

# The KoalaPad Book

Ideas and Activities from the Inventor of the Touch Tablet

David D. Thornburg



*KT 2010 Compatible Applications*



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# The KoalaPad Book

*David D. Thornburg*



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*To George and all the others  
who helped move the KoalaPad from my  
garage to the marketplace*



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## Preface

On May 21, 1983, a new product appeared on the shelves of several computer stores in the San Francisco Bay Area. This product was the KoalaPad touch tablet and its graphics software—a tool that, for the first time, made it possible for people who own personal computers to draw color pictures with the ease of gliding a finger over a smooth tablet surface. From this beginning, the KoalaPad tablet has grown in utility and popularity. Numerous software packages have been created to take advantage of the ease with which computer users of any age can use the tablet—as a drawing tool, as a pointing device, as a custom keyboard, and in other applications still waiting to be discovered.

This book is written for those who are interested in personal computers—both as users and as creators of computer programs. No matter where your interest lies on this spectrum, the KoalaPad will change your style of interacting with these machines and may change your view of personal computing itself. Whether you are a long-time user of the KoalaPad or are just thinking of purchasing this peripheral device, I have endeavored to fill this book with information of practical interest to you.

For example, we will explore some of the finer points of using the illustration software that accompanies the tablet. Some of these tips will have the least artistically inclined user creating stunning pictures in no time! For more advanced artists, some of the unique characteristics of computer graphics will be explained and explored.

Almost everyone who creates pictures on a computer display screen wants to get copies of these pictures on paper, to save or to send to friends. Consequently, an entire chapter is devoted to this topic. You will learn how to select a graphics printer and how to print your images once the printer is connected. The technique of photographing the screen will also be described, as will the preservation of your handiwork on videotape. As for the value of getting your pictures on paper,

thumb through the rest of this book and you will see hundreds of examples of transient screen images, frozen forever on the printed page.

When the KoalaPad first came out, many people thought of it as a computer graphics tool. As more and more applications became available, people found that this device could be used for such tasks as composing music, playing games, and writing computer programs, and as a perfect computer input device for the young. New applications are being created all the time. A chapter has been devoted to descriptions of many of the commercially available programs, from many companies, that use the KoalaPad for diverse applications.

Just as professional program developers have recognized the potential for this device, the home programmer can use it in many ways. The incorporation of the KoalaPad into your own computer programs is quite easy, and a chapter has been devoted to this topic.

The most exciting part of the KoalaPad experience is exploring the ideas that *you* will develop—the ideas for programs and applications that pave new territory, that allow you to use personal computers as they have not been used before. It is *your* efforts and ideas that will help realize the full potential of the KoalaPad, and it is *your* use of this device that I had in mind when I crafted the first rough prototype tablet many years ago.

I hope you will use the KoalaPad with as much enjoyment and pleasure as I had in helping to bring it to the marketplace.

## Acknowledgments

The KoalaPad touch tablet was the result of the combined and sustained effort of many of us who shared a vision of making computers responsive to people's ways of doing things. I can't list all who were involved with this activity, but I do want to mention several people who provided support, encouragement, and the effort needed to make this product a reality in its early stages.

I want to acknowledge George White for his vision, encouragement, and leadership in starting the company; Paul

Ralston for being the hardware wizard who made the tablet electronics work; Rick Parfitt and his friends for continuing to astonish me with the quality of their software; Jeb Eddy for his enthusiasm in reaching out to the educational marketplace; and all the rest of the Koala team for making this product the exciting tool it has become. You all have my deepest love and respect.

*San Carlos, California  
February, 1984*

*D.T.*



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# I.

## What Is the KoalaPad and What Makes It Useful?

Drawing pictures, making music, playing games, creating programs—the KoalaPad touch tablet can be used for any of these activities and many, many more. In fact, the KoalaPad can be used for so many things that this entire book is devoted to a description of its uses and some tips on how you can gain even more benefit from this powerful device.

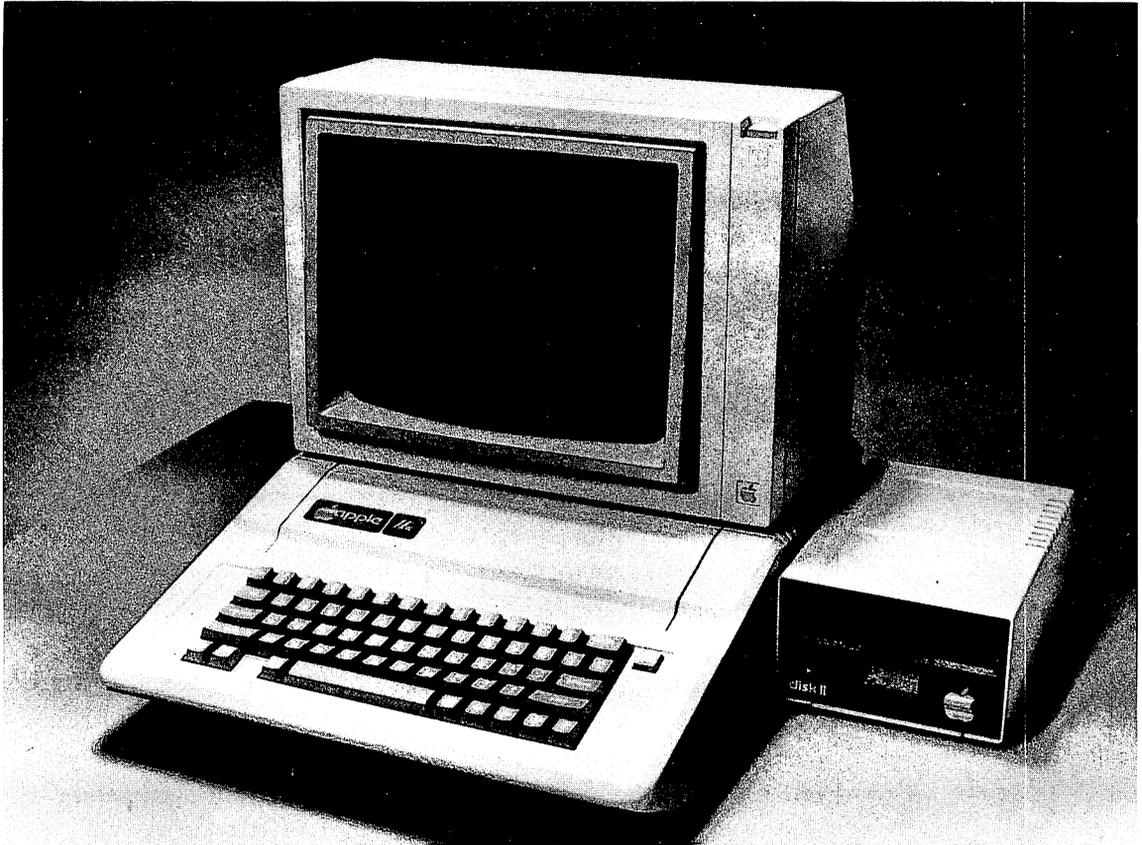
The goal of *this* chapter is to place the KoalaPad in perspective—to talk about what personal computing has been, what it is today, what it will be in the future, and the role that devices like the KoalaPad will play in determining the usefulness of a most powerful tool—your own personal computer. So sit back, relax, kick off your shoes, and set your Way-Back machine to 1978 for a brief history of personal computing.

To begin, personal computing didn't start in 1978; it started several years before that. What makes that year so important is that it was then that folks like you and me were first being encouraged to buy our own computer for use in our own homes. Until then, computers were sold to businesses and colleges as tools for commerce and research. The idea that computers would be used by people who wanted to play games was abhorrent to much of the established computer community.

However, the development of the low-cost microprocessor, a computer on a chip of silicon smaller than your fingernail, paved the way to the creation of a new industry—the personal computer.

