SPECTRAVIDEO™

CompuMate™

USER'S MANUAL

SPECTRAVIDEO'S USER'S MANUAL STATEMENT

This equipment generates and uses radio frequency energy and if not installed and used properly, that is, in strict accordance with the manfacturer's instructions, may cause interference to radio and television reception. It has been type tested and found to comply with the limits for a Class B computing device in accordance with the specifications in Subpart J of Part 15 of FCC Rules, which are designed to provide reasonable protection against such interference in a residential installation. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause interference to radio or television reception, which can be determined by turning equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient the receiving antenna
- Relocate the computer with respect to the receiver
- Move the computer away from the receiver
- Plug the computer into a different outlet so that computer and receiver are on different branch circuits.

If necessary, the user should consult the dealer or an experienced radio/television technician for additional suggestions. The user may find the following booklet prepared by the Federal Communications Commission helpful:

"How to Identify and Resolve Radio-TV Interference Problems" This booklet is available from the U.S. Government Printing Office, Washington, DC 20402, Stock No. 004-000-00345-4.

WARNING:
This equipment has been certified to comply with the limits for a class B computing device, pursuant to Subpart J of Part 15 of FCC Rules. Only peripherals, (computer input/output devices, terminals, printers, etc.) certified to comply with the Class B limits may be attached to this computer. Operation with non-certified peripherals is likely to result in interference to radio and TV reception.

CREDITS:

Written by: Steve Levenson

Graphics by: Cremarco Advertising, Inc.

Published by
SPECTRAVIDEO INTERNATIONAL LTD.

First Edition
First Printing 1983
Printed in Hong Kong

TABLE OF CONTENTS

PART ONE

CHAPTER 1
A New Beginning

The introduction of the Atari® VCS 2600 video game machine in 1978 revolutionized the world of toys. Children and adults alike were now able to play a new kind of game. With its flashy graphics and hair-raising sounds, the Atari® machine was much more exciting than any toy truck or toy doll.

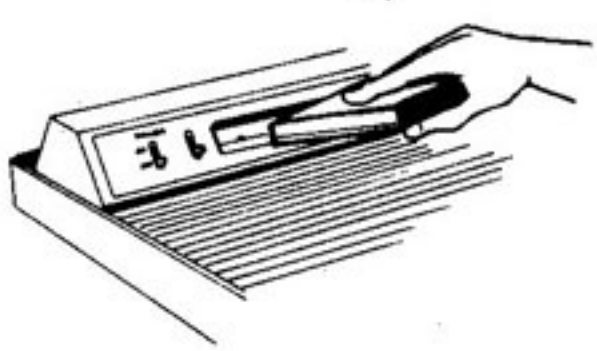
However, the home computer became the hit of the 1980's and probably will continue as such well into the future. Millions of Atari® game machine owners had little choice but to give up their little Atari® machines and buy expensive personal computers in order to join the microcomputer generation. That is until now, with the introduction of Spectravideo's Compumate™.

You have made a wise decision in selecting the Compumate™, which enables you to transform your Atari® game machine into a real computer! You already know that you can play games with your VCS, but we will show you that now, with Compumate™, you can also play music, draw pictures, print words and even learn how to program a computer. And by the time you finish reading this guide, you will agree that computers can be easy and fun to use.

CHAPTER 2
Set-Up

To set up the Compumate™ follow these steps:

1. Turn off the power to your VCS.

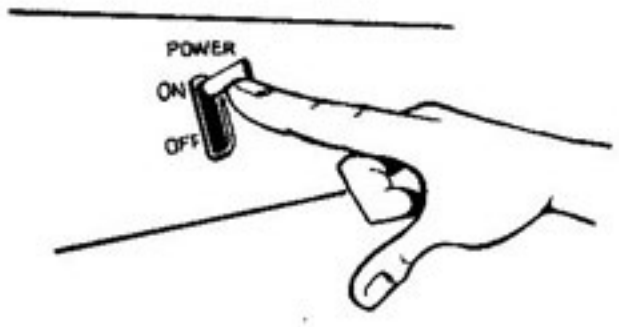


2. Remove the game cartridge, joysticks, paddles or any other device presently connected to your VCS.

3. Place the Compumate™ on the VCS.

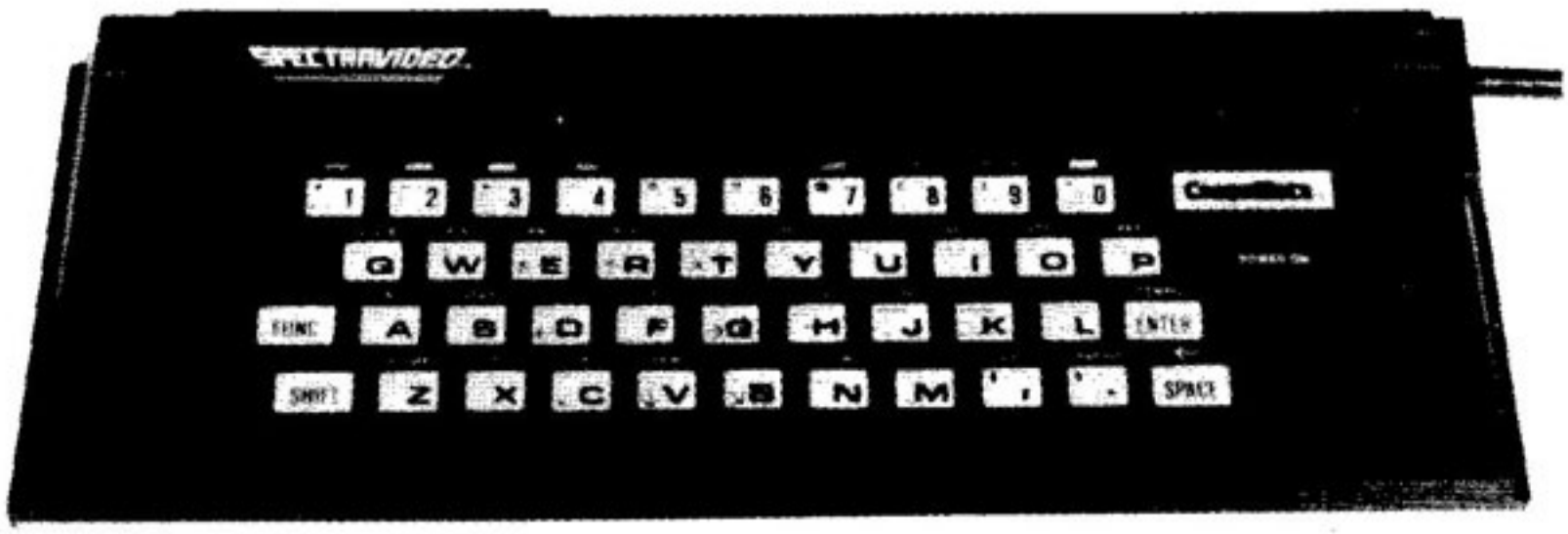
4. Insert the Compumate™ cartridge into the game cartridge slot.

5. Insert the plugs connected to the cartridge into the left and right joystick slots on the back of the VCS. Make sure that the plug marked "left" is in the left joystick slot and the plug marked "right" is in the right joystick slot.



6. Everything is now connected. We will tell you to turn on the power for the Atari® VCS very soon. Please continue reading.

CHAPTER 3
Meet the Keyboard



Today, most computers are controlled by the user sending instructions to the microprocessor-the brain of the computer-through the keyboard. Maybe someday in the future computers will be able to understand our voice, but until then, we must use a keyboard. The computer's keyboard should look familiar to you because it resembles that of a typewriter.

