer, consider looking for one that is both a TV and a monitor (such as Panasonic's Omni series). The monitor connections can also be used by videotape recorders and other video equipment. However, avoid the special *RGB* (Red-Green-Blue) monitors that are on the market. Although RGB monitors display very high quality pictures, neither the VIC nor the 64 can be used with them. Commodore's own Model 1701 monitor for the VIC and 64 offers similarly high quality, using a different principle, at a much lower cost.



Panasonic Omni series television—both a TV and a monitor.

### **USING BOTH A MONITOR AND TV**

If you are using a monitor with the 64, you have an option not available to VIC owners: after connecting a monitor (using the same cable as on the VIC), you also may add a regular TV, connected via the usual cable and TV/game switch box. This might be useful if you have both a color TV and a monochrome (black-and-white, green, or amber screen) monitor. You could then use the color TV screen for games and for educational programs that make use of color. You could use the monochrome monitor for business-related software programs, which often appear more clearly in one color. Generally, most people find monochrome monitors easier on the eyes during long sessions of reading words and numbers.



Commodore Model 1525 printer

## **DO YOU NEED A PRINTER?**

If you plan to use your computer either for business purposes or for writing long programs of your own, you may want a printer to make paper copies of your work. Once you decide on what types of material you want to print, you can determine the type of printer you need. Nearly any printer on the market can be connected to a VIC or 64 via a suitable adapter.

### **Which Kind of Printer?**

A popular type of printer is the *dot-matrix* printer. This kind of printer produces characters made up of dots, like pictures in a newspaper. This method is relatively fast and inexpensive, and it allows the printer to duplicate any character that can be displayed on the screen. Commodore's current printer for

the VIC and 64, the 1525, is a dot-matrix printer.

Commodore also has released a smaller, less expensive printer—a four-color pen plotter that can also print. If you need to plot colored graphs and can make do with narrow 4½-inch paper, you may want to consider this printer.

If you plan to use the printer to print business letters to clients or for other business purposes, you might want to consider a *letter-quality* printer. Unlike a dot-matrix printer, which makes characters out of dots, a letter-quality printer produces fully formed characters, like a typewriter. The fully formed characters give the finished product a more professional appearance.

In general, dot-matrix printers are faster and cheaper than letter-quality printers. A dot-matrix printer is capable of printing all graphics characters produced by the VIC or 64. A letter-quality printer, on the other hand, should be used for business-related printing because of the exceptional quality of the printing.

In addition to Commodore's own printers, there are many other makes to consider, such as Epson's FX-80 line of printers. Those needing letter-quality printing might consider C. Itoh's Starwriter printers. Less expensive,

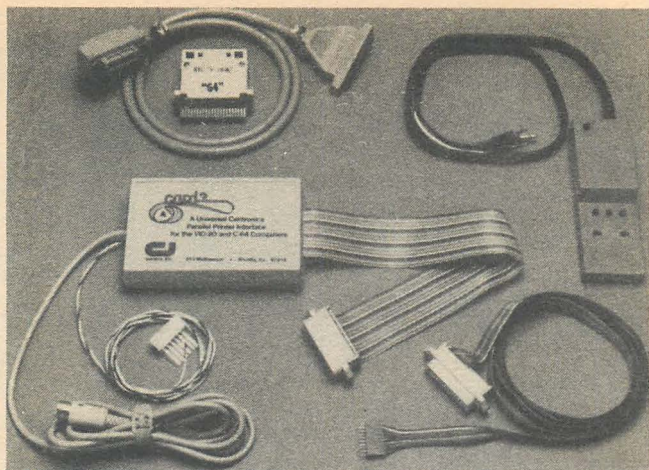


**Olivetti Praxis 30 electronic typewriter**

slower, and less durable printers are also available, such as the Smith-Corona TP-1. At about the same cost, an even slower and lighter-duty alternative is to use an electronic typewriter with a computer interface. For example, the Olivetti Praxis 30 can be specially adapted to work with your computer. The advantage of having a keyboard on the printer is for filling in blanks in computer-generated forms. Naturally, an electronic typewriter can also be used manually. On the other hand, at 12 characters a second, making a paper copy of a long program could take over an hour!

### **Printer Interfaces**

A printer interface is an adapter that connects the printer to your VIC or 64, enabling the printer to carry out your computer's instructions. Before buying a printer for your com-



**Printer Interfaces for your Commodore computer**

puter, be sure to find out what type of interface is needed for your particular printer-computer combination.

CARDCO's interface, called CARD? (pronounced "card print"), lets you use any *Centronics parallel printer* with a 36-pin Centronics connector (that is, most printers made for microcomputers) with your VIC or 64.

Another type of printer interface to consider is the V-Link or the C-Link, manufactured by Richvale Communications. These are IEEE-488 interfaces that plug into the cartridge connector of the VIC and 64 respectively. Among other advantages, they allow you to use a VIC or 64 with some of Commodore's larger disk drives and printers. Both also upgrade BASIC,

adding commands used in larger Commodore computers. However, using the links with some commercial programs requires extra setup. These interfaces make the most sense for those who already have other Commodore equipment.

We recommend that you avoid *parallel-to-serial* printer interfaces that attach to the computer's user port. Although these work well by themselves, the special programs they require are incompatible with some other programs you will most want to use with the printer. Unfortunately, we have not yet seen a serial interface that attaches to the connector used by Commodore's own printer. The advantage of a serial interface is that it uses a simpler cable, which can be used over fairly long distances without difficulty. If you are unsure of the type of printer interface you'll need, ask your computer dealer.

## **MODEMS**

A *modem* (MOdulator-DEModulator) is a device that allows you to communicate with other computer users, over nearly any distance. A modem translates computer signals into telephone signals so they can be carried over great distances by telephone wires; it also translates telephone signals back to computer signals so you can receive information from other computers. We'll talk more about the use of modems in Chapter 6, "Your Computer's Network."



**Commodore VICMODEM**

Commodore's VICMODEM currently is the least expensive modem available for the VIC or 64. It simply plugs into the user port of the computer and the handset of your telephone. To use the VICMODEM, you must have a phone with a removable cord ending in modular plugs (plastic clips) going from the base of the phone to the handset (the part you hold to your mouth and ear). You also have to make your call first and then manually transfer this cord from the handset to the modem.

There are other modems available that will work with your VIC or 64, if you purchase an appropriate interface. The Hayes Smart-modems, model 300 and model 1200, are now recommended by Commodore for use with their larger systems. Micro Systems Development makes several suitable interfaces.

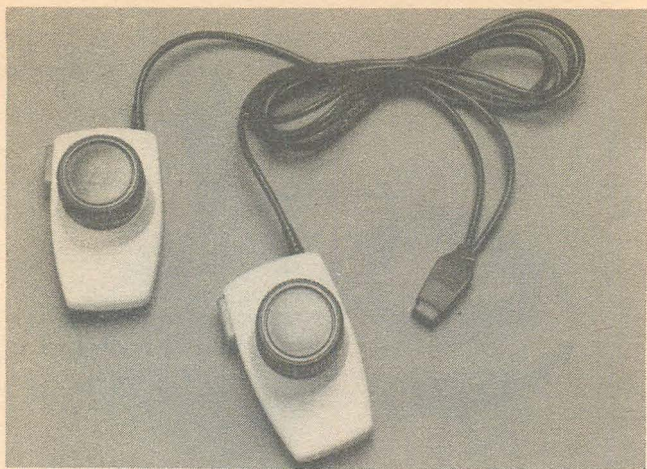


**Wico Joystick**

The Smartmodem 1200 from Hayes transmits information either at the usual speed of transmission or at a speed four times faster. If your computer calls are long-distance, the 1200 may pay for itself in shorter calls. Also see what other types of modems may have become available from Commodore when you buy.