The upstart manufacturers of personal computers were a smart bunch. They realized that they couldn't entice the general public into buying a computer if it looked like something you needed a Ph.D to turn on. So they made the "output" portion of the computer look remarkably like a familiar television

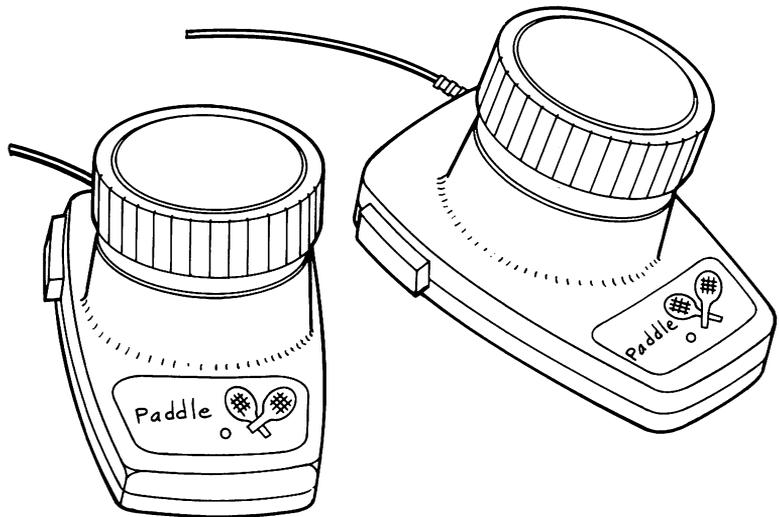
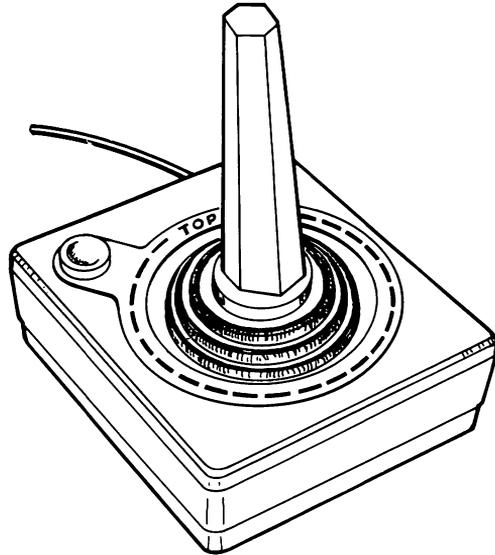
set, and they made the “input” side look remarkably like a familiar typewriter keyboard. Televisions and typewriters—nothing scary there.



The only problem with this configuration is that typewriter keyboards are only good for typing text, but television screens (and the computers that control them) can be used to display lots of things—pictures and animation as well as text.

Meanwhile, the video game companies were designing *their* machines for a market that was interested (initially) in playing action games on the home television set. Typewriter keyboards were inappropriate (as well as expensive) controllers

for action games, so video game manufacturers used inexpensive joysticks and “paddle controllers” instead.



From a technical viewpoint, one of the major differences between video game machines and personal computers was that the former used joysticks and the latter used keyboards.

Given the versatility of the computer's display (the TV screen) and the computational power of the computer itself, it was obvious that the typewriter keyboard was too limiting an input device for many applications. To take a noncomputer example, you probably wouldn't want to drive a car by typing:

**SLOW DOWN TO 20 AND TURN LEFT**

The gas and brake pedals and the steering wheel are much better tools for driving. Therefore, to broaden their use, personal computers were designed to use joysticks and paddle controllers as well as typewriter keyboards. The low cost of these devices made them quite popular and they, along with the keyboard, became the tools through which most computer owners communicated their desires to the computer.

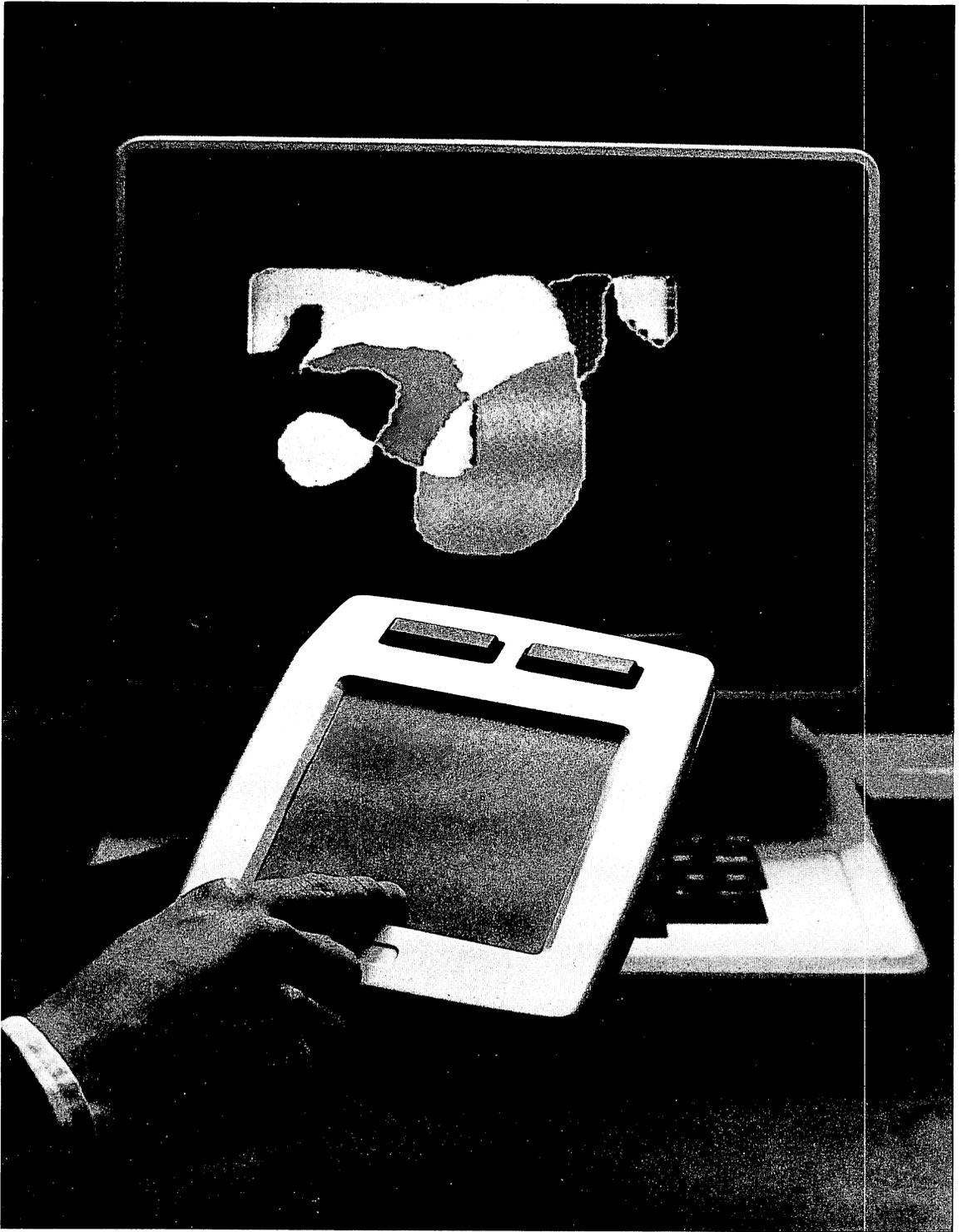
As useful and versatile as these input devices proved to be, it was clear from the outset that the users would benefit from having even more ways of communicating with the computer. Some attempts were made to bring low-cost speech recognition to the computer, but the resulting products were too limiting for general use. Light pens—tools that let the computer sense the position of a pen as it is held near the display screen—were also tried, with mixed success.

One of the most versatile input devices for computers in the early 1980s was the high-resolution digitizing tablet. This device allowed the user to draw on the tablet surface with a special pen, and the computer was able to keep accurate track of the pen position as it was moved. These tablets were typically very large (14 inches or so on each side). The precision of digitizing tablets was quite high, giving pen coordinates to an accuracy of one hundredth of an inch or better. Although these were perfect devices for accepting accurate tracings of maps or engineering drawings, for example, they were "overkill" for people who wanted to use them to draw pictures on the dis-

play screen. The reason for this was that personal computer displays were generally restricted to resolutions of under 300 dots horizontally and under 200 dots vertically. If the tablet was being used to control images on a normal TV screen, much of the tablet resolution was unusable. Because of their accuracy and resolution, however, these tablets were expensive—well over \$1,000 in most cases. Since personal computers were dropping in price, the customer was then confronted with the option of buying an input device that, by itself, cost several times as much as the computer!

In addition to their high price, the size of these tablets was a deterrent. Although size is not a major consideration in the workplace, it presents problems for people using computers in their homes. This was all quite unfortunate, because everyone who has used a digitizing tablet knows how easy it is to use and how versatile it can be.