Turn the power switch to the "ON" position and then look at the TV set. Compumate™ should display the picture that appears in Figure 1 and then play a few notes from "Twinkle Twinkle Little Star".

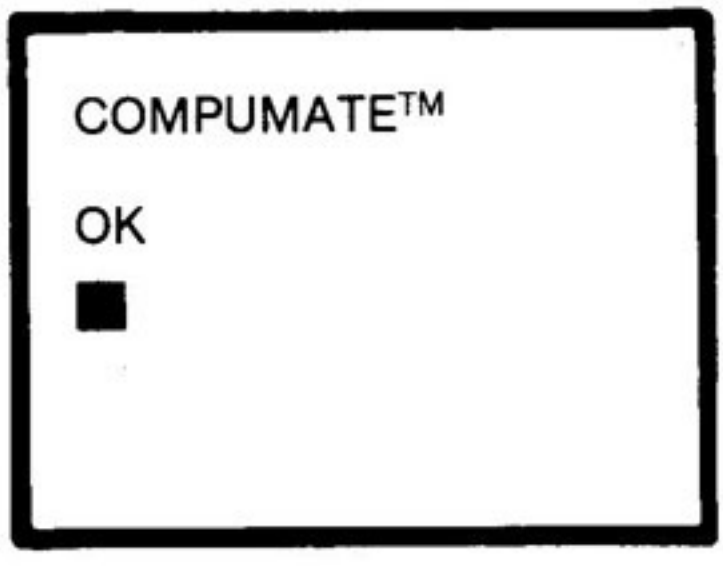


Figure 1

If you do not see this display on the screen immediately after turning on the power, turn to the troubleshooting chart in Appendix B for assistance.

Compumate™ acts in three different ways: It draws pictures, plays music and uses computer programs that you write. Each of these functions uses its own special screen. One is the TEXTSCREEN, where any message you type is displayed and where you can program in the BASIC computer language. Second is the MUSICSCREEN where you can play musical notes and write songs, and the third is the GRAPHICSCREEN where you can draw and create animated pictures.

Compumate™ places you on the TEXTSCREEN automatically after you turn the power on. The word "OK" is the message to you from the computer that it is ready to accept your commands. The white square underneath the word "OK" is called the "Cursor". Its position on the screen informs you of the location of the next letter you type.

As you can see, Compumate's™ keyboard is full of multi-colored letters, numbers, words and symbols. Believe it or not, all these marks have meanings and we will explain them to you.

Compumate's™ keyboard not only looks like a typewriter's keyboard, but it also acts like one. To convince yourself, press the **"W"** key and then the **"E"** key. The screen display should be identical to Figure 2 .

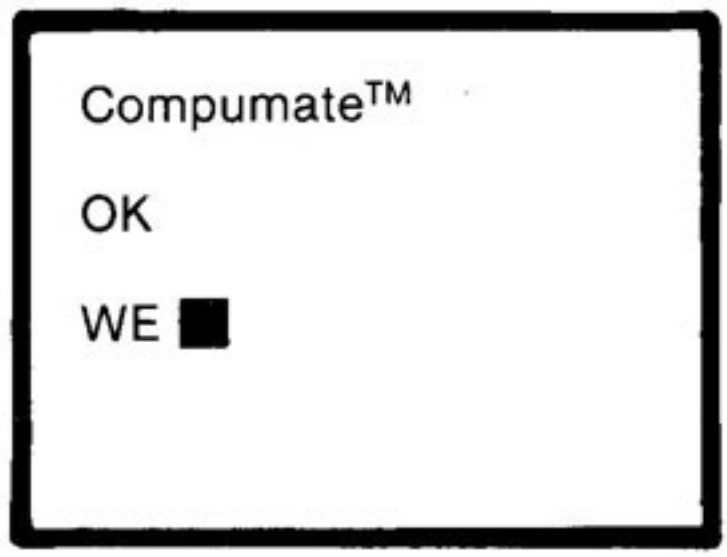


Figure 2

Press the **SPACE** key, located on the lower right side of the keyboard, and the cursor will move one space to the right.

The only characters that can be typed on the TEXTSCREEN in a way that the computer understands are the letters of the alphabet and the numbers 0-9. Although the music and drawing symbols can appear on the TEXTSCREEN, the computer will not understand them and will tell you that you made an error.

The **FUNC** key located on the left side of the keyboard is called the "Function" key. This key is known as the "Changer" because when it is pressed together with any one of three different keys it causes the computer to switch from the present type of screen (i.e. TEXTSCREEN) to another type (e.g. GRAPHICSCREEN OR MUSICSCREEN).

The **FUNC** key is also used to correct typing mistakes. Let's say, for example, that you typed an "A" instead of an "S". By pressing the **FUNC** key and holding it down while you press the **SPACE** key, the cursor will move one position to the left and erase the letter "A". Then you just type the letter "S".

Continue typing for a few minutes, to become familiar with the keys. Remember to use only the alphabet and number keys. If you type more than 12 characters on one line, the computer will automatically advance the cursor to the next screen line. When you feel you have had enough practice, please continue reading.

The remainder of this manual is divided into two sections: Part two and Part three. Part two will teach you three things: How to play musical notes and begin writing a song; how to draw simple pictures; and how to write simple BASIC programs (BASIC is an easy computer language to learn). Part two will give you enough material to practice to make you comfortable with the way Compumate™ works. When you are ready, proceed to Part three which contains information on Compumate's™ advanced music, graphics and BASIC programming capabilities.

PART TWO

CHAPTER 1
Simple Music

Compumate™ places you in the TEXTSCREEN when you turn the power on. Do you remember which key you must press to change from the textscreen to the music screen? We hope you remembered that it is the **FUNC** key. But you must also press a second key together with the **FUNC** key. Can you guess which one it is?

We will give you a hint. Look very closely at the keyboard. All the symbols for the musical notes are written in red ink on or above the letter keys. All these keys are marked in Figure 3.

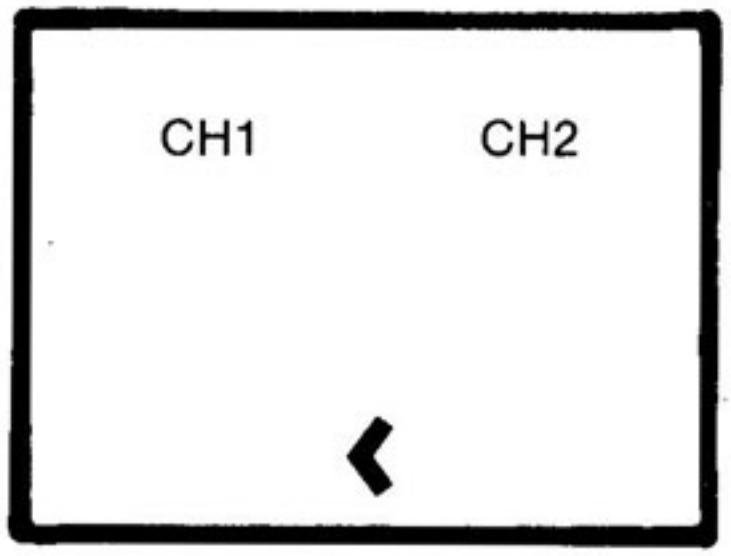
Figure 3

FUNC

MUSIC

M

Have you found the key we need yet? We need the **"M"** key, because directly above it is the word "MUSIC". Now that you know which keys to use, go ahead and press the **FUNC** key while you simultaneously press the **"M"** key. The TV screen should look like this:



You can instruct Compumate™ to play a series of notes on two different channels. When these two channels are played at the same time they sound like a stereo system. The sign "CH1" refers to music channel one, and "CH2" refers to music channel two. You should have noticed that the cursor (the little white box) disappeared. Well, it didn't exactly disappear. The arrow at the bottom of the screen is the new cursor. It tells you which channel you are instructing.