### **JOYSTICKS FOR GAMES**

A *joystick* is a handle that can be moved in eight compass directions, plus a button that can be pressed. Typically, games use the joystick to move players and the button to shoot a weapon or to begin the game. Some people might not consider a joystick an important accessory for a computer; on the other hand, most of the best games require it, and few computer users entirely avoid computer games.



Commodore game paddles

There are dozens of brands of joysticks available, including those made by Commodore.

## **GAME PADDLES**

If you want two people (on the VIC) or four people (on the 64) to be able to play computer games at once, you may want a set of Commodore game paddles. These allow motion only along a line, but they double the number of players possible for the few games set up to use them.

You can safely use Atari joysticks and paddles, rather than the Commodore components, although these Atari equivalents usually cost more.

## **LIGHT PENS—GREAT DRAWING TOOLS**

The light pen is another device that connects

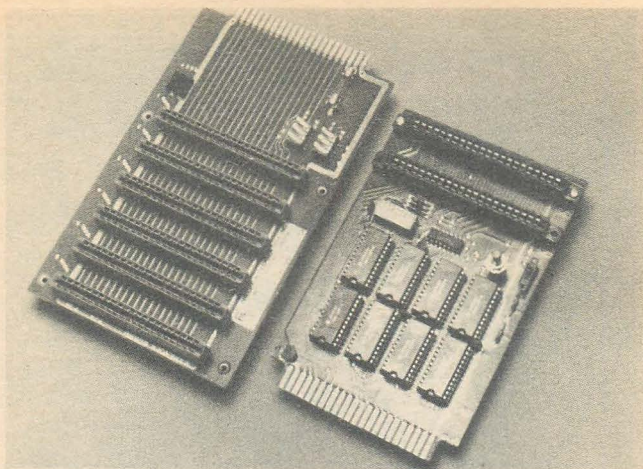


**Commodore 8K memory expansion cartridge**

to the game connectors of the VIC and 64. By pointing this device at the screen, you can draw images which will appear on the screen. It also lets you communicate with the computer without typing, simply by pointing to a word or phrase you want the computer to act on. Before buying a light pen, see how precisely it is able to follow your movement on the screen. To be good for drawing, it must be very exact.

## **MEMORY EXPANSION FOR VIC OWNERS**

VIC owners may want to consider this add-on immediately. Many software programs cannot run on a standard VIC because of the VIC's small amount of built-in memory. The cure is an add-on memory cartridge. Commodore sells these in 8K and 16K versions. (Each K stands



### Motherboards

for about 1,000 characters of memory capacity.) Many software programs for the VIC require at least 8K of added memory. Some business programs and adventure games need 16K extra. The most you can add is 24K, plus the 3K in products like Commodore's super-expander cartridge (discussed in Chapter 5, "Software"). If you need a considerably larger amount of memory, however, you might consider trading up to the 64.

### **FOR THE PERSON WITH EVERYTHING: MOTHERBOARDS**

After you add extra memory, an interface or two, and some software cartridges to your VIC, you may want a way to keep them all plugged in at the same time. The accessory that allows this is called a *motherboard*. It is a fiberglass board that plugs into the large

expansion port on the back of the computer. A motherboard has several empty connectors spaced along its top. Each of these is connected to the original expansion port connector. This allows up to three or six accessories (depending on brand and model) to be plugged into the expansion port at the same time.

Here are some features to look for in a motherboard:

- Separate, easy-to-work switches for each of the connectors. Some add-ons are incompatible with others and separating them with switches is the only way to keep them all plugged in at the same time.
- A fuse, for safety purposes.
- A reset button. This allows you to restart the computer easily, without actually turning it off.
- Gold-plated contacts, for more reliable operation.
- A solder mask, which is a coating over the board that protects it in case a metal object is dropped on it.

More connectors are not always better. For example, extra connectors may strain the VIC power supply, stick out further behind the VIC, and cost more. On the other hand, get a motherboard with as many connectors as you expect to need.

One other point about motherboards: Since they extend the computer's main electronics outside its case, they may interfere with radio-frequency signals coming into a TV or into other equipment. Before buying a motherboard, talk to your dealer about whether you can return the board if this interference should occur.

There are several motherboards available for the VIC that are well made and that meet all the suggested requirements. One from CARDCO, which has three connectors, is called the CARDBOARD/3s; it sells for about \$40. Another from Precision Technology Inc., which has six connectors, is called the V-36; it sells for about \$70. CARDCO also makes a six-connector model, and PTI has a three-connector model. CARDCO also has a new motherboard for the 64, which has five slots.

## **SOUND AND MUSIC**

There are several excellent products for the VIC and 64 that make sound and music. One such sound device is the Votrax Type-'n-Talk text-to-speech synthesizer, with a fairly understandable voice, for about \$250. It plugs into the back of the VIC or 64 and plays through most hi-fi speakers. It is programmed as though it were a printer and is just as easy to use. The Scott Adams adventure games for the VIC (see Chapter 5, "Software") use this special synthesizer. A speech synthesizer can also be helpful for the handicapped.

Since the 64 has better sound and music capabilities, the sound in software programs for the 64 is more advanced than the sound in programs for the VIC.

Two other Commodore products for the 64, about to appear on the market, are a plug-in piano keyboard (with three extra sound chips) and an electronic drum attachment. Each is expected to sell for under \$100.

# TROUBLESHOOTING GUIDE

PROBLEM	POSSIBLE CAUSE	REMEDY
Power light off	Computer not turned on	Turn on power switch at side of computer
	Computer not properly connected to power supply	Check power socket at side of computer
	Power supply not properly connected to wall	Check wall outlet
	Blown fuse in building	Check fuse box
	Blown fuse in computer	Have dealer replace with 3 amp slo-blo fuse
Power light on, but no picture (after second attempt to turn on computer)	TV on wrong channel	Try both Channels 3 & 4
	Incorrect hookup at TV	Hook up to VHF antenna terminals
		Check cable connection at TV/game switch box
	VIC modulator or monitor cable not plugged in	Check five-pin DIN connector on back of computer
	64 video cable not plugged in at computer	Check cable connections at back of computer
Modulator does not work	Modulator on wrong channel	Flip switch on modulator or on back of 64
	TV not turned on	Turn on TV
Poor picture	TV not tuned well	Check fine tuning of channel on TV
Picture with poor color	Bad color adjustment on TV	Adjust color, hue, and brightness controls on TV
	Bad color adjustment on computer	Have dealer adjust computer
Picture with no sound (if using a program with sound)	TV volume too low	Adjust TV volume
	TV fine-tuning off	Check fine-tuning of channel on TV
Picture with poor sound (if using a program with sound)	TV volume too high	Adjust TV volume
	Interference from other devices	Turn off other nearby electronic devices

# LIST OF COMMANDS

Whenever you need to remember which BASIC command to use, refer to this list. These are the main commands you will need to use on your VIC 20 or Commodore 64 computer.