In response to the price and size constraints of digitizing tablets, the KoalaPad was invented.



The KoalaPad touch tablet, as it was first produced, has a 4¼" by 4¼" pressure-sensitive square area and two buttons. (The later model of the device operates the same way but looks a little different.) The KoalaPad is connected to the computer through the joystick or paddle controller connector and is able to detect the position of a finger or a plastic stylus anywhere on the sensitive surface. The tablet resolution is 256 units in each axis, which conforms to the display resolution of most personal computers on the market today. The two buttons make it easy to signal the computer to perform certain tasks.

The KoalaPad allows personal computer owners, for the first time, to convey position information to a computer with the ease of moving a finger on a tablet surface. The compact size and low price of this device brings it into the realm of accessibility of all personal computer owners.

However, a tablet by itself is not enough. To be able to use the tablet, users need computer programs. The most obvious program to create is one that lets you construct color pictures of your own design on the computer display screen. Because of the popularity of this activity, this software is included with the KoalaPad.

It is important to realize, however, that the KoalaPad is much more than a graphics tool. As you will see in Chapter IV, it is a useful input device for educating young children, for composing music, for playing games, and for many other activities that reach far beyond creating pictures. In fact, much of the excitement that has been generated since the introduction of the KoalaPad arises from its tremendously broad scope of application.

The KoalaPad is making personal computers easier to use and hence is making their applications more powerful to their users. It is this characteristic that makes the KoalaPad so interesting.

As we look to the future, it is clear that advances in programs, as well as in input and display technologies, will make computers even more powerful than they are today. The futurists tell us that we have entered the Information Age—an era in which the creation, analysis, and distribution of information

will form the backbone of our economy. The computer is our principal information tool, and it will take on increasing importance to us and to our children in the years ahead. It is important that advances in this technology be to the benefit of those of us who use it.

Devices like the KoalaPad not only make computers easier to use, they make computers useful for new tasks—many of which are yet to be developed. If you are interested in writing your own computer programs, you will find the KoalaPad an easy device to incorporate into your software.

The key to future applications of computers may well lie in your hands!

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# II.

## How to Get the Most out of the Illustration Software

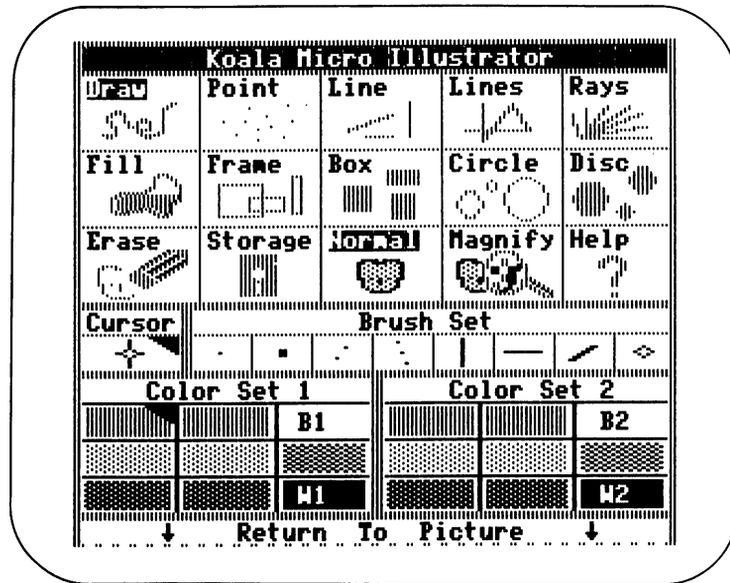
### Overview

One of the most striking features of the KoalaPad is the ease with which it lets you create pictures with your computer system. Because the creation of graphic images is such a major use for this device, this chapter will review some of the features of the graphics software that accompanies the tablet and will describe a technique that lets anyone—child or adult—create pictures out of an alphabet of simple shapes. We will also describe a “video game” that can be played using the KoalaPad and the illustration software.

### The Illustration Software

The graphics program that is shipped with the KoalaPad allows the user to create color pictures that can be displayed, saved on a diskette, and printed. There are differences among the Koala graphics programs for various computers. Some versions have a few more features than others, but all of them include the features that will be discussed in this chapter.

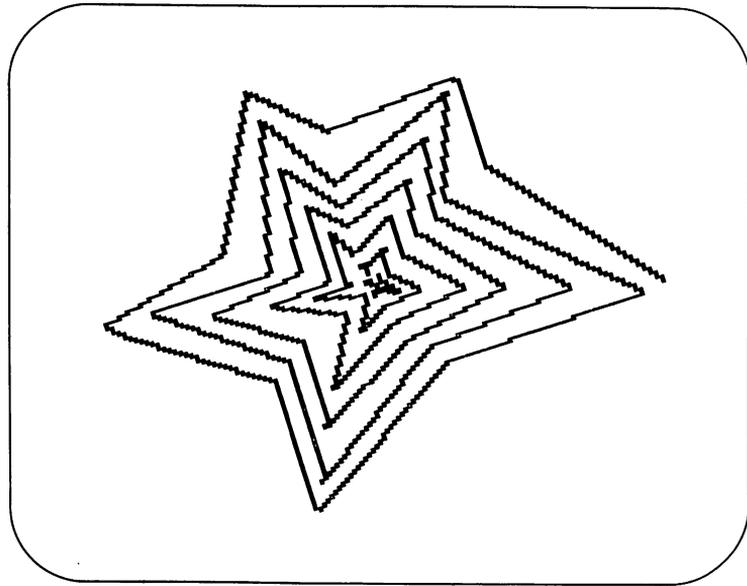
The graphics software lets you create pictures using the entire screen as a drawing surface. A menu showing the various options available for your use is displayed on a separate screen that can be brought into view any time you want to see it. A typical menu screen looks like this:



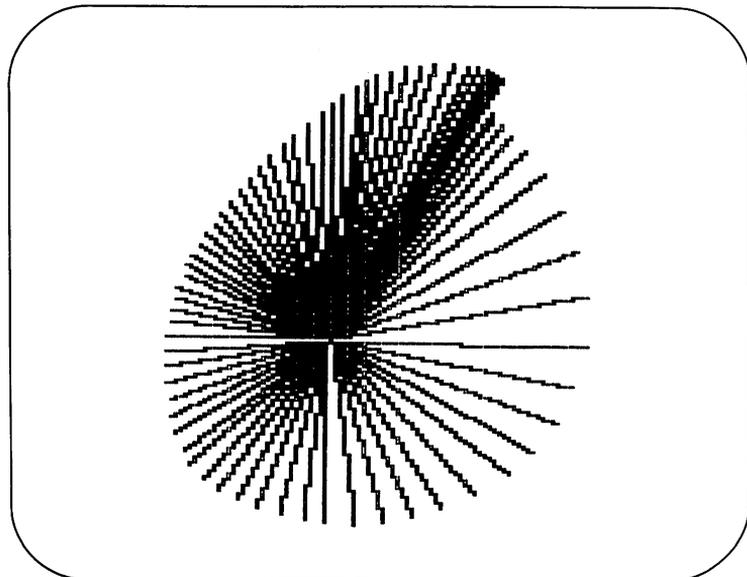
The menu shows 10 drawing tools, 5 picture management and assistance tools, 8 brush shapes, and a set of 18 color patterns that can be used in your pictures.

The illustration software lets you select from many drawing tools, any of which can be chosen by using the KoalaPad to point to the box containing the desired function and then pressing one of the KoalaPad buttons. Once a tool has been selected, you can switch to the picture screen and continue working on your picture.