Before showing you how to write your own songs, we recommend that you listen to Compumate's™ built-in songs. They will give you an idea of what you can do. The following is a list of the four built-in demonstration songs and the keys to press to hear them.

KEY TO PRESS	SONG
3	TWINKLE TWINKLE LITTLE STAR
4	LONG LONG AGO
5	JINGLE BELLS
6	MY BONNIE

Listen and enjoy them. To stop a song in the middle press the **SPACE** key.

We will now explain how to use both channels, how to simulate the sound of a piano or organ, and how to change the speed at which a song is played. In Part Three we will show you how to save your songs and replay them at a later date.

Press the following keys one after the other: **"Q"** (DO), **"W "** (RE), **"E"** (ME), **"R"** (FA), **"T"** (SO), **"Y"** (LA), **"U"** (TE), **"I"** (DO), **"O"** (RE), **"P"** (ME), **"A"** (ME), **"S"** (FA), **"D"** (SO), **"F"** (LA), **"G"** (TE).

These are the musical notes that are available to you.

Press these keys again and this time look at the screen. You will notice that the arrow cursor is pointing at these notes. Compumate™ can accept many notes at a time and it keeps track of them in the order that you type them in. The number 001 (actually number 1) is the number of the first note that you typed. Since you typed all the musical notes listed above one after the other and did not tell the computer to remember them in the order that you typed them, the number 001 stayed there and the computer did not advance to note 002, 003 etc.

OK. You are now ready to begin writing your own songs! Follow our instructions carefully.

1. If you are already on the MUSICSCREEN go to step 2. If you are still on the TEXTSCREEN, press the **FUNC-M** key combination to get onto the MUSICSCREEN.

2. Press the **FUNC-N** key combination. This tells the computer to clear space in its memory to temporarily store your work. In the future, you should press this key combination to clear the screen of any previous work and prepare the computer for you to start over again.

3. Here we go. After you input the notes for the following song, try to figure out which song it is. Be sure to glance at the screen after you type each note to make sure that you have typed the right key. If you make a mistake and type the wrong key, Press the **FUNC-D** key to delete (erase) the key you just typed incorrectly, and then type the correct key.

Press:

1. **DO** SPACE
2. **RE** SPACE
3. **ME** SPACE
4. **DO** SPACE
5. **ME** SPACE
6. **DO** SPACE
7. **ME** SPACE
8. **RE** SPACE
9. **ME** SPACE
10. **FA** SPACE
11. **FA** SPACE
12. **ME** SPACE
13. **RE** SPACE
14. **FA** SPACE
15. **ME** SPACE
16. **FA** SPACE.
17. **SO** SPACE
18. **ME** SPACE
19. **SO** SPACE
20. **ME** SPACE
21. **SO** SPACE
22. **FA** SPACE
23. **SO** SPACE
24. **LA** SPACE
25. **LA** SPACE
26. **SO** SPACE
27. **FA** SPACE
28. **LA** SPACE
29. **SO** SPACE
30. **DO** SPACE
31. **RE** SPACE
32. **ME** SPACE
33. **FA** SPACE
34. **SO** SPACE
35. **LA** SPACE
36. **LA** SPACE
37. **RE** SPACE
38. **ME** SPACE
39. **FA** SPACE
40. **SO** SPACE
41. **LA** SPACE
42. **TE** SPACE
43. **TE** SPACE
44. **ME** SPACE
45. **FA** SPACE
46. **SO** SPACE
47. **LA** SPACE
48. **TE** SPACE
49. **$\overline{\text{DO}}$** SPACE
50. **TE** SPACE
51. **LA** SPACE
52. **FA** SPACE
53. **TE** SPACE
54. **SO** SPACE
55. **$\overline{\text{DO}}$** SPACE

Now press the **AUTOPLAY KEY** (the **"L"** key), sit back and try to name the tune.

Did you get it? That's our version of "Doe-a-Deer" played on one channel!

4. How long a note is played is called its "duration". Each note that you just typed was played for the same amount of time. To change the length of time that each note of our song "Doe-a-Deer" was played, you must first return to the first note of the song (note number 001). To do so, press the **FUNC** key and continue to hold it down while you press the **SPACE** key. You will see all the notes flash by on the screen until the arrow cursor points to note number 001.

5. Press one of the musical scale keys that appear on the bottom row of keys on the keyboard, and then the **SPACE** key. The musical scale keys are highlighted in Figure 4.

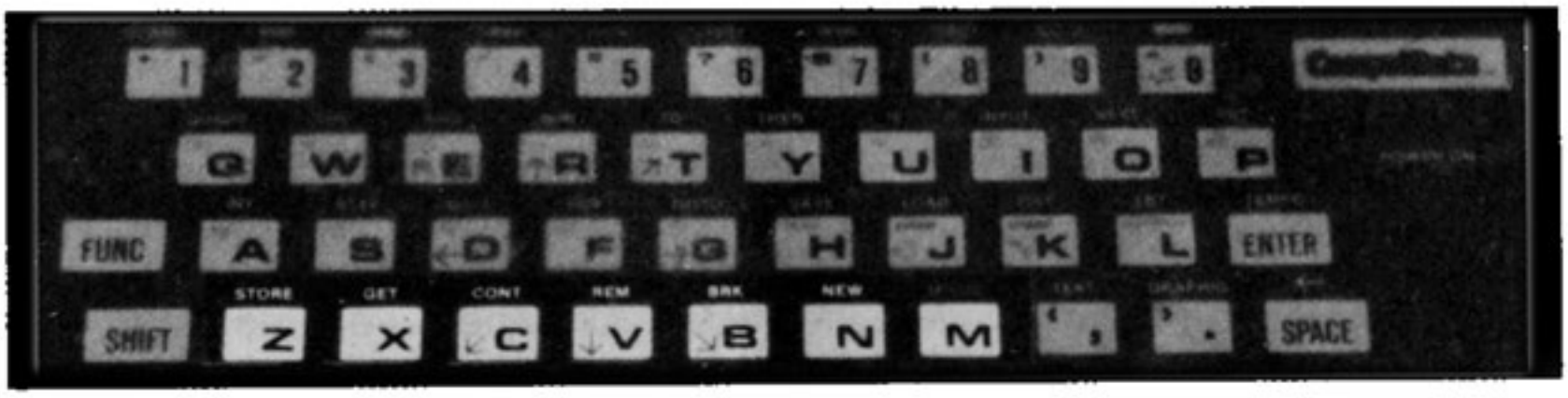


Figure 4

If you do not know what the different scale symbols mean, don't give up hope. Experiment. Whatever you do is OK. You can't hurt the computer. You will learn the differences among the scales by attaching different scales to the same note, and you will be able to hear the sound that the computer makes after you press the **SPACE** key.

After you choose a musical scale and press the key that contains that symbol, the symbol will appear to the right of the note on the screen. When you press the **SPACE** key the computer will produce the note for you to hear and will then advance to note number 002. Continue to choose the musical scales for the other notes of the song. (Don't forget to press the **SPACE** key after pressing each scale symbol.) When you have given each note a symbol, press the **AUTOPLAY** key to hear your new version of the song.

6. The speed or pace at which a song is played is called its "Tempo". You can select the Tempo you want by pressing the **FUNC** key and, while holding it down, pressing the **ENTER** key (above the **ENTER** key is the word TEMPO). Then release both keys and press a number from **1** to **9,** then press **AUTOPLAY.** The lower the number you choose the quicker the song will be played, and the higher the number you pick the slower the song will be played.