COMMAND	EXPLANATION	EXAMPLE
---------	-------------	---------

PRINT	Instructs program to print message enclosed in quotation marks or to perform a calculation	PRINT "alphabet message" PRINT 6 + 3
-------	--	---

To use a program someone else wrote, you need to learn these words:

LOAD	Transfers a program into a computer	LOAD"FR*",8,1
------	-------------------------------------	---------------

RUN	Begins a program	RUN
-----	------------------	-----

CONT	Abbreviation for CONTINUE	CONT
------	---------------------------	------

To check or change a program, you need to use these words:

LIST	Displays the lines of a program	LIST 1-500
------	---------------------------------	------------

REM	Abbreviation for REMARK	REM BASIC WORDS TO LEARN
-----	-------------------------	-----------------------------

TIS	Abbreviation for TIME STRING	TIS = "113015"(11:30:15am)
-----	------------------------------	----------------------------

SAVE	Stores program outside a computer, for example, on a cassette or diskette	SAVE"FR*",8,1
------	---	---------------

To send information to a printer or disk drive, you need these words:

OPEN	Opens "phone line" to either disk drive or printer	OPEN4,4
------	--	---------

CMD	Abbreviation for COMMAND (Sends a typed command directly to disk drive or printer)	CMD4
-----	--	------

PRINT#	Prints screen message on printer (Use when done with CMD)	PRINT#4
--------	---	---------

CLOSE	Hangs up "phone line" to disk drive or printer	CLOSE4
-------	--	--------

To change keyboard characters to a different picture, use these words:

POKE	Sends messages to special memory box	POKE
------	--------------------------------------	------

CHR\$	Abbreviation for CHARACTER STRING	CHR\$(14)
-------	-----------------------------------	-----------

PEEK	Reads contents of special memory box	PEEK(?)
------	--------------------------------------	---------

# SOFTWARE

### USING SOFTWARE

Now that you have practiced using the keyboard of your VIC or 64, it's time to try loading your first commercial program into your computer. Choose the program—either on cassette or diskette—that you wish to practice loading. Then, follow the step-by-step instructions presented here. If you are using a cassette program, follow the "ON CASSETTE" instructions; if your program is stored on a diskette, follow the "ON DISKETTE" instructions.

### FIRST, MAKE A BACKUP COPY

Even before you run your first program, you should make a copy of it on a blank cassette or diskette. You can then use the backup copy of the program and keep the original in a safe place. This way, if anything happens to the copy you are using, you will still be able to use the original.

Many software companies have done something to their cassette tapes and diskettes to protect them from being copied for commercial use. However, usually there is some method available to you for making a backup copy. *Do not buy programs that cannot be copied for backup purposes!* If you already have a program that specifically says it cannot be copied, your local users' group may be able to help

(see Chapter 6). Otherwise, be sure that you can return a defective cassette or diskette program and exchange it for one that will work correctly.

If no instructions are given for making a copy, try the following set of commands to make your own archival backup. (This right is guaranteed to you by law.) If your program cannot be copied and you want to practice running it anyway, skip to the "NOW, RUN THE PROGRAM" section of instructions.

## **ON CASSETTE**

### **Inserting the Cassette**

#### **STEP 1**

Turn on your computer, the TV, and the Datassette or other cassette player.

#### **STEP 2**

Hold the cassette with the side you want to use facing up and insert it into the Datassette or other cassette player. Then, close the lid. When handling the cassette, be sure not to touch the actual magnetic tape.

**NOTE:** If this is the first time you are using this cassette tape, do the following:

- Press the FAST FORWARD button on the Datassette or cassette player and let the tape run to its end.

- Press the STOP button; then press the REWIND button to bring the tape back to its beginning. This helps even the tension on all sections of the tape so that it will work smoothly and reliably.

## **Loading the Program Into Memory**

### **STEP 1**

On the keyboard, type the word LOAD.

NOTE: Whenever you type instructions, if you make any mistakes, simply use the INST/DEL key to backspace and erase, or the SPACE bar to move forward and erase.

### **STEP 2**

Once the word LOAD is typed correctly, press the RETURN key. The computer flashes a message on the screen:

PRESS PLAY ON TAPE

### **STEP 3**

When this message appears, press the PLAY button on the Datasette/player.

- IF YOU HAVE A VIC, the following message will appear on the screen:

OK  
SEARCHING

- IF YOU HAVE A 64, the screen will go blank for a few moments. Then the following message will appear:

FOUND

To continue loading the program ON THE 64, press either the C= key or the SPACE bar. (ON THE NEWER MODELS OF THE 64, the program will continue to load even if you forget to do this.)

#### **STEP 4**

You will know that the program is loading when:

- IF YOU HAVE A VIC, this message appears:

LOADING  
READY.

- IF YOU HAVE A 64, the screen becomes blank again.

### **Making the Backup Copy**

#### **STEP 1**

Take the original cassette tape out of the Datasette/player.

#### **STEP 2**

Place a new blank cassette tape in the Datasette/player, and rewind it to the beginning.

### **STEP 3**

To record the program onto your blank cassette tape, type:

SAVE "NAME"

NAME is the name of the program. Be sure to type the name within quotation marks.

### **STEP 4**

Press the RETURN key to tell the computer you are ready. If it was possible, your program will be copied now.

### **Check to be Sure the Copy Was Made Correctly**

Now rewind the tape to the beginning again. Type the word VERIFY and press the RETURN key. If the copy was made, the following message will appear:

VERIFYING  
OK  
READY.

If the copy was *not* made, the following message will appear:

?VERIFY ERROR  
READY.

If the copy was not made correctly, try this procedure again or seek help where you bought the software.

## **ON DISKETTE**

### **Inserting the Diskette**

#### **STEP 1**

Turn on your computer, the TV, and the disk drive.

#### **STEP 2**

Insert the diskette with the label side facing up, and the bottom end of the diskette facing away from you. Be sure not to touch the magnetic portion of the diskette; hold the diskette by its protective jacket.

### **Loading the Program into Memory**

#### **STEP 1**

To load the program into memory, type:

```
LOAD"*",8
```

The "\*" tells the computer to load the first program it encounters, while the 8 tells the computer to find the program on the disk drive—device number 8—instead of on the Datassette/player—device number 1.

**NOTE:** If you are loading a machine-language program, you will have to type a ,1 after the ,8. If this additional parameter is needed, this will be specified in the program's instructions.

NOTE: Whenever you type instructions, if you make any mistakes, simply use the INST/DEL key to backspace and erase, or the SPACE bar to move forward and erase.

## **STEP 2**

When you are finished typing, press the RETURN key. The following messages appear:

SEARCHING FOR "\*"
LOADING
READY.

## **Formatting a New Diskette**

Before you can copy a program onto a new diskette, you must *format* the diskette. Formatting puts the tracks and sectors onto a blank diskette which allows it to store information.

## **STEP 1**

Take the original diskette out of the disk drive.

## **STEP 2**

Place a new, blank diskette in the disk drive.

## **STEP 3**

Type the following three commands exactly as they appear here. *Be sure to press the RETURN key after typing each of these commands.*

OPEN 15,8,15
PRINT#15,"NO:NAME,ID"
CLOSE 15

Be sure to type the number zero (not the letter O) between the N and the colon. For NAME, type the name of your program. For ID, type any 2-character identification number you choose.

### **Making the Backup Copy**

Type the following command, substituting the name of your program for the word NAME:

```
SAVE"NAME",8
```

If the program could be copied, it will be copied now.