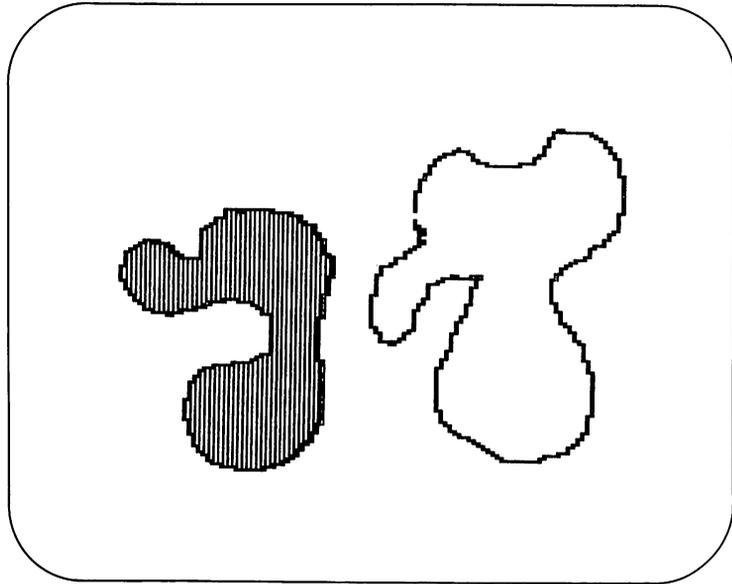
The first tool, *Draw*, lets you sketch freehand lines by running your finger over the tablet surface. If the left tablet button is not held down, no line is drawn. If, however, you hold down the left button while moving your finger or stylus on the touch tablet, a line will be drawn on the screen. The following line was made with the diagonal brush:



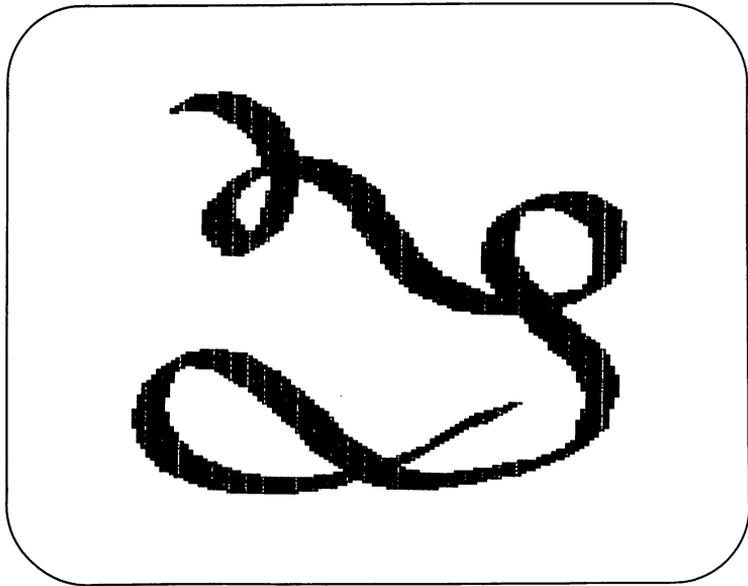
Just as lines drawn end-to-end are useful, so are lines that all emanate from one point. Using the Rays tool, you can pick a starting point and draw a nice pattern by pressing either KoalaPad button as you move your finger around on the tablet.



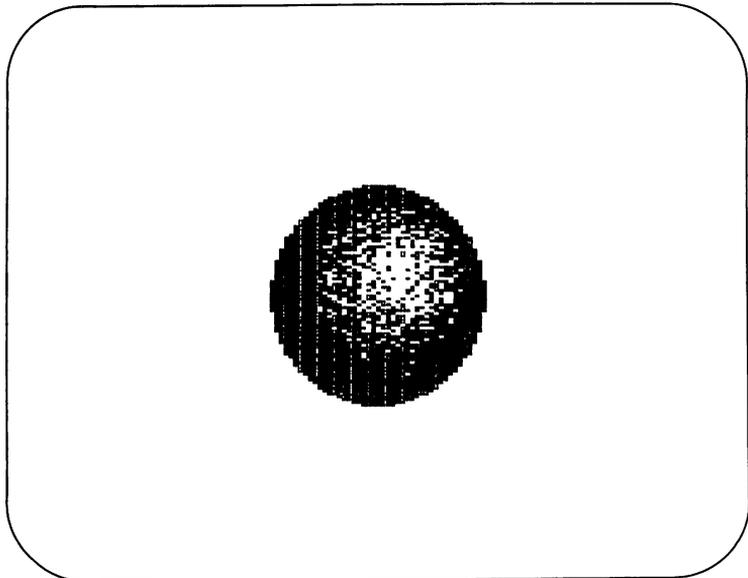
The Fill tool lets you fill in outlined shapes that you have already drawn. To start filling an area, simply place the cursor anywhere inside the area to be filled and press either button on the KoalaPad.



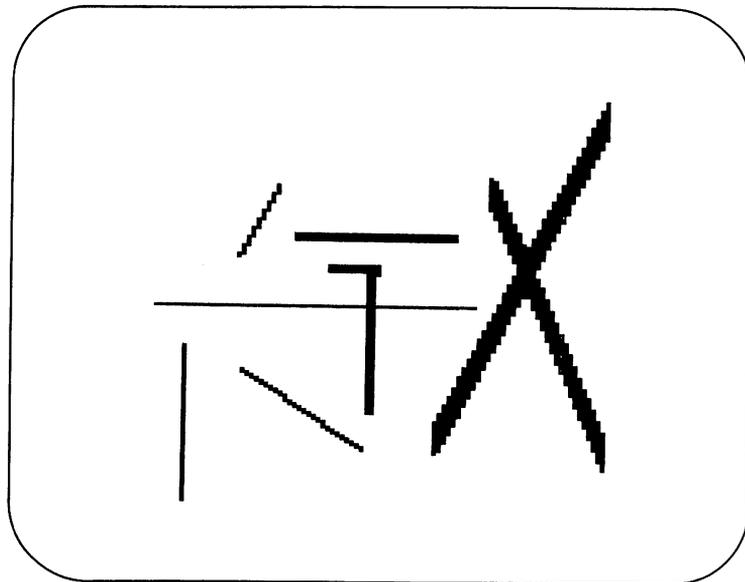
There is one characteristic of this tool of which you must be aware. If the shape you are filling has *any* gaps in it, or if it has been drawn with something other than a solid line, the filled color may “leak” out of your area and spill onto the rest of the picture. For example, there is a small gap in the empty area on the right side of the picture above. If we fill this area, we will get a very obvious leak:



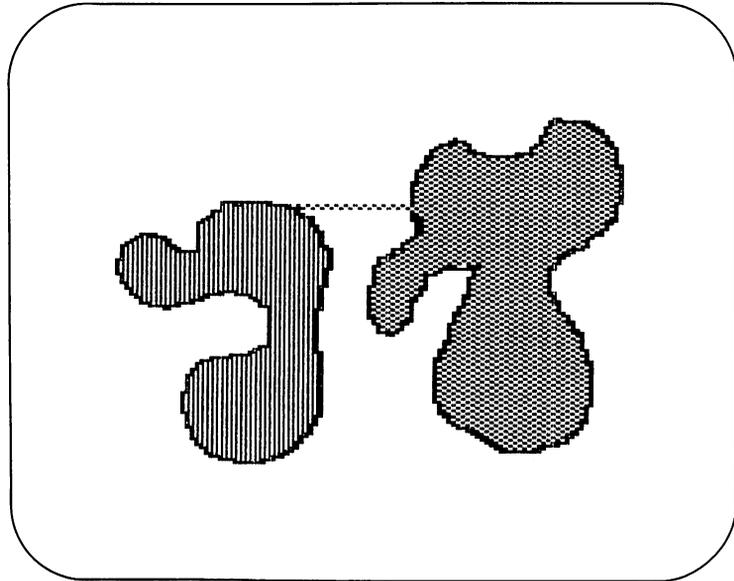
In addition to drawing freehand lines with various brushes and colors, you can also draw individual points using the **Point** tool. One application of this tool is the creation of “airbrush” shading to make a disc look more like a sphere.