7. Once you understand how to teach the notes to the computer to play on Channel One, it is very easy to teach it the notes to play on Channel Two. To tell the computer what notes to play on Channel Two, press the right arrow symbol which is located on the same key that contains the period mark (on the bottom row of the keyboard). The arrow cursor will then point to Channel Two on the right side of the screen. To reverse the arrow and make it point at Channel One, press the key that contains the left arrow symbol (which is on the same key that contains the comma).

8. You are now set to input notes to Channel Two. Follow steps 3-5 listed above. Channel Two works just like Channel One. When you have finished instructing Channel Two, press the **AUTOPLAY** key to hear your masterpiece.

9. If the notes you typed don't produce the song that you expected, go back to the beginning of the song (note number 001) by pressing the **FUNC-SPACE** keys and check to make sure you typed the correct notes. To check your notes, press the **SPACE** key again and again. Each time you press the **SPACE** key, Compumate™ will play one note. When you have found your error you can either delete (remove) the note which doesn't belong there, or you can insert (add) a forgotten note. We will illustrate how to do so with an example:

EXAMPLE: let's say your song consists of five notes

001 DO

002 RE

003 ME

004 FA

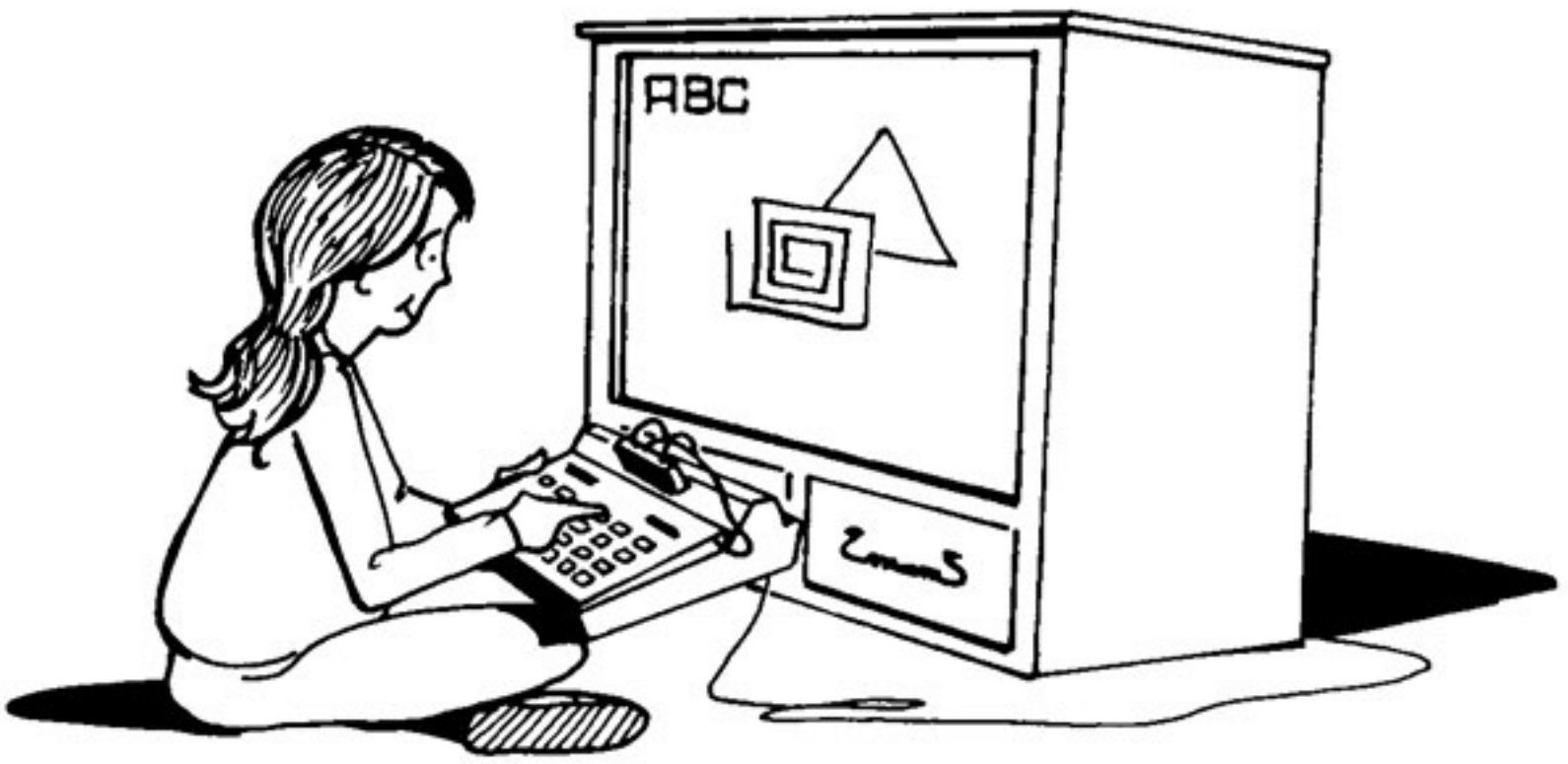
005 SO

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 postition 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.

