

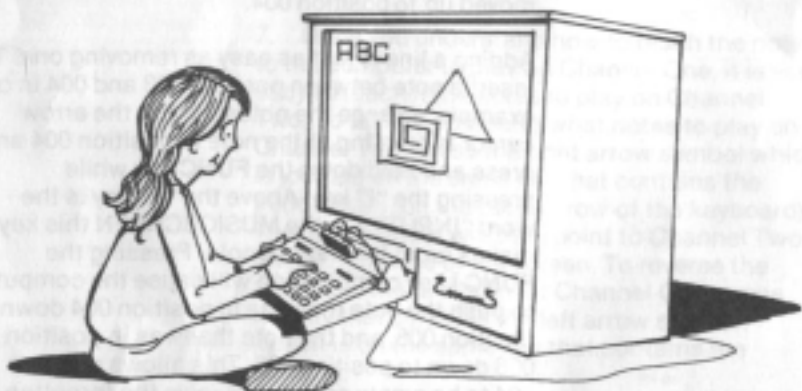
and you wish to remove the "FA" note (presently in position 004). Arrange the notes so that the arrow cursor is pointing at the note in position 004 (by using the **SPACE** key to go forward or the **FUNC-SPACE** keys to go backwards), and hold the **FUNC** key down while you press the "D". The word "Dele" is marked above this key. "Dele" is short for "Delete" which means to remove. After the **FUNC-DELE** keys are pressed, the "SO" note that was previously in position 005 has now moved up to position 004.

Adding a line is just as easy as removing one. To insert a note between position 003 and 004 in our example, arrange the notes so that the arrow cursor is pointing at the note in position 004 and press and hold down the **FUNC** key while pressing the "I" key. Above the "I" key is the word "INPUT". On the **MUSICSCREEN** this key makes room for another note. Pressing the **FUNC-I** key combination will cause the computer to push the note that was in position 004 down to position 005, and the note that was in position 005 down to position 006. This allows position 004 to be empty so it can receive the forgotten note. Now type the forgotten note at position 004.

10. We will conclude this chapter with reference to the instrument option. Before pressing the **AUTOPLAY** key to make Compumate™ play your song, you can tell it to simulate a piano or an organ. If you press the "J" key, the letter "P" will be displayed on the screen next to the channel at which the arrow cursor is pointing, and the computer will sound like a piano (there is a picture of a piano marked on the "J" key). If you press the "K" key, the letter "O" will be displayed next to the channel at which the arrow cursor is pointing and the computer will sound like an organ (there is a picture of an organ on the "K" key).

## CHAPTER 2

# Simple Graphics



Its time for you to try your hand—we really mean your fingers—at drawing on the GRAPHICSCREEN.

**FUNC**

**GRAPHIC**



1. Press the **FUNC-GRAPHIC** key combination to get into the GRAPHICSCREEN. The screen will clear and the cursor will blink in the center of the screen. (If you were already there, fine.)

Before we get to work, you ought to take a look at the two built-in demonstration pictures. Press the number "7" key, and when you finish looking at the snowman press the number "8" and look at the map of the world. You too can make pictures like these, and even string them together to form a movie! It's as easy as following these steps.

2. Press the **FUNC-N** key combination.
3. Press the key marked "DRAW" (the "J" key). When you press the "DRAW" key you are telling the cursor to put its pen down so that when you move the cursor it will leave a trail behind it.
4. To draw, press the keys that contain the arrows that are highlighted in Figure 5.



Figure 5

5. The cursor will move in the direction of the arrow key that you press. The cursor will continue to draw until you press the "ERASE" key (the "K" key). When the "ERASE" key is pressed, the cursor picks up its pen and puts its eraser down so that when you press the arrow keys, the cursor moves but it does not draw. It will now erase any previously drawn lines. The cursor will continue to erase until you press the "DRAW" key. By switching between drawing and erasing you can make the cursor leave a mark exactly where you want. That's how we drew the snowman and the map of the world in our demonstration programs. Try it.