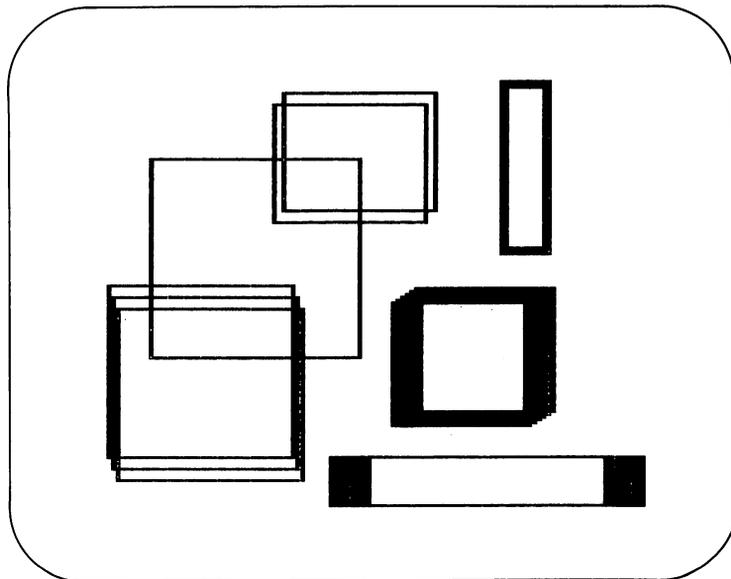
Straight lines can be created with the Line tool. To draw a line, you just point to one end of the line, click either tablet button, point to the location of the other end of the line, and click the button again to draw the line. As you draw straight lines, you will notice that the only lines that are not bumpy are the ones that are either horizontal or vertical. Lines that are drawn at an angle display "jaggies." These bumps arise from the fact that your computer display only allows colors to be placed on a fixed grid. This grid makes computer graphics resemble needlepoint more than painting. As a straight line is drawn at an angle, there will be places where the line is "broken" as it moves from one grid location to another.



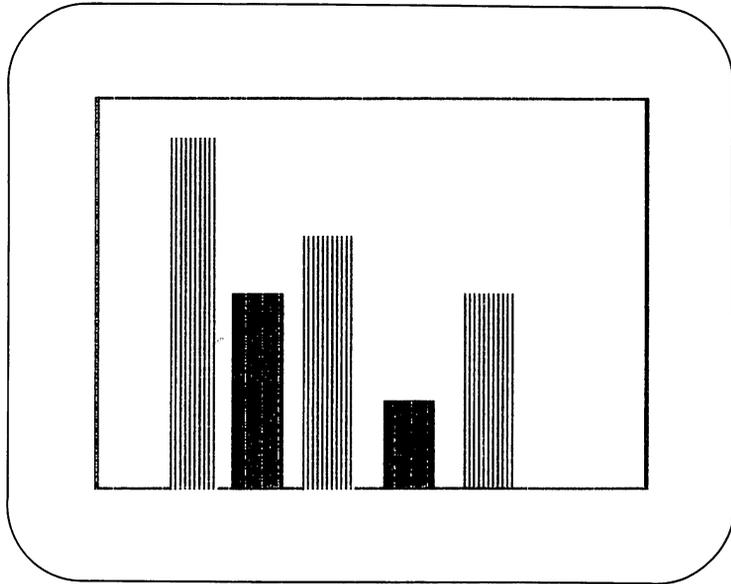
Although detached straight lines are very useful, you may want to draw complete sets of lines that are connected end to end. The Lines tool lets you do that.



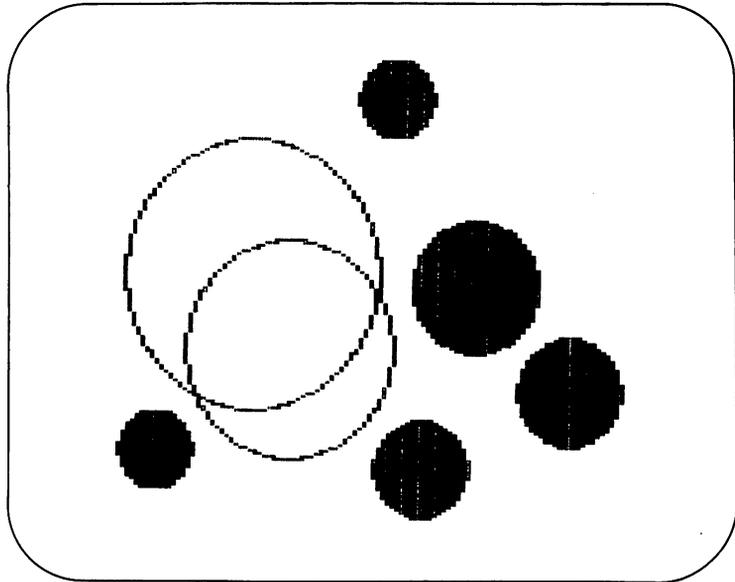
The **Frame** tool lets you draw rectangles and squares, as long as the sides are parallel to the edges of the screen. By using different brushes, many kinds of frames can be drawn.



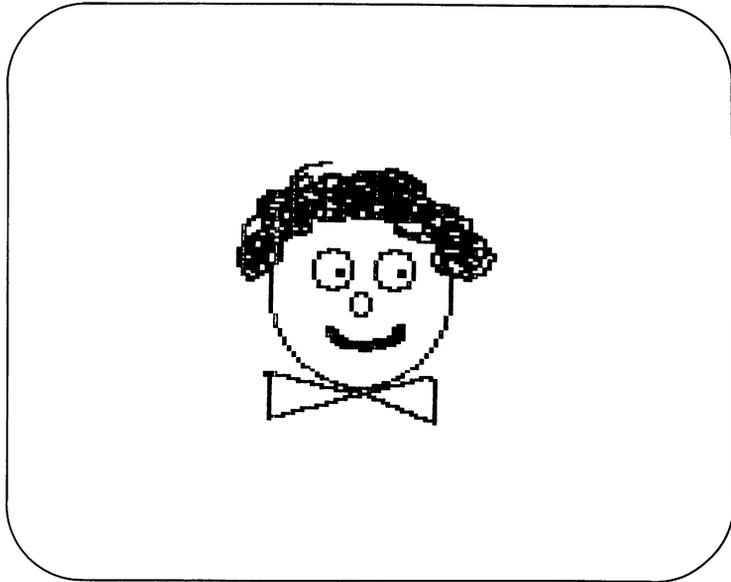
**Boxes** are just solid frames, and they can be made in any color. One of their practical uses is the creation of bar graphs.



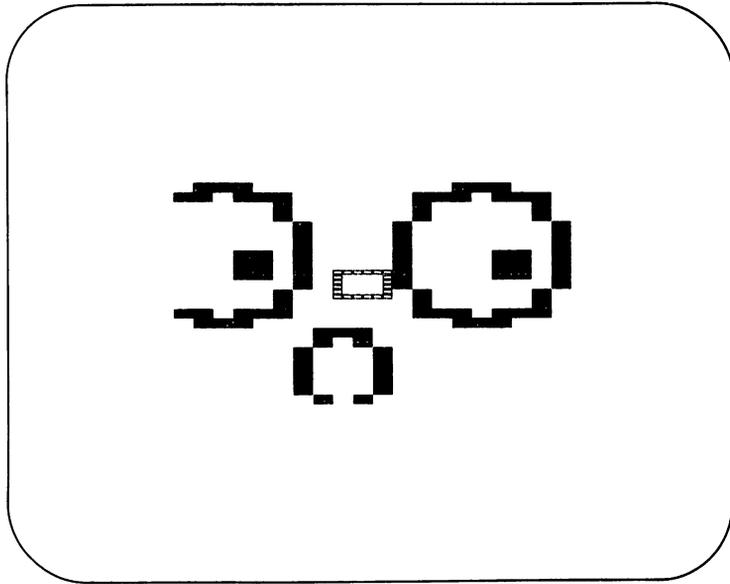
**Circles and Discs** are the round counterparts to frames and boxes. To create any of these shapes, you first select the center and then a point on the perimeter. When you click the KoalaPad button a second time, the desired shape will be drawn.



The **Erase** function lets you clear the picture screen and set its background to any color you choose. **Storage** lets you save and retrieve picture files from the diskette. **Normal** and **Magnify** are two display modes that you can use when creating your picture. For example, the following picture is shown in the **Normal** mode:



If you now select **Magnify**, the KoalaPad lets you scroll anywhere you want on the picture. The portion that is displayed on the screen is a large magnification of the original. The following picture shows the magnified region around the eyes and nose of the head:



This set of drawing tools is good for a very wide range of illustration tasks. The combination of the KoalaPad with software of this type provides a great deal of utility to the user.