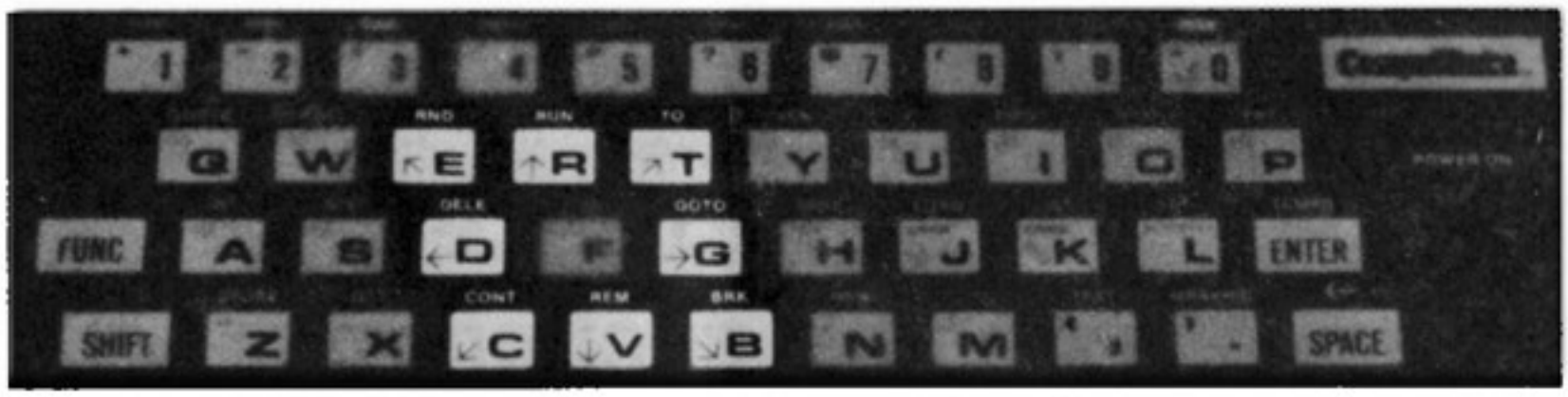


Figure 5

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

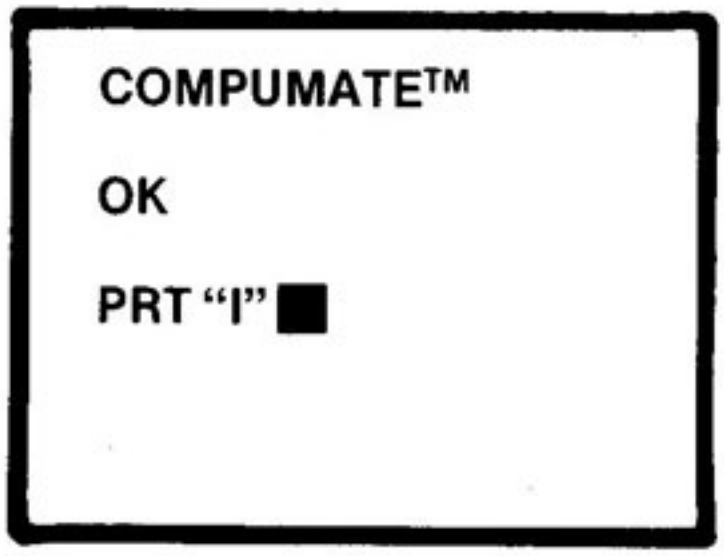
1. If you are not on the TEXTSCREEN, then press the **FUNC-TEXT** key combination. If you are already there, fine.

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.

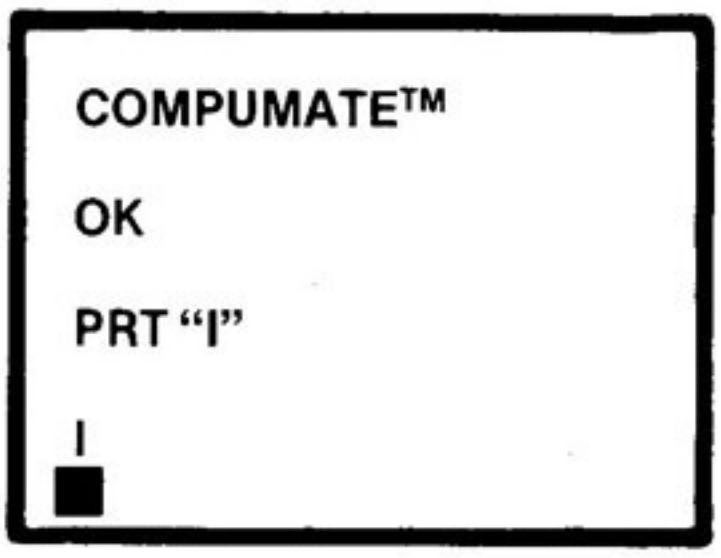
The first BASIC instruction you will learn appears in abbreviated form on the keyboard. The instruction is "PRT" which stands for "PRINT". You can probably guess correctly what this instruction does even before we tell you.

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:



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:



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:

```
I

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.

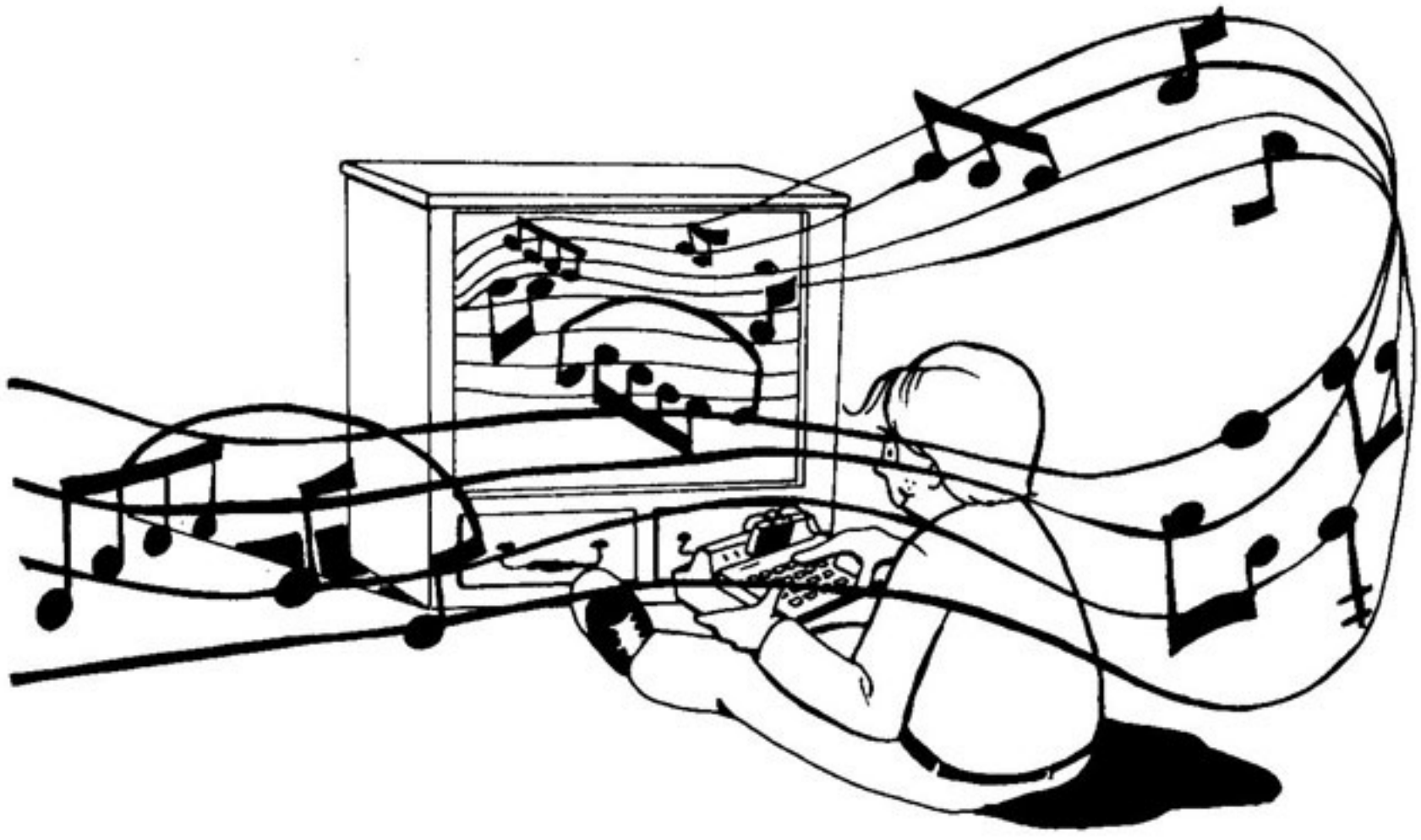
Speaking of errors, don't be surprised if the computer sometimes responds with the following message:

```
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.

PART THREE

CHAPTER 1
Going Ahead With Music



You already know how to write songs with Compumate™. This section will explain how to temporarily save your program in the computer's memory and also how to permanently save your programs on a cassette tape.

To temporarily store and play back your song:

1. Compose your song on the MUSICSCREEN.

2. Once your song is complete, press the **FUNC** key and while holding it down press the **STORE** key (the **"Z"** key). Release both keys, then press number **1.** This will put your song in temporary storage area 1 (called a "buffer" in computer jargon). To prove to yourself that your program is saved press the **FUNC-NEW** key combination. This will clear the screen of your song. Now press the number **1** key and your song will be played back. To make the song reappear on the screen, press the**FUNC** key and while holding it down press the **GET** key (the **"X"** key). Release both keys, then press number **1.** Your song will be retrieved from buffer one and displayed on the screen.

3. There is a second temporary storage area to store a song which is known as buffer 2. If you compose a second song and wish to store it in buffer 2 then repeat step 2, only instead of pressing the number 1 with the **FUNC-STORE** key combination, press number **2** with it. Once your song is stored in buffer 2 and you wish to recall and display it on the screen, press the **FUNC-GET** key combination along with the number **2** instead of the number **1**.