6. Now that you know the secrets of how to draw, we will show you how to change the colors of the cursor's pen and the screen's background. To change the color of the cursor's pen, press the "DRAW" key and then press the **FUNC** key and while holding the **FUNC** key down press one of the color keys. The colors are marked above the numbers located on the uppermost row of keys. So if you want the cursor to draw in yellow you would press "DRAW" and then the **FUNC-3** key combination. If, after you have chosen yellow as your pencolor, you suddenly change your mind and want to switch to green, you must press "DRAW" again and then the **FUNC-5** key combination. To change the background color of the screen, press the "SPACE" key and then the **FUNC-color-number** key combination that you wish. Thus if you wanted a red background, you would press **SPACE** and then the **FUNC-1** key combination. If after you have chosen red as your background color you wish to change it to black, you would press the **SPACE** key and then the **FUNC-9** key combination.

That's all the graphics we are going to show you right now. In PART THREE you will learn how to string together the pictures you create to simulate a movie. After you have finished drawing, continue on to the next section and enter the exciting world of computer programming.

# CHAPTER 3

## An Introduction to Computer Programming



To be able to control a computer you must be able to communicate your instructions in a language that the computer understands. Compumate™, like most personal computers, understands a language called BASIC (Beginner's All Purpose Symbolic Instruction Code). This language, which is built right into Compumate™, is a set of English words with which you can instruct the computer to perform certain functions.

Programming is the act of writing the instructions and information that must be given to the computer in order for it to perform a task. Programs differ from one another in that the instructions and information necessary for a program to manage a household's checkbook, for example, are different from the instructions and information needed in a program that controls a video game.

There are two different ways to type an instruction in BASIC into your computer: In "program" mode or in "immediate" mode.

As its name implies, you are in "program" mode when you write a program. A BASIC program is a set of instructions typed one instruction after the other with a line-number beginning each instruction line. An example can be seen in Figure 6 .

```
10 PRT "I"
20 PRT "LOVE"
30 PRT "MY"
40 PRT "COMPUMATE"
■
```

Figure 6

Line numbers are generally in intervals of ten to allow for easy reference when corrections are required or when additional lines need to be inserted. The computer performs each line of instructions after you type **FUNC-RUN ENTER**.

The second way of instructing the computer is "immediate" mode. It is called "immediate" because after each instruction is typed and the **ENTER** key is pressed, the computer immediately responds. Do not precede a line of instructions with a line number when you are in "immediate" mode.

For most of the time spent with this guide, you will be in program mode. If you are serious about learning programming you will continue to write programs and very infrequently be in the immediate mode. The immediate mode is generally reserved for "housekeeping" details like saving programs on a cassette tape or loading information from a cassette into the computer.

We realize that these words and concepts are new to many of you, but don't worry. These ideas will become clearer as you continue reading.

To program in BASIC you must be on the **TEXTSCREEN**.

**FUNC**

**TEXT**



1. If you are not on the **TEXTSCREEN**, then press the **FUNC-TEXT** key combination. If you are already there, fine.

2. We will now demonstrate the difference between giving the computer an instruction in immediate mode and in program mode.

Many of the instructions and commands of the BASIC language are available on Compumate™. The instructions and commands are printed above the alphabet keys. Some of them are printed in abbreviated form on the keyboard even though on some other computers they are printed in non-abbreviated form. We will tell you when you are using an abbreviated form so that whatever we teach you about Compumate's™ BASIC can be used when you advance to other machines. To use these BASIC words on the TEXTSCREEN, you must hold down the **FUNC** key while pressing the key that has printed above it the instruction you want.

The first BASIC instruction you will learn appears in abbreviated form on the keyboard. The instruction is "PRT" which stands for "PRINT". You can probably guess correctly what this instruction does even before we tell you.

3. Press **FUNC-P**. The word "PRT" will appear on the screen. Then press the **SPACE** key. Next, press the **SHIFT** key and while holding it down press the double quotation mark (the number zero key). Type the letter "I" and then press the **SHIFT**-number zero key combination to put a double quotation mark after the word "I". The screen should look like this:

```
COMPUMATE™
OK
PRT "I" █
```

The flashing cursor should still be at the end of the line.