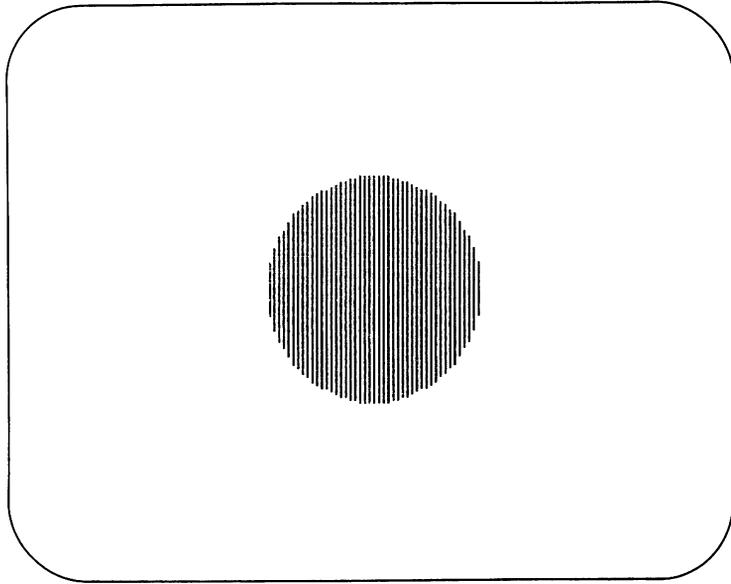
### **An Easy Drawing Method**

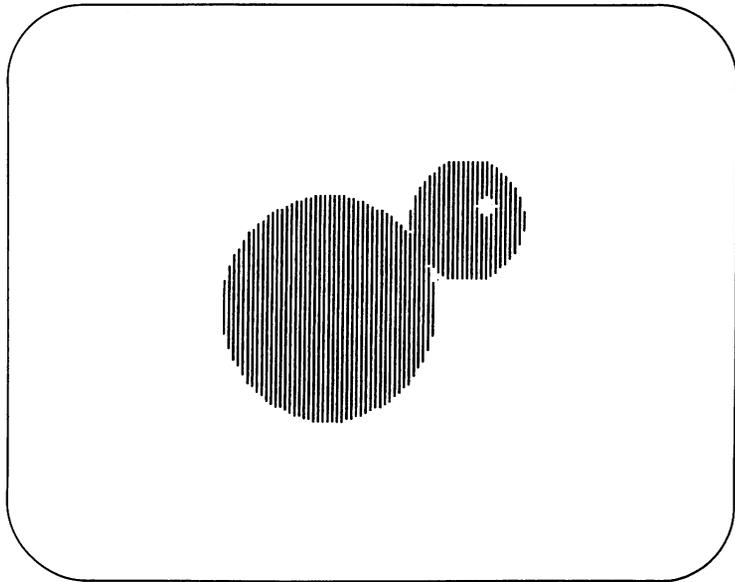
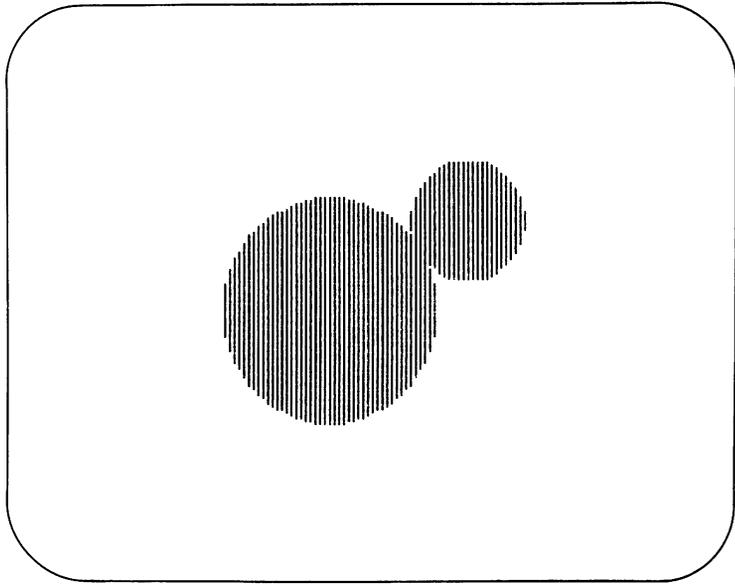
If you are like me, you may think that *no* amount of computerized help is going to make you a good artist. Well, I don't care if you are six or sixty, I have found a drawing technique that will have you creating excellent pictures in no time at all.

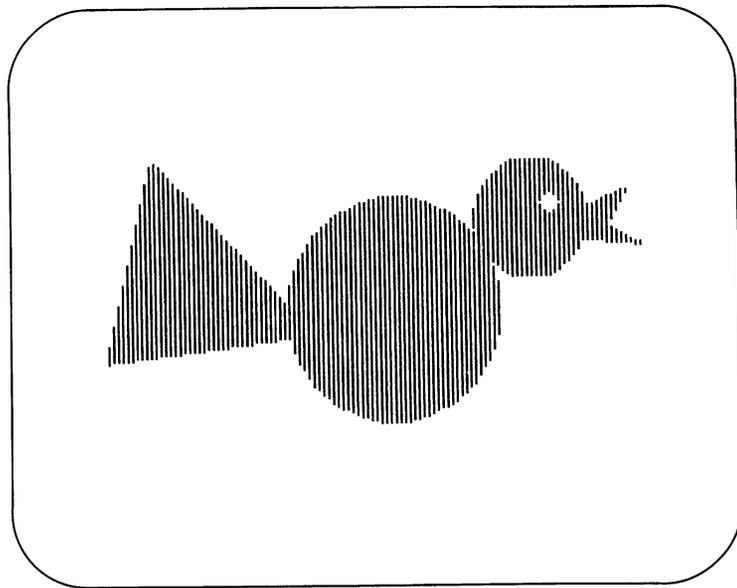
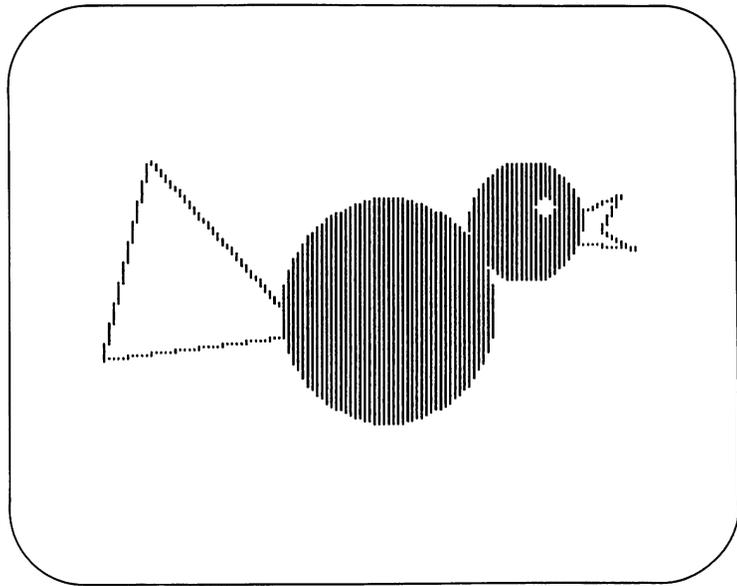
This technique was developed by Ed Emberley and is described in his many drawing books (for example, *Ed Emberley's Drawing Book of Animal's*; *Ed Emberley's Drawing Book—Make A World*; *Ed Emberley's Big Green Drawing Book*; and others published by Little, Brown and Co.).