### **Check to Be Sure the Copy Was Made Correctly**

Type VERIFY"\*",8 and press the RETURN key. If the copy was made, the following message will appear:

```
VERIFYING  
OK  
READY.
```

If the copy was *not* made, the following message will appear:

```
?VERIFY ERROR  
READY.
```

If the copy was not made correctly, try this procedure again or seek help where you bought the software.

## **NOW, RUN THE PROGRAM**

At this point, if you were able to make a backup copy, turn off the computer, TV, and Datassette/player or disk drive to try running the program as you normally would from the first step. Then, perform the appropriate procedure for cassette or diskette that follows.

If no backup copy was made and you are working with the original cassette or diskette program, just follow the appropriate procedure for cassette or diskette.

### **ON CASSETTE**

#### **STEP 1**

Turn on the computer, the TV, and the Datassette/player.

#### **STEP 2**

Take the cassette containing the *copy* of the program you just made (or the original if no copy was made) and insert it into the Datassette/player.

### **Loading the Cassette Program**

There are two methods for loading the program into your VIC or 64. Try either method. The simpler method is presented first.

## **Method 1**

### **STEP 1**

Hold down the SHIFT key while pressing the RUN key. This tells the computer to load into its memory the first program it finds on the cassette tape.

### **STEP 2**

When the message PRESS PLAY ON TAPE appears on the screen, press the PLAY button on the Datassette/player. You should then see the following message appear on your TV:

SEARCHING

FOUND

LOADING

READY.

RUN

At this point, you will usually see the first message of the program you have loaded.

### **STEP 3**

To use the program, just follow whatever instructions appear on the screen.

## **Method 2**

### **STEP 1**

Type the word LOAD and press RETURN.

### **STEP 2**

When the message PRESS PLAY ON TAPE appears on the screen, press the PLAY button on the Datassette/player.

### **STEP 3**

ON THE 64, when the message FOUND appears, press either the C= key or the SPACE bar to continue loading the program.

### **STEP 4**

To run the program, type RUN and press RETURN.

### **STEP 5**

When the first message of the program appears on the screen, follow those instructions to use the program.

## **ON DISKETTE**

### **STEP 1**

Turn on the computer, the TV, and the disk drive.

### **STEP 2**

Take the diskette containing the *copy* of the program you just made (or the original if no copy was made) and insert it properly into the disk drive. If you need more detailed instructions, see Step 2 of "Inserting the Diskette."

### **STEP 3**

Type the following command and press RETURN:

```
LOAD "*" ,8
```

As before, you should see these messages appear on the screen:

```
SEARCHING FOR "*"
LOADING
READY.
```

#### **STEP 4**

Type the word RUN and press RETURN.

#### **STEP 5**

When the first message of the program appears on the screen, follow those instructions to use the program.

### **WHAT KIND OF SOFTWARE DO YOU NEED?**

Whenever you buy a commercial software program, consider exactly what it is you want your computer to do for you. Remember that the computer is good at two jobs: calculating numbers and making either/or decisions. Your computer can read through any information you put into it, make necessary decisions, and give the information back to you in a new form. You see this process occur often when you use the computer for form letters, mailing lists, term papers and articles, inventories, simulations, and in strategy or adventure games. The computer uses its calculation capabilities during accounting programs, tax preparation packages, educational math and science programs, and arcade games.

The kind of software you need depends on the way you intend to use your computer. Are you going to use your new computer to play games, to learn to program, or to run educational programs? For these functions, you will want to buy software that contains lots of color and animated pictures (called *graphics*), uses joysticks or game paddles, and doesn't need a printer. You can put off buying a disk drive for awhile.

Are you going to use your new computer for serious business purposes, for writing, for bookkeeping, for controlling your house maintenance systems, or for large mailing lists? Then you'll want to buy disk software (and therefore a disk drive) that can be used with a printer. You may want software that stores its data in such a way that the data can be transferred to a more expensive program on a larger computer later on.

Recall that software programs are available in three formats: cartridge, cassette, and diskette. The type of format in which you purchase a program will depend upon your needs (time involved for loading a program, storage capabilities, etc.), the equipment you have (cassette recorder or disk drive), and the availability of the program in the desired format.

## SOFTWARE FOR STORING YOUR OWN PROGRAMS OR FILES: CASSETTES AND DISKETTES

To save your own programs or other documents you create, get short 10-minute blank cassettes. The cassettes with the best reputation are Agfa's PE-611, available at most computer stores. Inexpensive C-30 cassettes also give good results. A C-10 tape is just about right for programs up to about 16,000 characters (16K) long, while a C-20 will hold any program you are likely to write. You don't need special leaderless cassettes, because the computer automatically winds past the leader when it saves your program.

When you save your own work, it is best to put only one program on each side of a cassette (make two copies of each program, one right after the other). Otherwise, you may have trouble locating your programs later.

Commodore disk drives allow you to safely use the most inexpensive type of diskettes, called *single-sided, single-density*. Be sure to choose a quality brand, but don't waste money on luxury brands. Currently, both Leading Edge's Elephant diskettes and Verbatim's Datalife diskettes are reliable and fairly low in cost.

## **TAKE CARE OF YOUR SOFTWARE**

When using any brand of cassette or diskette, the first sign of potential trouble is noise. If a cassette or diskette is noisy as it turns, friction is present that eventually will cause wear or uneven operation in the recorder or disk drive.

If a cassette or diskette is no longer able to save a program properly, stop using it. The same holds true of a diskette that fails to *format* properly. *Formatting* is the process of preparing a new diskette for use, described earlier in this chapter.)

Avoid *double-siding* your diskettes (preparing diskettes for storing programs on both sides). Although this temporarily doubles the storage capacity of a diskette, it increases the risk of having the diskette, or even the drive itself, go bad in use.

## **SOFTWARE SOURCES**

Where can you buy the software programs you need? As with peripherals, the most obvious source is Commodore itself. The store where you bought your computer will probably carry the most popular Commodore programs. Also, check out other computer stores, stereo and electronic shops, and large department stores. The independent companies that specialize in providing software for the VIC and 64 advertise in computer magazines and also sell through many Commodore dealers.

Another important source of programs is other computer owners. The users' groups listed in Chapter 6 collect programs that have been placed in the *public domain*. That means the author doesn't expect a royalty. You can copy these programs and give them to someone else without breaking copyright laws. You still may have to pay a small amount for these programs, to pay for the cost of the blank cassette or diskette and the time it took someone to copy it. Surprisingly, many public domain programs are as good or better than commercial programs. This is because different people in the users' groups take someone else's program and add their own ideas and improvements. After many people have improved a program, it can't help being good!

One last source of programs in the public domain can be found by hooking your computer to a network via telephone, as described in Chapter 6. For this method, the only cost is your telephone bill.

## **BUYING SOFTWARE**

When buying software, choose products that run on Commodore's most up-to-date version of Microsoft BASIC. If you have a VIC 20 and have not expanded its memory, only buy programs needing 5K or less of RAM memory unless you also plan to buy the additional amount of memory needed. Some games and most business software need a VIC expansion cartridge of 8K or 16K extra memory. (Memory expansion is discussed in Chapter 4, "Peripherals.")

For each program you want to buy, ask yourself these questions:

- Does this version of the program run on my VIC 20 or Commodore 64? Many Apple and Atari programs, for instance, are also available for the VIC and 64. But you can't just buy the Apple or Atari version and expect it to work. Each of these companies makes sure that its own programs work only on its equipment.
- Do I need an expansion cartridge (FOR THE VIC 20) for this program, and if so, which one? 8K? 16K? More?
- Does the program come as a cassette, cartridge, or diskette?
- Are there any extra pieces that must be plugged into the computer before the program can work?