4. After you temporarily store a song in buffer 1 you can compose another song and store it in buffer 2. You can play one song after the other by pressing the **"1"** key and then pressing the **"2"** key.

To permanently store your song on a cassette tape:

1. Compose your song or songs on the MUSICSCREEN, and if need be, temporarily store them in buffer 1 and buffer 2.

2. Connect the plugs of the cord provided with Compumate™ to your cassette recorder as follows: (a) the opposite side of the cord that plugs into the **"EAR"** jack on the recorder should be connected to the **"EAR"** jack on the right side of Compumate's™ keyboard, and (b) the opposite side of the cord that plugs into the **"MIC"** jack on the recorder should be connected to the **"MIC"** jack on the right side of Compumate's™ keyboard.

3. Set the volume of your recorder to about ¾ of its maximum. If your recorder has a tone control dial, set it on the **HI** position (or if your recorder has separate controls set the treble to **HI** and the bass to **LO**).

4. Press the play and record buttons on your recorder simultaneously. Then press the **FUNC** key and while holding it down press the **SAVE** key (the **"H"** key). Compumate™ will do the rest.

NOTE: After you instruct Compumate™ to save or load a song, the TV screen turns red. It will return to normal after the song is saved or loaded (10-30 seconds later).

To load a song from your cassette recorder into Compumate™:

1. Make sure that the recorder and Compumate™ are properly connected.

2. Press the **FUNC-MUSIC** key combination so that you are on the MUSICSCREEN.

3. Press the play key on your recorder. Then press the**FUNC** key and while holding it down press the **LOAD** key (the **"J"** key). Within 2 to 3 seconds you should see 2 yellow strips on a red background on the TV screen. Compumate™ will then do the rest. If the song does not load, then adjust the volume of the recorder and try this again from the beginning of step 3.

NOTE: Some recorders may not work exactly as described above. If this is the case with your recorder, try removing one of the plugs from the right side of Compumate's™ keyboard: when loading, pull out the plug in the **"MIC"** jack and when saving, pull out the plug in the **"EAR"** jack. Then try again the procedure described in step 3.

CHAPTER 2
Going Ahead With Graphics

You already know how to draw on the GRAPHICSCREEN. This section will explain how to create many pictures and animate them like a cartoon, and how to permanently save your programs on a cassette tape.

To animate your pictures: In the following steps you will draw a series of three different pictures and then connect them to form a movie.

1. Draw a picture on the GRAPHICSCREEN.

2. Once your PICTURE is complete, you should store it in buffer **1.** Press the **FUNC** key and while holding it down press the **STORE** key (the **"Z"**key) and then press number **1.** This will store your picture in buffer 1. To prove to yourself that your picture is saved, press the **FUNC-NEW** key combination. This will clear the screen of your picture. Now press the number **1** key and your picture will be displayed.

3. Press the **FUNC-NEW** key combination to clear the screen and draw another picture.

4. Now you will store the second picture in buffer 2. Repeat step 2 pressing the **FUNC-STORE** key combination with the number **2,** instead of the number **1.** Your second picture is now stored in buffer 2.

5. Press the **FUNC-NEW** key combination and draw another picture. Repeat step 2 by pressing the **FUNC-STORE** combination with the number **3** (your two previous pictures are stored in buffers 1 and 2). Your third picture is now stored in buffer 3.

6. Here is the moment you have been waiting for! You will now tell Compumate™ to flip through your pictures one after the other thereby giving the impression of a cartoon or movie. You can do this either by pressing key **1,** then key **2** and then key **3,** or by pressing the **AUTOPLAY** key (the **"L"** key). You can speed up or slow down the rate at which the pictures change by pressing the **FUNC** key and, while holding it down, pressing the **TEMPO** key (the **ENTER** key). Release both keys and then immediately press a number from **1** to **9.** The smaller the number the quicker the pictures will change, and the higher the number the slower the pictures will change.

7. There are 6 buffers available in which to store pictures. They are numbers **1-6.** Buffers **7** and **8** contain the two built-in demonstration pictures.

To permanently store your pictures on a cassette tape:

1. Compose your picture or pictures on the GRAPHICSCREEN, and temporarily store them in the buffers.

2. Connect the plugs of the cord provided with Compumate™ to your cassette recorder as follows: (a) The opposite side of the cord that plugs into the **"EAR"** jack on the recorder should be connected to the **"EAR"** jack on the right side of Compumate's™ keyboard, and (b) the opposite side of the cord that plugs into the **"MIC"** jack on the recorder should be connected to the **"MIC"** jack on the right side of Compumate's™ keyboard.

3. Set the volume of your recorder to about ¾ of its maximum. If your recorder has a tone control dial, set it on **HI** (or if your recorder has separate controls, set the treble to **HI** and the bass to **LO).**

4. Press the play and record buttons on your recorder simultaneously and then press the **FUNC** key and while holding it down press the **SAVE** key (the **"H"** key). Compumate™ will do the rest.

NOTE: After you instruct Compumate™ to save or load a picture, the TV screen turns red. It will return to normal after the picture is saved or loaded (10-30 seconds later).

To load pictures from your cassette recorder into Compumate™:

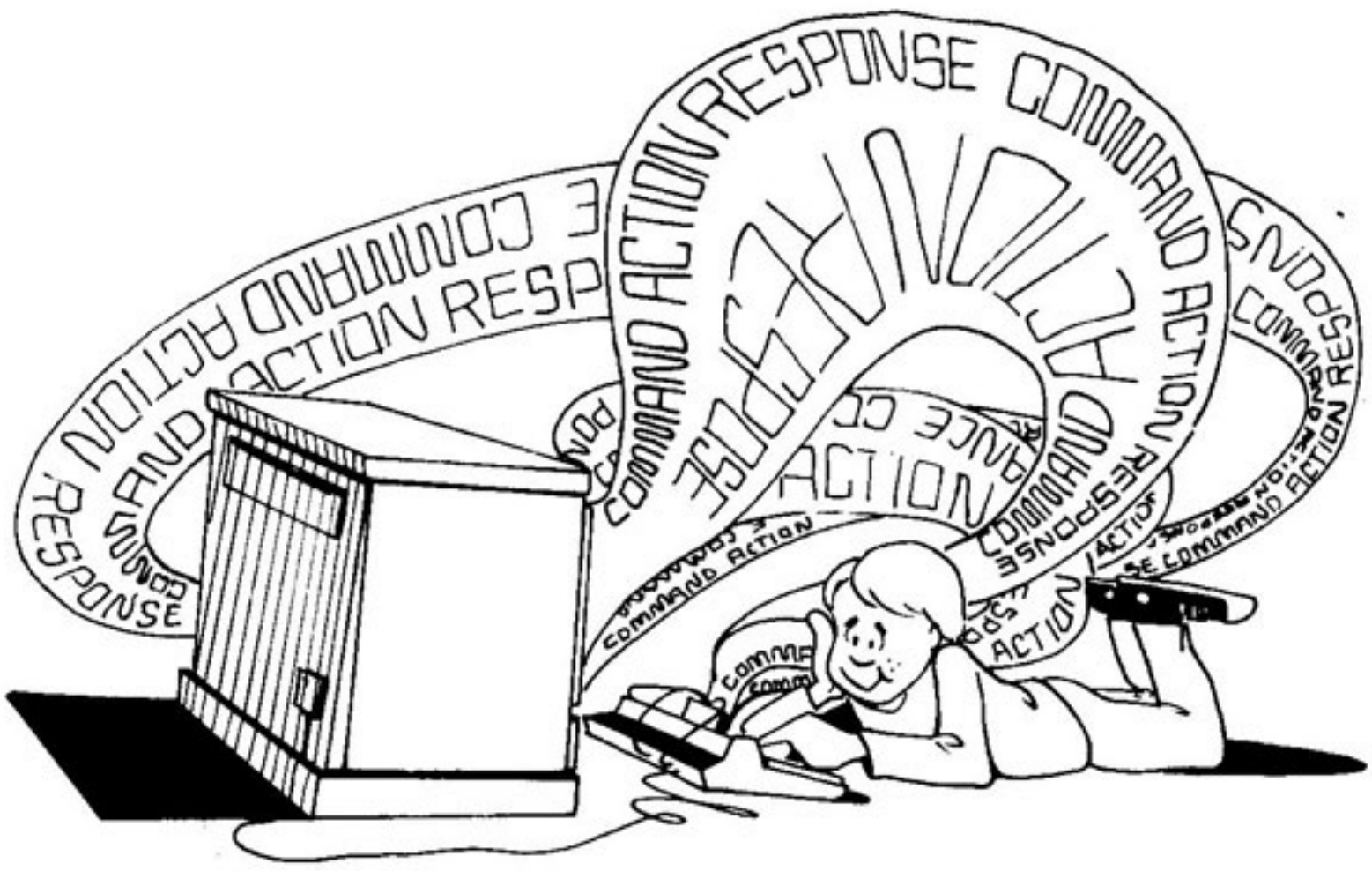
1. Make sure that the recorder and Compumate™ are properly connected.