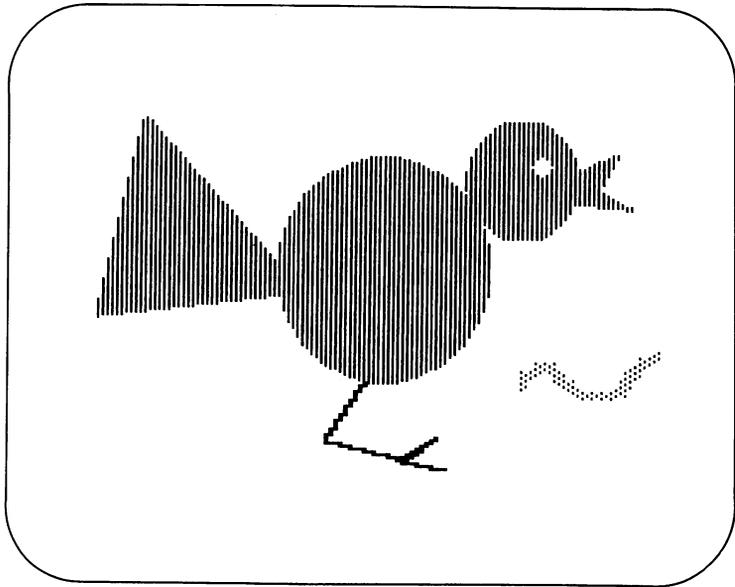
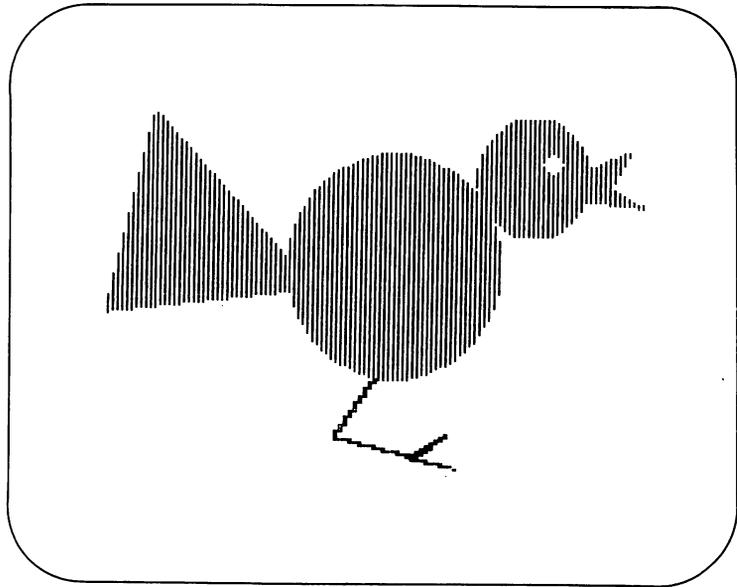
The key to his drawing technique is the adoption of a graphic "alphabet"—a set of basic shapes that can be assembled to create pictures of almost anything. He shows that, just as words and sentences can be formed from an alphabet of letters, pictures can be formed from an alphabet of shapes, such as discs, rectangles, squiggly lines, triangles, and so on.

For example, the following sequence of figures shows the creation of a bird (and worm) using the Disc, Lines, and Fill functions, more lines, and, for the worm, a freehand line made with the square brush shape.





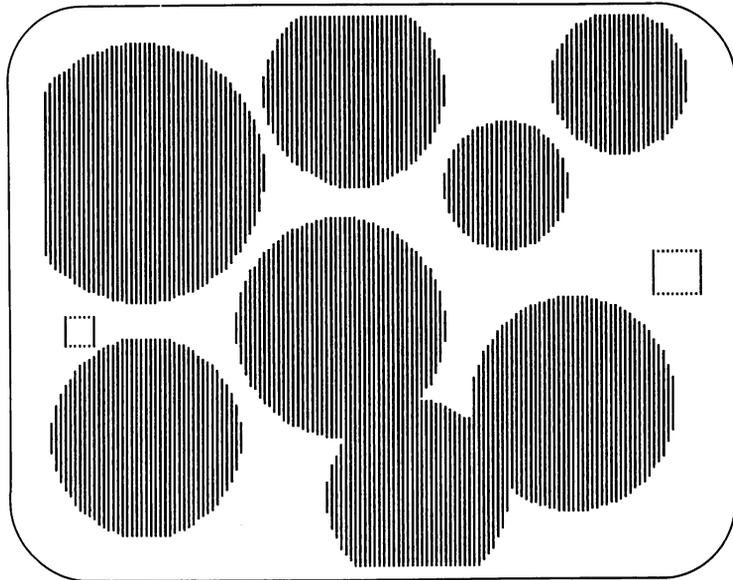




As you thumb through Ed Emberley's drawing books, you will find that his drawing techniques can be used quite easily with the KoalaPad illustration software.

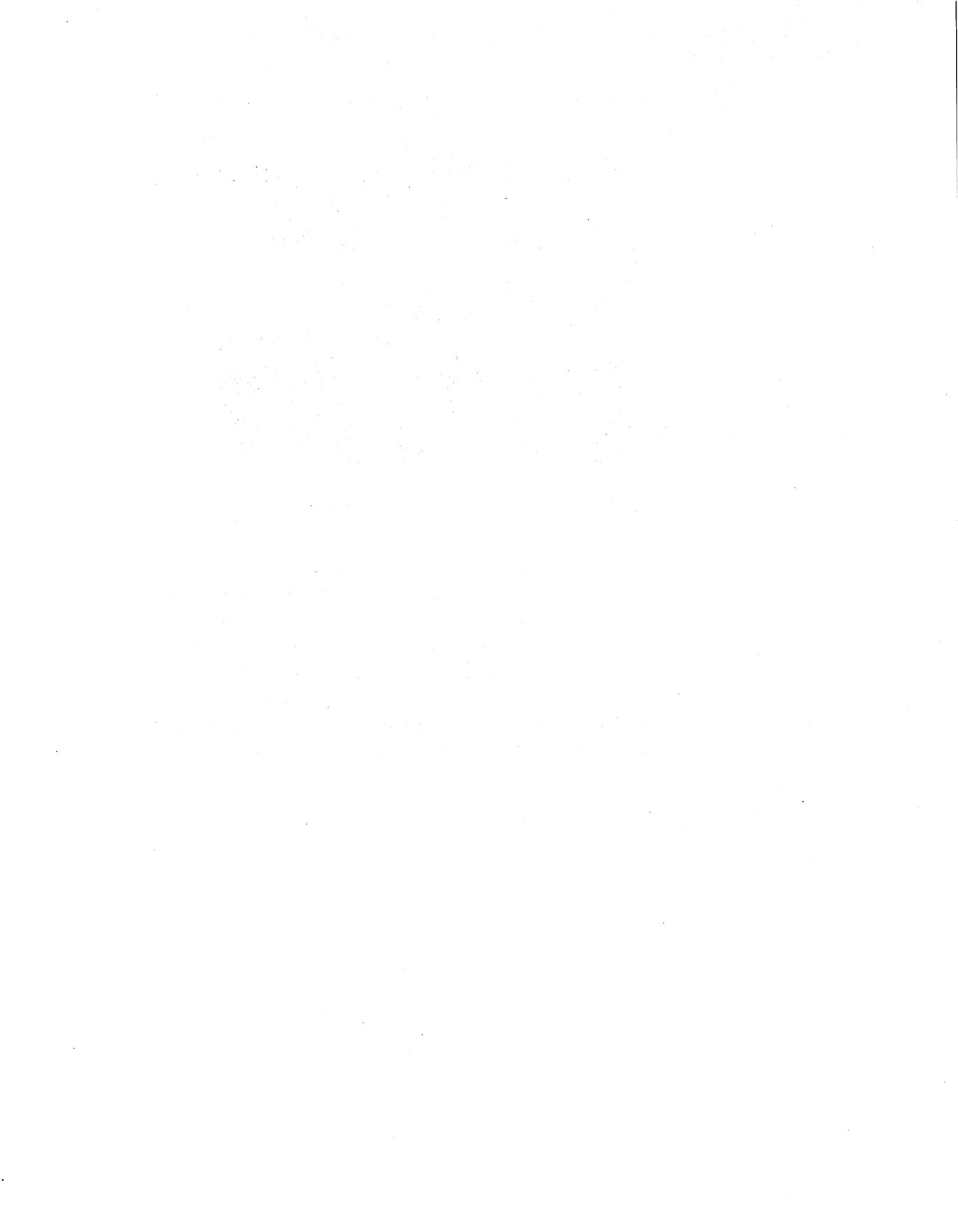
### A Graphic Game

One advantage of images on the display screen is that you can interact with them. My ten-year-old son Harvey invented a game that you can play with your KoalaPad. First, you create a series of discs on the screen that form a maze from one side to the other.



Depending on your skill level, you can place the discs closer together or farther apart. The goal is for each player to draw a line from the box on the left to the one on the right without touching any of the discs. Each player uses the Draw function and uses a line of a different color. Players take turns creating new mazes to solve. If the discs are close together, it takes a great deal of eye-hand coordination to get through the discs without touching any of them.





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# III.

## Getting Pictures on Paper

Although the creation of graphic images on your computer display screen may provide a great deal of personal satisfaction, you probably would also like to share the results of your effort with others. Clearly, your computer system is too cumbersome to carry around to show to all your friends, so a more transportable form for your artwork must be found. This chapter describes three ways of capturing your artwork for later viewing: using a graphics printer connected to your computer, using a camera for recording images off the screen, and using a video cassette recorder for recording video signals directly from the computer.