4. Press the **ENTER** key and look at the screen. It will look like this:

```
COMPUMATE™
OK
PRT "I"
█
```

When you press the **ENTER** key while in immediate mode, you are telling the computer that you have finished working and that you want the computer to begin working. Compumate™ will politely respond and print your message on the screen. When it is finished obeying your instructions, it will display the "OK" message to inform you that it is ready for more instructions.

5. Now, we'll move to program mode. Make sure that the cursor is on the left side of the screen. If it isn't, use the **FUNC-SPACE** key combination to do so. With the cursor in position type the line exactly as shown:

```
10 PRT "I" ■
```

and then press the **ENTER** key. Notice that this time the computer does not print your message right away. When you press the **ENTER** key in program mode you are telling the computer to look at what you typed and store it in its memory until you give it further instructions as to what to do with your program. Continue by typing the rest of the program exactly as it is shown. Remember to press the **ENTER** key after you complete each line of instruction.

```
20 PRT "LOVE"
```

```
30 PRT "MY"
```

```
40 PRT "COMPU
```

```
MATE" ■
```

As you type the word "COMPUMATE" on line 40 the computer will automatically advance the cursor to the next line after the letter "U". That is because COMPUMATE™ has room for only 12 characters on a screen line. However, while a screen line is limited to 12 characters, each line of your BASIC instructions can be up to 49 characters. Even though the 49 characters might take up 4 screen lines, they are all considered one BASIC line of instruction.

Now type **FUNC-RUN ENTER** and watch the screen as the computer goes to work on your program. Compumate™ should have printed the following:

```
1
LOVE
MY
COMPUMATE
█
```

5. That was easy, wasn't it? It's important to remember that the following common errors can occur when you use the **PRT** instruction.

#### COMMON ERRORS WITH THE PRT INSTRUCTION

- A. FORGOT THE LINE NUMBER
- B. FORGOT THE QUOTES
- C. FORGOT THE PRT INSTRUCTION
- D. FORGOT TO PRESS ENTER

**Explanation of error A.** Remember, the computer starts working at the lowest line number and works its way higher. If you forgot the line number then the computer doesn't know that your instruction is part of the program.

**Explanation of error B.** The computer knows only to print the message that is between the double quote marks. If you forget to use quotes then the computer not only doesn't know what to do with your message but it won't recognize it to be a BASIC command and therefore it will tell you that you made an error.

**Explanation of error C.** If you forgot to use the word **PRT** then the computer will not know what to do with your message. Even if you typed in some other BASIC word it will not know what to do with your message, and will then tell you that you made an error.

**Explanation of error D.** If you did not press **ENTER** then you have not yet told the computer to look at your instruction.



**How to correct errors A-D.** If you have already pressed the **ENTER** key, you must retype the entire line of instruction. To retype the line, start with the line number and type carefully. Don't forget to press **ENTER**.

Here is a favorite little program that will cause the computer to continue printing forever unless you stop it. Type the program exactly as you see it:

```
10 PRT "HELP"
```

```
20 GOTO 10
```

```
■
```

This program introduces another BASIC command called **GOTO**. As its name implies, the **GOTO** instruction tells the computer to go to whatever line number follows the **GOTO** instruction—in this case, to line 10. What will happen? Press **FUNC-RUN** and then **ENTER** to find out. To stop the runaway program you must break the program. This is done by pressing the **FUNC-BRK** key combination. **BRK** is the abbreviation for **BREAK** (it is located atop the "B" key).

Continue to practice writing programs which use the **PRT** instruction. It takes a while to get accustomed to instructing the computer in the way that it wants to be instructed. No one, not even a professional programmer, always writes a program 100% correct the first time. It's natural to make mistakes. That is how you will learn and grow.

Speaking of errors, don't be surprised if the computer sometimes responds with the following message:

```
ERR 7
```

```
■
```

or some other message beginning with ERR after you press the **ENTER** key. Compumate™ signals you with any one of over a dozen different error numbers when you make an error. For an explanation of the error that you made, look up the number that appears next to the "ERR" word in Appendix A. In this appendix we will briefly explain your error in English, (not in computer jargon) and suggest how to correct it.