2. Press the **FUNC-GRAPHIC** key combination so that you are on the GRAPHICSCREEN.

3. Press the play key on your recorder and then press the **FUNC** key and while holding it down press the **LOAD** key (the **"J"** key). Within 2-3 seconds you should see 2 yellow strips on a red background on the TV screen. Compumate™ will then do the rest. If the song does not load, adjust the volume of the recorder and try this again from the beginning of step 3.

NOTE: Some recorders may not work exactly as described above. If this is the case with your recorder, try removing one of the plugs from the right side of Compumate's™ keyboard: when loading, pull out the plug in the **"MIC"** jack and when saving, pull out the plug in the **"EAR"** jack. Then repeat step 3.

CHAPTER 3
Going Ahead With Computer Programming



It is time to move ahead and write some fun programs. Along the way we will introduce you to many more instructions of the BASIC computer language. We will proceed by highlighting the names of the new instructions, show you a simple program that demonstrates the new instruction that you should type and run, and then explain the program.

Turn on Compumate™ and press the **FUNC-TEXT** key combination to get on the TEXTSCREEN.

RND

The RND instruction tells Compumate™ to pick a random number. What is a random number?

Well, if you were to close your eyes and pick a number out of a barrel full of numbers, the number you picked would be called random. Or if you were to spin a pair of dice, the number you rolled would be considered random. A random number is one that is unpredictable (unless of course you were a prophet).

NOTE: In each of the sample programs we will often not skip spaces between some of the instructions in order to fit a whole line of instruction on one screen line. Don't forget, Compumate™ can only display 12 characters on any one screen line. Be very careful, when copying the sample programs, to type exactly what we write, skipping spaces only where we do.

Type the following:

```
10PRT RND (10)
■
```

Now type **RUN ENTER.** Compumate™ will print a number. The RND (10) instruction tells Compumate™ to pick a number from 0 to 10 and the PRT instruction tells Compumate™ to print it on the TV screen. Type RUN **ENTER** again and Compumate™ should print a different number. Continue pressing RUN **ENTER** a few times until you understand what we mean when we say that the RND instruction tells Compumate™ to pick a random number. The number inside the parentheses that follows the RND instruction can be from 0 to 255. In other words, the number in parentheses tells Compumate™ to pick a number that is specified in the parentheses. The number in parentheses is the upper boundary of the numbers Compumate™ can choose from.

LET

Type the following:

10 LET A = 10

20 LET B = 20

30 LET C = A + B

40 PRT C

Then type RUN **ENTER** (hitting **ENTER** should be automatic for you by now). The computer will print the number 30 on the screen.

The instruction "LET" is a very important one. "LET" is always followed by a letter of the alphabet. This letter is called a container (for those of you that know junior high school math, a container is really a variable). How does Compumate™, and all computers, use containers?

The instruction on line 10 tells Compumate™ to place the number 10 in a container called "A" in its memory. Think of "A" as a cup, and the number you type as a mark on a piece of paper that is placed in the cup. Line 20 tells Compumate™ to put the number 20 in a container called "B". Then on line 30, Compumate™ is told to take the two numbers from containers "A" and "B" and put them into a third container called "C". Finally line 40 tells Compumate™ to print whatever is stored in container "C". Since the numbers 10 and 20 are stored in "C", the sum is 30. That is why Compumate™ prints the number 30 on the screen.

Why do computers use containers?

Container names can be thought of as the number part of the address of your home. If a friend mails a letter to you and the envelope bears only the name of the street you live on but not the specific number of your house, it is quite possible that your mail will be placed in the wrong box. Similarly, if we feed the computer information that is not "correctly addressed", we will have a hard time finding the information we need later on.

The computer's memory is like a filing cabinet. If we throw information inside the cabinet and do not place it in a file folder, it will be very difficult to find that information again. The containers are like folders into which we place information.

Compumate™, like most computers, uses two different sets of containers. One set of containers holds only numbers, the second set holds only letters and words.

The names of the containers that hold only numbers are:

A,B,C,D,E,F,G,H,I,J,K,L,M,N,O,P

The names of containers that hold only letters or words are:

Q$,R$,S$,T$,U$.V$,W$,X$,Y$,Z$

Notice the dollar sign that is attached to each name. This reminds both you and the computer that this container holds only letters or words.

Here is an example for you to type. It uses containers that hold only letters or words.

```
10LETQ$ = "HI"
20LETT$ = "THER
E"
30 PRT Q$
40 PRT T$
■
```

Type RUN. Compumate™ should print the words "HI" and "THERE" on the screen.

INPUT

As its name implies, the instruction INPUT allows you to put something into the computer's memory. Of course we must also use a container. Type the following:

10 INP A

20 PRT A

Now type RUN. A question mark will appear on the screen. Type in any number and press **ENTER.** The computer will then print it out. Do you understand why? Line 10 tells Compumate™ to wait until you type in a number. Then Compumate™ places your number in container "A". Line 20 tells Compumate™ to print whatever is stored in "A". Since the number you typed is stored in "A", it prints your number. Try it. Type a number and then press **ENTER.**

Here is an example of an INPUT to a container that holds only letters or words. Type:

10 INP T$

20 PRT T$

Type RUN. A question mark will appear on the screen. Compumate™ is waiting for you to type in a few letters or a word and press **ENTER.** Then it will print whatever you typed. You must enclose the letter or word that you type in double quotation marks, for example, "Computers". Try it. Type a word, then press **ENTER.**

IF-THEN

It's time for us to present a program which is slightly more complex. Type the following:

10 LETA= RND(5)

20 INP B

30 IF B = A THEN

PRT "CORRECT"

This program is designed to play a guessing game. The computer picks a random number and places it in container "A" (line 10). It then waits for you to input your guess of a number from 0 to 5, which it then stores in container "B" (line 20). Then the two containers are compared. If the number in container "B" (your guess) equals the number stored in container "A" (the random number picked by the computer) Compumate ™ will print "CORRECT".