These extra pieces can include components called *dongles* (or *keys*) and *interfaces*. A dongle is a plastic component that you insert in a port of your computer to make the program run. Certain programs use the dongle as a protection device against illegal program copying, because the program will not work properly unless the dongle is used.

- Will I need to use a particular port for some other program *at the same time* I am running the program I want to buy?

For instance, don't buy a word processing program that uses a dongle in the same port needed for a spelling checker program that you want to use to check your letter after you've typed it!

- What other equipment do I need to use this program effectively?
- Does the program work best with a printer, joysticks, or game paddles?
- Will I have to buy this equipment?

For instance, *WordPro* on the 64 works only with printers connected to the serial bus connector on the back of the disk drive. This software program is not set up for some of the popular new printers, such as Leading Edge's Banana Gorilla model.

## Which Programs Should You Buy?

Let's divide the software into the following categories:

- Games and entertainment programs
- Educational programs
- Word processing programs
- Home finance programs
- Data base programs
- Computer languages

### **RECOMMENDED GAMES AND ENTERTAINMENT PROGRAMS**

Most computer games are sold only as cartridges. There are a variety of games from which to choose. The so-called *arcade* games emphasize skill and help the player to develop extremely fast eye-hand coordination. These games can be separated into *shoot-'em-up*, *steering*, and *chase* categories.

Other games emphasize strategy. For instance, adventure games use words, map directions, and riddles to get through fantastic multilevel mazes. *Simulation* games create real-life situations in which the player participates. For centuries, people have played strategy games such as chess, checkers, and backgammon; these and other strategy games are now available on the computer.

Here is our pick of the best games now available for the VIC and the 64. We've grouped these recommendations according to the type of skill that is most required. Only a few of the top games are described in detail. Remember that if our game chart says BOTH, you must still buy the version that specifically works on your machine. The same cartridge, cassette, or diskette will not work on both the VIC and the 64.

### **Skill Games**

Chase	BOTH	<i>Radar Rat Race</i> , from Commodore
	VIC	<i>Shamus</i> , from HES
	64	<i>Jawbreaker</i> , from Sierra On-Line
Shoot-'em-up	BOTH	<i>Gorf</i> or <i>Omega Race</i> , from Commodore
Steering	BOTH	<i>Jupiter Lander</i> or <i>Midnight Drive</i> , from Commodore
	BOTH	<i>Frogger</i> , from Sierra On-Line
	VIC	<i>Meteor Run</i> , from UMI
	64	<i>Motor Mania</i> , from UMI
	64	<i>TSI Cycles</i> , from Creative Equipment

## Strategy Games

Adventure	VIC	<i>Adventureland, Pirate Cove, and three other Scott Adams adventure games, from Commodore</i>
	64	<i>Deadline, Starcross, Suspended, or Zork 1, 2, &amp; 3, from Infocom adventure games</i>
Simulation	VIC	<i>Choplifter, from Creative Software</i>
	BOTH	<i>Jupiter Lander or Midnight Drive, from Commodore</i>
Chess	VIC	<i>Sargon II, from Commodore; BOSS, from UMI</i>
Monopoly	64	<i>Monopoly, in the public domain</i>
Othello	BOTH	<i>Renaissance, from UMI</i>

The best games in either category that use game paddles, rather than joysticks, are:

BOTH *Clowns, Seawolf, or Omega Race, from Commodore*

VIC *Pinball Spectacular or Super Smash, from Commodore*

*Radar Rat Race* is a challenging skill-type arcade game available for both VIC and 64 computers. You listen to "Three Blind Mice" as you wander through mazes—avoiding cats and eating cheese for more energy. This game has several levels of play, as well as excellent color pictures. You never see the entire maze at one time, but there is a radar to show your rough position in relation to pursuing rats and various cheese bits. The cats, on the other hand, appear without warning.

In *Adventureland* you try to explore fields, forests, and caves as you search for buried treasure. You test your word skills and directions (north, south, east, west, up, and down). If you have a Votrax Type-'n-Talk voice synthesizer, this game will even speak to you.

*Renaissance*, a good strategy game, is a computerized version of Othello, from UMI. Play is like an elaborate version of tic-tac-toe.

## RECOMMENDED EDUCATIONAL PROGRAMS

Educational software packages can help you learn classic studies such as astronomy, geography, history, math, chemistry, physics, English, and foreign languages. Two national companies with a large choice of educational programs are Micro-Ed and American Peripherals. Each lists several hundred choices, by subject and grade level. Write them for their catalogs, and ask your local computer dealer to order the programs you want.

Typing is an important skill that really helps when you use a computer. A good typing tutorial is *Typing Tutor*, from Taylormade Software. We highly recommend it.

Commodore offers two educational software packages for the young: *Home Babysitter* (FOR THE VIC only) teaches preschoolers the alphabet and counting, and *Speed/Bingo Math* (for ages 4 to 10) offers arithmetic drill. A third program, *Visible Solar System* (for junior high students through adults), teaches astronomy. However, Commodore's real effort in educational software is in the public domain. Commodore has made available to their dealers over 50 diskettes of educational programs. Over 600 programs are listed in Commodore's Educational Software Catalog. These programs all work on the 64, and some also work on the VIC.

## RECOMMENDED WORD PROCESSING PROGRAMS

Word processing software allows you to type a letter or a report, change it around until it satisfies your needs, and then print it, letter-perfect, with even margins and proper centering on the page. The key to this software's versatility is in how many chunks of information can be manipulated at a time, how easy it is to make changes, and whether it can handle specialized functions, such as automatically creating titles, footnotes, and page numbers, and printing out entire books with one command. If the program needs line numbers to keep track of sentences or lines of text, it is called a *text editor* or *line editor* and is not true word processing software. (*Quick Brown Fox* falls into this category.) True word processing software makes full use of Commodore's exceptional screen editor, allowing you to make corrections anywhere on the screen.

At this writing, there are three really good word processing software programs for the 64, and one good alternative program: *Easy Script* from Commodore, *Paperclip* from Batteries Included, and *WordPro 3 Plus/64* from Professional Software, with *TOTL.TEXT 2.6* from TOTL Software, Inc., as a good alternative.

*TOTL.TEXT* does less and works more slowly; however, it costs less and is the only program of those mentioned to allow true footnotes.

*Easy Script* is very powerful and smooth in operation, much like *Paperclip*, but cheaper. This package gives you a larger workspace for your writing.

*Paperclip* is the most expensive, but it is very versatile. It can put as many as 255 columns of information in up to 16 levels of alphabetical order, and it can add and subtract both across and down.

Although *WordPro 3 Plus/64* costs less than *Paperclip*, it doesn't have as many features as *Easy Script* and *Paperclip*.

FOR THE VIC 20, you must have some expansion memory in order to use word processing software. *Wordcraft 80* and *WordPro*, two well-known word processing programs for the original Commodore computers, will soon be available in simpler versions for the VIC.

When the *WordPro* version is available, it will probably be named *VICPro*, and will be quite similar to the popular original *WordPro 2*. At the moment, however, the best VIC word processing program is *Wordcraft 20*, from UMI, which includes 8K of extra memory. Unfortunately, it costs more than the VIC itself.

A very nice and inexpensive word processing program for VIC is *Word Wizard*, on cassette from Micro Ware Distributors (also sold by CARDCO as a cartridge under the name *Write Now*). For this program, you use a joystick to move the cursor around the screen for editing. *Word Wizard* also justifies print, centers text, searches for key words, and highlights what you are working on in red. Simple stick-on job aids attach to the VIC keyboard to make this program's features easy to use. Although not in the same league as *Wordcraft 20*, it's a better value for most users.

There are also a few good, inexpensive text editors, such as TOTL Software's *TOTL.TEXT* for the VIC and Bill Robbins' *Word Processor*, from Intelligent Software. However, both are written in BASIC, and are therefore slow.

## RECOMMENDED HOME FINANCE PROGRAMS

Home finance programs keep track of your tax information or your budget by use of an electronic spreadsheet. *Busicalc* is a very good electronic spreadsheet for both the VIC and the 64, from Skyles Electric Works. Despite screen limitations, this program works well. FOR THE COMMODORE 64, an excellent home finance program is *Calc-Result*, from Handic Software.

As for true accounting packages FOR THE 64, *The Businessman*, from Southern Solutions, is one of the most complex and finished products presently on the market. The accounting packages from Info Designs, now sold directly by Commodore, are also complex, finished programs. However, doing accounting with less than two disk drives is either time-consuming or risky. If you have a lot of accounting data, you may do better to get one of Commodore's larger disk drives and a suitable interface. Since these peripherals are all expensive, good accounting packages for the VIC are still rare.

## **RECOMMENDED DATA BASE PROGRAMS**

Data bases keep track of things like mailing lists, grocery lists, personnel information, etc. A data base program can take separate pieces of information and rearrange them in a different order. For instance, you can take a mailing list arranged in alphabetical order and ask your computer to print out the labels in zip code order for the Post Office. You can also select information for people whose ages fall only within a certain range, if that information has been put in each person's record.

For a simple mailing list FOR THE VIC AND 64, you can't beat *TOTL.LABEL* from TOTL Software, Inc. This is a very versatile and useful mailing list program. If used WITH THE VIC, your computer will need 8K of extra memory.

For a more elaborate data base program, we recommend *Flex File 2.1* from Webber Software, for both the VIC and the 64. The VIC version requires memory expansion; both versions require a disk drive. It is a reliable, simple program that has been popular on larger Commodore computers for several years. With it, you can set up your own fields, do math calculations, sort alphabetically, and print reports.

An even better version of CMD's popular and versatile program, *The Manager*, is also expected FOR THE 64 soon and will be sold directly by Commodore.

## **RECOMMENDED COMPUTER LANGUAGES**

A *computer language* is a set of instructions which you can use to communicate with your computer. The language that is built into your VIC or 64, Microsoft BASIC, is a more sophisticated version of the original BASIC language.

With computers, some languages are better for certain purposes than others. Certain computer languages are better for graphics, others are better for mathematical functions, and so on.

FOR THE VIC, there is a version of FIG FORTH available from HES, and a well-done Vanilla PILOT from Tamarack Software. If you need the Logo language for the VIC, you can try Turtle Graphics from HES. Logo (and other languages that use turtle graphics) are used to move the cursor in different directions so that graphics can be created. By using simple commands, children can easily use these languages.

FOR THE 64, there is also Vanilla PILOT from Tamarack Software, a PILOT from Commodore, and Logo (an enhanced version of Terrapin's Apple Logo) from Commodore. The CP/M operating system and some of the thousands of programs that work with it are now available from Commodore. The UCSD Pascal language should also be forthcoming from Commodore.

A truly fantastic but little-known language called COMAL will soon be available FOR THE COMMODORE 64. This is a simple yet powerful language which is used for teaching. Developed in Denmark as a first computer language for schools, it combines the best elements of BASIC and Pascal into one structured computer language for beginners. It is in the public domain, with lots of help in how to use it being provided by the COMAL Interest Group of Madison, Wisconsin.

The Pascal and COBOL languages, which are more complicated and sophisticated than BASIC, eventually will be available FOR THE 64. These languages, often used for business applications, can perform certain complex operations in less time than it would take using BASIC.

# YOUR COMPUTER'S NETWORK

Besides the commercial software and hardware you can buy from your local Commodore dealer or store, where else can you get help to use your new VIC or 64 computer? You have four extremely good places to turn:

- Local users' groups
- Magazines
- Networks
- Bulletin boards

## **LOCAL USERS' GROUPS AND CLUBS**

Local groups and clubs of Commodore owners, called PET or Commodore users' groups, are especially helpful in getting the public domain software mentioned earlier, as well as for teaching, exchanging new ideas, solving problems, and demonstrating new software or hardware. As the groups have grown in the past year, many have subdivided into specialty areas, such as ham radio users, educators, VIC 20 users, Commodore 64 users, handicapped users, and modem users.

## **Is There a Group Near You?**

Here is a list of contacts for several of the best-known Commodore users' groups in the United States. A more complete list, including individuals hoping to form a group, can be found in each issue of *Commodore: The Micro-*

computer Magazine. Each issue of the *Midnite/PAPER* also includes news about users' groups. If there is no group in your immediate area, contact the nearest one anyway. Someone in it may know of other nearby groups and users. Include a self-addressed, stamped envelope to ensure a reply. If that fails, ask your dealer or a computer instructor at a nearby school or college. Perhaps they will know of a group or will want to help you form one.

#### **ALABAMA**

Hal Carey	9002 Berclair Rd.	Huntsville, AL	35802
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#### **ARKANSAS**

Geneva Bowlin	Middle School, Davis St.	Conway, AR	72032
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#### **ARIZONA**

Roy Schahrer	842 W. Calle del Norte	Chandler, AZ	85224
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#### **CALIFORNIA**

DES	8315 Firestone Blvd.	Downey, CA	90241
Tom Lynch	21208 Nashville	Chatsworth, CA	91311
Jane Campbell	P.O. Box 7776	San Diego, CA	92107
J. Johnson	886 South K	Livermore, CA	94550
SPHINX	P.O. Box 151	Berkeley, CA	94701
M. Van Der Kooi	22355 Rancho Ventura Rd.	Cupertino, CA	95014

#### **COLORADO**

Louis Roehrs	4 Waring Lane	Littleton, CO	80121
Jack Moss	6350 W. Mississippi	Lakewood, CO	80226
John Adams	1435 Gillespie Dr.	Boulder, CO	80303

#### **CONNECTICUT**

Walter Doolittle	Doolittle Rd.	Preston, CT	06360
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#### **FLORIDA**

JAPS	401 Monument Rd. #177	Jacksonville, FL	32211
Dave Young	7170 S.W. 11th	W. Hollywood, FL	33023
Joe Spatafora	6219 13th Ave. South	Gulfport, FL	33707

#### **ILLINOIS**

Jim Oldfield	635 Maple	Mt. Zion, IL	62549
Art DeKneef	833 Willow	Lake In The Hills, IL	60102
Rockford PUG	1608 Benton St.	Rockford, IL	61107

#### **INDIANA**

Ted Powell	12104 Meadow Lane	Oaklondon, IN	46236
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#### **IOWA**

Herb Harmison	200 Engineering Annex, ISU	Ames, IA	50010
John Yigas	1721 Grant St.	Bettendorf, IA	52722

**KANSAS**

Mei Zandler	2231 Bullinger	Wichita, KS	67204
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**KENTUCKY**

Jim Kemp	1010 S. Elm	Henderson, KY	42420
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**MARYLAND**