RUN the program and try your luck. If you do not guess the correct answer, Compumate™ will end the program, and print its usual "OK" message on the screen. If you don't get the guess correct the first time, then RUN the program again, and again, and...

REM

It might not be obvious from a quick look at the last program (which was used to demonstrate the IF-THEN command) what the program was intended to do. To remind yourself what a program is supposed to do you have the option of placing comments in your programs. Taking the last program as our example you should be able to tell very quickly which line in the following program we have added.

5 REM GUESSIN

G GAME

10 LETA = RND(5)

20 INP B

30 IF B = A THEN

PRT "CORRECT"

Line 5 is the addition. It contains the REM instruction which is the abbreviated form of REMark. Whatever words follow the REM instruction are for your benefit only. They are ignored by the computer, and are not used together with the rest of your program.

FOR-NEXT

Type the following program:

10 FOR A = 1 TO

100

20 PRT A

30 NEXT A

Now type RUN and you will see all the numbers between 1 and 100 printed on the screen, one after the other. Do you understand why this happened?

Take a look at the program you just typed. What's the problem—it's not on the screen and you don't want to retype the whole thing? The solution is simple. Press the **FUNC** key and while holding it down press the **LIST** key (the **"K"** key) and then **ENTER.** Your program will be LISTed on the screen.

Line 10 tells Compumate™ to place all the numbers between 1 and 100 into the "A" container one at a time. The obedient computer begins by putting a 0 in the "A" container. The instruction PRT A on line 20 forces Compumate™ to look up the number stored in the "A" container and display it on the screen. Then on line 30, Compumate™ is told to take the next number after 0 and place that in the "A" container. Since a container can hold only one item at a time, the 0 is removed from the "A" container and the number 1 is inserted into the "A" container. Then the computer is sent back to line 10 to begin the process again.

Since the number 1 is one of the numbers that were specified to be placed in the "A" container, the computer proceeds to line 20 where Compumate™ finds the number 1 stored in "A" and prints it on the screen. Line 30 causes the number 1 to be erased from "A", places the number 2 in container "A" and returns to line 10. This loop continues until the 100 is placed in "A" and printed on the screen. Since the number 101 is past the boundary of 100 (which we told the computer to stop at), Compumate™ does not print the number 101, but simply stops.

The FOR-NEXT set of commands are always a pair. Never use one without the other. The FOR-NEXT loop works much differently than the loop that we can create with the GOTO command. As your programming skills develop, you will learn when the use of each is appropriate.

If you want to stop a program before it ends, for example, you want to stop the above program before it prints all the numbers from 1 to 100. Then press the **FUNC** key and while holding it down press the **BRK** key (the **"B"** key). To continue the program from where it paused, press the **FUNC** key and while holding it down press the **CONT** key (the **"C"** key).

GOSUB-RETURN

Type in the following:

10 PRT 1

20 GOS 70

30 PRT 3

40 GOS 80

50 GOTO 90

70 PRT 2

75 RTN

80 PRT 4

85 RTN

90 PRT "BYE"

Type RUN and you will see the numbers 1-4 and the word BYE printed on the screen.

Line 10 prints the number 1. The instruction GOS on line 20 is the abbreviated form of GOSUB which tells the computer to jump to the specified line. So the computer jumps to line 70 and prints the number 2. It continues to line 75, where it sees the instruction RTN which is short for RETURN. RTN sends Compumate™ back to the line that follows the one it jumped from. Since it jumped from line 20, Compumate™ returns to line 30 and prints number 3. Line 40 sends it to line 80 where it prints the number 4. Line 85 sends it back to line 50. Line 50 sends it to line 90 and it prints BYE.

We hope that you followed the flow of the program. Here is the order in which the lines of instructions were followed:

1. 10
2. 20
3. 70
4. 75
5. 30
6. 40
7. 80
8. 85
9. 50
10. 90

The GOS-RTN set of commands is a pair. Never use one without the other.

What is the difference between the GOTO command and the GOS-RTN command? Well both commands cause the computer to jump to another line. The difference is that when the GOTO command causes the computer to jump, the computer doesn't remember the line that it jumped from. Thus to return to its line of departure, you must instruct it with another GOTO command. However, when the GOS command causes the computer to jump, all you need do is tell it RTN,—without specifying a line number to return to—and Compumate™ will remember from which line it jumped.

To save and load BASIC programs follow the directions in the previous chapters on music and graphics.

Important! To change a line of instruction:

There are two ways to change a line of a program. Let's take the following simple program as our example:

10 PRT "HI"
20 PRT "LO"

If you want to erase line 10, you can type the number 10 and immediately press the **ENTER** key. To prove that this line has been erased, press the **FUNC-LIST** key combination and you will see that only line 20 will be listed.

A second way to erase a line is to press the **FUNC-DELE** key combination. Then type the number 10 and immediately press **ENTER.** This will delete line 10.

If you want to change line 10 to print the word "HE", simply retype the whole line to read:

10 PRT "HE"

NOTE: There is much more to the BASIC computer language than could possibly be utilized by your Atari VCS, even with the help of Compumate™. While Compumate™ provides an excellent introduction to computers there is much more to computer programming, art and music. When you have played with Compumate™ and feel that you want to step up to a more powerful personal computer, Spectravideo will be waiting with its SV-318. The SV-318 is your gateway to the world of practical and affordable personal computing.

APPENDIX A
Error Code Numbers And Their Meaning

CODE #	MEANING
0	An instruction that is illegal in direct mode is entered as a direct mode command. e.g. the instruction FOR was typed and you pressed ENTER in direct mode. You forgot that the FOR instruction can only be used in a program.
1	You used a command that belongs in immediate mode inside a program that you are trying to save on a cassette tape. e.g. the instruction LIST or RUN was placed in a program.
2	The computer ran out of memory because your program was too large, or a FOR-NEXT loop was nested more than four levels deep, or a GOSUB was nested greater than 6 levels deep.
3	The string of characters you tried to store in a container is too long, it will not fit. Lessen the number of characters.
4	You tried to place a number in a container that holds only words, or a letter in a container that holds only numbers.
5	You used the FOR instruction without matching it with the NEXT instruction. Don't forget they are always a pair.
6	Invalid expression. What you typed doesn't mean anything to Compumate™. Check your spelling.
7	The number you input is either too small (less than −999999) or too big (greater than +999999) for Compumate™ to use.
8	The number resulting from a calculation that Compumate™ performed is too small or too big.
9	You tried to divide by zero. You forgot that, even in elementary school math, this is not allowed.

10 You used the RTN instruction but did not use a matching GOS instruction. You forgot that the GOS-RTN set of instructions is a pair.

11 You specified the line number for a GOTO, GOS or other instruction to jump to, but there is no such line number in your program.

12 You have told Compumate™ to CONTinue a program after you paused it (with the FUNC-BRK instruction), but it cannot continue.

13 Something went wrong when the cassette recorder was being used to load a program. Try it again, being careful not to jostle the machine.

14 An expression is too long because it contains more than 10 numbers or variables (containers).

APPENDIX B
Trouble Shooting Chart

SYMPTOM	POSSIBLE CAUSE	REMEDY
NO POWER	Power Switch not turned ON.	Turn on Power switch which is on the left-hand side of the machine.
	Power cable not connected	Be sure the power cable is connected to the computer and the wall sockets.
NO SOUND OR PICTURE	Wrong TV channel	Select channel 2 or 3
	Wrong TV hook up	Hook up the computer to the "VHF" antenna terminals.
	Loose video cable	Be sure all video cables are securely fastened.
NO SOUND	TV volume too low	Adjust the volume control of your TV.
NO COLOR		Adjust TV color level and fine tune the TV.