APCU	5014 Rodman Rd.	Bethesda, MD	20016
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**MASSACHUSETTS**

Boston Computer Society	Three Center Plaza	Boston, MA	02108
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**MICHIGAN**

Norm Eisenberg	32800 W. 12 Mile Rd.	Farmington, Hills, MI	48018
Gerald Carter	734 Donna Dr.	Temperance, MI	48182

**MINNESOTA**

Charles McCarthy	1359 W. Idaho Ave.	St. Paul, MN	55108
Mitzi Hannan	St. Clair School	Mankato, MN	56001

**MISSOURI**

Richard Schumacher	733 Avenue H, Box 6613	St. Louis, MO	63125
Rick West	5214 Blue Ridge Blvd.	Kansas City, MO	64133

**NORTH CAROLINA**

Hank Roth	P.O. Box 30694	Raleigh, NC	27622
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**NEW HAMPSHIRE**

D. McCormack	P.O. Box 981	Salem, NH	03079
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**NEW JERSEY**

ACGNJ	18 Alpine Dr.	Wayne, NJ	07470
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**NEVADA**

LVAPUG	4884 Iron Ave.	Las Vegas, NV	89110
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**NEW MEXICO**

Danny Byrne	6212 Karlson NE	Albuquerque, NM	87113
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**NEW YORK**

LIPS	Harborfield HS, Taylor Ave.	Greenlawn, NY	11740
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**OHIO**

Phil Lynch	107 S. Westmoor Ave.	Columbus, OH	43204
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**OREGON**

John Jones	2134 NE 45th Ave.	Portland, OR	97213
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**PENNSYLVANIA**

Joel Casar	2015 Garrick Dr.	Pittsburgh, PA	15235
Jim Mathers	3021 Ben Venue Dr.	Greensburg, PA	15601
Lewis Buttery	134 College Hill Rd.	Enola, PA	17025
PET Cassette Exchange	c/o 252 Bethlehem Pike	Colmar, PA	18915

**SOUTH DAKOTA**

Jim Dallas	515 S. Duff	Mitchell, SD	57301
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**TEXAS**

SCOPE	4020 Summit Circle	Carrollton, TX	75006
Don Lambert	3200 E. Renner Rd. #CS7	Richardson, TX	75081
John Walker	8738 Wildforest	Houston, TX	77088
Slim Wilson	290 Dowlen Rd.	Beaumont, TX	77705
Larry Williams	P.O. Box 652	San Antonio, TX	78293

**UTAH**

Jack Fleck	2236 Washington Blvd.	Ogden, UT	84401
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**VIRGINIA**

Bob Karpen	2045 Eakins Court	Reston, VA	22091
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**WASHINGTON**

Richard Ball	2565 Dexter N. #3203	Seattle, WA	98109
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**WISCONSIN**

Walt Sadler	256½ W. Broadway	Waukesha, WI	53186
Ted Polozynski	P.O. Box 21851	Milwaukee, WI	53221
Geoffrey Turney	817 Maple Terrace	Madison, WI	53705

**CANADA**

TPUG	381 Lawrence Ave. W.	Toronto, Ontario	M5M 1B9
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**ENGLAND**

ICPUG	30 Brancaster Rd. Newbury Park	Ilford, Essex	IG 7EP
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In addition, there are a few other well-known groups serving special interests.

**ASSEMBLY LANGUAGE (ATUG)**

Brent Anderson	200 S. Century	Rantoul, IL	61866
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**HAM RADIO**

Clark Stewart	104 Henrietta St.	Ravenswood, WV	26164
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**SUPERPET USERS' GROUP**

SPUG	P.O. Box 411	Hatteras, NC	27943
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## MAGAZINES SPECIFICALLY FOR COMMODORE USERS

There are many computer magazines and newsletters devoted largely to users of Commodore VIC and 64 computers. Some of these magazines and newsletters are described here.

The *Midnite/PAPER* is an independent bimonthly, specializing in informative reviews, news, and hints; from 1238 Richland Avenue, Lincoln, IL 62656.

*Micro Computer Printout* is a monthly British magazine. Refreshingly honest and humorous, it provides a wealth of useful information; from

Freepost, Yateley, Camberley, Surrey GU17  
7BR, England.

*The Transactor* is a Canadian magazine once published by Commodore Canada. Now in its fourth year, it is a well-known and respected technical journal; from 500 Steele Avenue, Milton, Ontario L9T 3P7 Canada.

*Compute's Gazette* is written specifically for VIC and 64 owners. It aims for an audience of beginners; from Box 5406, Greensboro, NC 27403.

TPUG sends the monthly journal *TorPET* to members. This monthly offers a program library for members only; from 381 Lawrence Avenue West, Toronto, Ontario M5M 1B9 Canada.

*Power/Play* is Commodore's own magazine for the VIC and the 64. This quarterly provides official information and is largely home- and beginner-oriented. A bimonthly, *Commodore: The Microcomputer Magazine* is for more serious and advanced users. Both magazines are available from Commodore, 1200 Wilson Drive, West Chester, PA 19380.

*FOX 20* is a new monthly cassette magazine of computer programs and articles. Because the programs are on cassette, you save the time it would take to type them; from P.O. Box 507, Deer Park, TX 77503.

*Journal/20* is a new bi-weekly newsletter for VIC owners, which has proven quite helpful thus far; from P.O. Box 1149, Van Alstyne, TX 75095.

*Commander* is another monthly journal for owners of Commodore computers; from P.O. Box 98827, Tacoma, WA 98498.

## **USING A MODEM WITH YOUR COMPUTER**

Another way to get more information is via your telephone and modem. Private (free!) *bulletin board systems* have been set up in most large cities across the U.S. You dial the phone number of a computer bulletin board system (BBS), and your screen shows messages that other people have entered. Messages are like short letters or questions addressed to a specific person or to anyone in general who wants to answer. The person who runs the BBS is called the *System Operator*, or *SYSOP*. The *SYSOP* will try to answer questions and keep the bulletin board working properly. The only costs are your telephone bill—and the good will of an overworked, unpaid *SYSOP* or your family when you spend too much time on the phone!

## **PRIVATE BULLETIN BOARDS FOR COMMODORE COMPUTERS**

One impressive use of small computers is as electronic bulletin boards. These are computer-controlled message minders, generally available at no charge, to anyone with a modem (see Chapter 4, "Peripherals"). Simply plug your VICMODEM or other modem in, then load and run a software program that helps your VIC or 64 communicate via modem. (Suitable software programs usually include the word *terminal* or *term* in the name.) Be sure your modem is set up to *originate* a call, since that is what you are going to do. Also be sure to select the terminal option in your modem program. The last step is to dial the number of a bulletin board system (abbreviated as BBS).

Here is a list of bulletin boards that are open to anyone who uses Commodore equipment. This list was current as this book went to press, but bulletin boards often come and go quickly. Bimonthly updates are printed in the *Midnite/PAPER*.

STATE	NAME/CITY	HOURS	TIME ZONE	PHONE	SYSOP
IL	Commodore, Chicago	24 hrs.	CST	(312)397-0871	Keith Peterson
IL	Video King, Chicago	24 hrs.	CST	(312)674-6502	Gene Alper
IL	LYNX-LINE, Lincoln	9:30 p.m.—8 a.m.	CST	(217)735-3331	Jim Strasma
IN	AVC-Commline, Indianapolis	24 hrs.	EST	(317)255-5435	Tim Renshaw
MA	MASSPET, Boston	7 p.m.—9 a.m.	EST	(617)824-4878	David Rogers
MO	KCPUG, Kansas City	24 hrs.	CST	(816)356-2382	Rick West
MO	Commodore Communications, St. Louis	24 hrs.	CST	(314)625-4576	Tony Ott
TX	RPCC, Dallas	5 p.m.—8 a.m.	CST	(214)996-7994	Don Lambert
WA	NWCUG, Seattle	24 hrs.	PST	(206)743-6021	Dean Johnson
WI	SEWPUG, Racine	24 hrs.	CST	(414)554-9520	Tim Tremmel
WY	SE WYOMING PUG, Cheyenne	24 hrs.	MST	(307)637-6045	Roger Kessler
PR	Caparra Heights Station, Puerto Rico	8 p.m.—8 a.m.	AST	(809)781-0350	Julio Martinez
ONT	Nortec, Toronto	24 hrs.	EST	(416)487-5833	David Bradley
ONT	PSI Word Pro, Mississauga	Evenings	EST	(416)624-5431	Steve Punter
ONT	RTC, Toronto	24 hrs.	EST	(416)884-6198	Peter Smith
ONT	TPUG, Toronto	24 hrs.	EST	(416)223-2625	David Williams

## Talking to a Bulletin Board

Fortunately, all North American PET Bulletin Board Systems (PBBS for short) operate in the same way. When you reach the BBS number, it will ring and then be answered with a loud tone. When you hear this, connect your own modem. If it is a VICMODEM, do this by unplugging the cord right at the handset of your phone and reconnecting it at the back of the VICMODEM.

Once the connection is complete, press the RETURN key on the keyboard a couple of times. Within a few seconds you should see a "Hello" message from the BBS appear on your screen. The message will go on for a while, explaining a lot about the system, including your options. Of these, the most interesting are messages, bulletins, and downloading.

One of the real services a BBS provides is allowing people to leave messages for each other in a public forum typically open all night long. These messages usually remain on the system until the intended recipient sees them, even if it is a week later at 3:00 AM. Many messages ask for help from anyone reading the message. It rarely takes long for someone to leave an answer.

For more general information, many PBBSs provide a bulletin section. Commodore's dealer-only PBBS, for example, includes a list of most everything that has been found to go wrong with Commodore hardware and tells you what to do about it.

### **Getting Programs from a Bulletin Board**

One of the most helpful features on a bulletin board system is called *downloading*. Downloading allows you to load a program or file from the BBS over the phone onto your own cassette or diskette. Most likely you will be using the downloading procedure only for diskettes, though, because of the substantial amount of time it would take to download onto a cassette.

You can download a number of programs or files from other people via the bulletin board system. Commodore's public BBS in Chicago, for example, includes several hundred free programs that anyone may download. You can even tell your computer to send a program to the bulletin board for a friend to download it into another computer.

To download, you need a specific terminal program that uses the protocol which allows you to talk to any PBBS. This program, originally written by Steve Punter, is in the public domain and may be obtained from many users' groups or from the author. Once you have this program, you may even use it to download improved versions of itself directly from a PBBS and give copies to someone else. Unfortunately, this terminal program only downloads to the 64, CBM, and PET models, not to the VIC. At this time, downloading cannot be successfully and consistently completed with the VIC.

The download feature normally asks for the secret password, *eezoo*. This is just to keep those without the proper program from trying to download. All other instructions you'll need to download are in each PBBS as bulletins.

## **COMMERCIAL COMPUTER NETWORKS**

Another kind of telephone information is found in the commercial computer networks, such as CompuServe, the Source, and Dow Jones. These networks act as huge electronic libraries of information. They store newspapers, stock exchange information, games, the World Book Encyclopedia, and general information on many other topics. You pay an annual fee to join, plus a fee for each minute you talk to the network. The advantage of this type of information exchange is that you can communicate with non-Commodore brand computers, as well as send messages.

### **The Commodore Information Network on CompuServe**

Of the new *information utilities*, as computer networks are sometimes called, one of the best for Commodore users is CompuServe. The reason is simple: Commodore uses CompuServe to host the Commodore Information Network. Though you may also want to use the Source, Dow Jones, or other services, the easiest way to get help directly from Commodore is by contacting them through CompuServe.

If you buy a VICMODEM (described in Chapter 4, "Peripherals"), it comes with a free membership and one hour's free use of CompuServe, as well as introductory offers for the Source and Dow Jones. If you buy a different type of modem, computer stores sell a combination membership and manual for CompuServe for approximately \$40. You may also get information about CompuServe by calling (800) 848-8199. Ohio users must call (614) 457-8650.

### **Talking to CompuServe**

Let's assume you have hooked up your modem and are ready to call CompuServe's system of large mainframe computers in Columbus, Ohio.

Your first step is to phone an access point to the system. Most large cities in the U.S. or Canada have a number that links directly to CompuServe as a local call, often through an intermediary company such as Telenet or Tymnet. Outside large cities, your cheapest option will likely be to call a number in the nearest large city in the next state. (Interstate phone rates are often lower than intrastate rates, especially at night.) It may even be cheapest to phone directly to CompuServe in Ohio.

When using CompuServe, try to call at night or on weekends to minimize both phone company and CompuServe rates. In fact, you may want to limit your use of the system for the first few months, until you can estimate your costs for each use of the system. It isn't unusual for new customers to get carried away to the tune of several hundred dollars the first month.

Once you reach CompuServe, you will need a secret password to get into the system. This password keeps others from charging their use of the system to you. (You can change your password if that ever happens.) You may also have to type other messages to reach the system. If you have trouble figuring these out, the people at CompuServe's toll-free number can help.

Once in the network, type GO CBM and press the RETURN key. This transfers you immediately into the Commodore Information Network. You can take time to read the other options CompuServe provides later; going straight to the Commodore section saves both time and money.

## **Options on the Commodore Information Network Section**

At this time, the Commodore network includes ten options:

- 1 Introduction
- 2 Survival Kit
- 3 HOTLINE
- 4 Announcements
- 5 Bulletin Board
- 6 Articles from Commodore magazines
- 7 Directories of resources
- 8 Tips on using your computer
- 9 Current retail prices
- 10 A questionnaire

Once you are familiar with these options, you can skip directly to the one you want by adding its page number to the end of GO CBM when you first enter CompuServe.

Of the available options, the most impressive is HOTLINE. Here you simply type any question you have for Commodore. Commodore promises to answer quickly, and has sometimes done so even before a user hangs up. Since the answers are public, you may want to look through the displayed answers before asking your own question. Perhaps someone else already has an answer that will help you.

Another option you may use often is Bulletin Board, which is much like the local bulletin boards. It includes a CB radio-like conference call option, complete with "channels."

Elsewhere in the Commodore Information Network, you will find lists of users' groups, of companies selling products for Commodore computers, of Commodore dealers, and of articles about Commodore equipment.

By using the bulletin boards, contacting your local users' group, and reading those magazines that offer helpful information, you will learn new uses for your VIC or 64, and a great deal about the opportunities that the growing computer field has to offer.



# LEARN HOW TO USE YOUR COMPUTER

**This User's Guide will lead you step by step through all phases of learning how to use your new computer: from setting it up, to learning what each key does, to expanding your system with peripherals. Specific exercises are included for each key on your computer's keyboard, plus easy-to-understand instructions and clear photographs. It also provides software buying recommendations and a guide to users' groups.**