### **Computers and Printers—The Perfect Match**

If you use your computer for purposes other than video games, it is likely that you have thought about getting a printer. Printers are useful whenever you need a permanent record of your computer activities. You can use your printer to list your programs, to type out letters and mailing lists, and to print out your pictures.

Because printers are not cheap (and some of the less expensive printers aren't very good), you will want to be sure that your printer will get enough use to justify its expense. If you are like many personal computer users, you will find that a printer that lets you get both text and graphic images will be used every day.

### **Choosing Your Printer and Interface**

Depending on the computer you are using, the choice of an appropriate printer can be easy or complex. The reason for this is that there are many different types of printers on the market, and not all of them can be used with any computer. Further-

more, you may need to purchase an interface adapter that translates the computer's signals into a form that is intelligible to the printer. Once the printer and interface have been selected, you may find that you need special software to print your pictures. The combination of printer, interface, and printer software should be thought of as a complete purchase. In this section we will review some of your options and discuss some printer systems that can be used with your Apple, Atari, Commodore, or IBM computer.

Computer printers fall into two general categories: those that print using fully formed characters (like a typewriter) and those that form characters out of an array of dots (dot matrix printers). Although printers that use fully formed type (such as daisy wheel printers) generally produce higher-quality text printing, they are inappropriate for the printing of graphic images. Many (but not all) dot matrix printers, on the other hand, are capable of printing both text *and* graphic images. You must be sure that the printer you choose has a graphics option to print the pictures you create with your KoalaPad.

There are three types of dot matrix printer technology in popular use. Thermal printers generate dot patterns on heat sensitive paper using a miniature array of heaters that is passed over the paper surface. These printers tend to produce low-contrast printout, and the final image generally must be kept in a cool place. Needle printers, on the other hand, print on plain paper with an array of magnetically actuated needles that strike an inked ribbon of the sort used in an ordinary typewriter. These printers are quite reasonably priced and produce printout that has good contrast. Some needle printers are capable of producing color pictures as well. Ink jet printers form pictures by spraying a very fine pattern of dots on the paper surface. By having several colors of ink jets, colored images can be produced.

When buying a computer printer, be aware that you will get what you pay for. Make sure that you have seen (and like) graphic images made with the printer of your choice and using the same computer model you own. Your computer salesperson may be able to provide you with a complete package that

meets all of your needs. There is nothing more frustrating than being trapped with a printer that doesn't meet your needs. Most of the black-and-white images in this book were created with the Epson MX-100 printer. The Epson MX- and FX-series printers are capable of generating excellent images on plain paper, and they are quite reasonably priced. As you shop around, you will find other printers that produce good black-and-white printout, so the choice of printer is largely up to you. Of the color printers on the market, the ink jet models from Radio Shack and Diablo are very nice. The Diablo printer produces very vivid colors, but it is more expensive than the Radio Shack model. Because color ink jet printers are fairly new items, you should be certain that they can be used with your computer before you buy one.

The interface electronics that you need depends entirely on which computer you are using. For example, if you have an IBM PC computer, the IBM parallel interface card connects to the Epson printer to produce graphic printout with no additional software required. Similarly, graphics printers can be connected to the Atari computers using the Atari 850 interface. One way to print KoalaPainter images from the Atari computers is with the magic Dump II+ cartridge and Koala Converter disk from Sar-An Computer Products (see Appendix A for the addresses of companies mentioned in this chapter). If you are using the cartridge version of KoalaPainter on your Atari computer, the easiest graphics printer package to use is the Screen Printer Interface from Macrotronics. This package includes a special cable that bypasses the need for the Atari 850 interface, but the version I have works only with the Atari 400 or 800. This interface can be used with graphics printers from Centronics, Trendcom, IDS, or Epson. Several printer interface cards are available for the Apple II series computers. As with printers, you must choose a card that supports the printing of graphic images. Two excellent choices are the Grapppler, from Orange Micro, and Print-It, from Texprint, Inc. Both of these cards offer several features you might find useful. For example, they allow you to print your image in magnified form so that each screen picture takes up an entire  $8\frac{1}{2}'' \times 11''$  page. Most of

the images in this book were made in this fashion. Commodore 64 images can be printed through the use of the "Card?" interface card and printer utility software from CardCo.

## Printing Your Pictures

Once you have connected your printer and interface circuitry to your computer, you are ready to start making prints of the artwork you have created with your KoalaPad. Generally, the task of printing a picture consists of loading the picture into the computer's display memory and then sending the graphics print commands to the printer interface.

### *Using the Apple Computer System*

The technique used to make a copy of your screen image from the Apple computer will depend on which printer interface you use. If you are using the Print-It interface from Texprint, all you have to do is bring the desired image onto your computer display screen and then press the special key that is connected to the interface card. Assuming that you are using a black-and-white (as opposed to color) printer, you would then type WRD and press the RETURN key to start printing the image. The letters WRD stand for White and black, Rotate, and Double size. The resulting image will print horizontally on an 8½" × 11" page. Most of the illustrations in this book were printed in this fashion. An advantage of this printer interface is that it lets you print images from *any* source—even action games. When the printout is completed, the computer automatically returns to the program it was using before the special interface key was pressed.

If you are using another type of printer interface, such as the Grappler, it is still easy to make copies of pictures you have created with your KoalaPad. One way to do this is with a special program, which first loads your picture into the computer's display memory and then sends the appropriate printer commands to your interface card. This can be done from the computer language of your choice, but it will be demonstrated in

BASIC in the program that follows. This program (which you might want to save on your picture disk under the name **PRINTER**, will automatically make a set of printed pictures for each picture name you have listed in the **DATA** statement in line 6000. As you can see from line 400, this program automatically adds the **PICTR.** portion of the filename to the name you have given your pictures. The sample data in line 6000 corresponds to pictures named **P1** through **P13**. You should, of course, type in your own picture names here. This program assumes that your printer interface card is located in slot #1. If you have the card in another slot, you must change the **PR#1** in line 5000 to the correct slot number.

Because this program automatically ejects a fresh page at the end of each picture, it will run unattended with either the Print-It or Grappler interface card. Since a disk full of pictures will take some time to print out, you might want to run this program during a well-deserved break in your activities!

```
100 D$ = CHR$ (4)
200 I$ = CHR$ (9)
300 READ FL$
400 PRINT D$; "BLOAD PICTR."; FL$; ",A$2000"
500 GOSUB 5000
600 GOTO 300
5000 PRINT D$; "PR#1"
5100 PRINT I$; "GDR"
5200 PRINT CHR$ (12)
5300 PRINT D$; "PR#0"
5400 RETURN
6000 DATA P1,P2,P3,P4,P5,P6,P7,P8,P9,P10,P11,P12,P13
```

### *Using the Atari Computer System*

Assuming that you are using the cartridge version of KoalaPainter and the Macrotronics screen printer interface, making graphic prints of your pictures is very easy. You must

be sure that your Macrotronics disk is in the disk drive when the power to your computer is turned on. Instead of seeing the KoalaPainter screen, you will be asked to type the number that corresponds to your printer (numbers for various popular printers are shown in the manual). For an Epson printer, for example, you would type 3. When you have done this, you are allowed to use the KoalaPainter software, with one added feature. Any time you want a paper copy of the picture on the screen, all you have to do is hold down the key marked CTRL and press P. Once the picture has been printed, you can continue to use KoalaPainter. Printing pictures becomes as easy as using KoalaPainter to load a desired picture on the screen and pressing CTRL-P

If you are using the disk-based version of KoalaPainter, you will find it easier to make printouts of your pictures with the graphics printer program from Sar-An.

### *Using the Commodore 64 Computer System*

Unfortunately, the CardCo interface does not allow pictures to be printed directly from the KoalaPainter program. This means that you must use a special program to load these pictures into your computer. Producing printouts of your KoalaPainter pictures requires the following steps: First, load the screen printer interface program from CardCo. When this program is run, you will be asked to answer several questions regarding the CardCo program you want to run and where you want it "loaded." Our example assumes that you have chosen option 0 for the location of the program. When you have answered some questions about your printer, the machine language program that performs the screen printing is loaded and you are returned to BASIC. At this point, you can set up a useful printer option by typing:

SYS 52227

Once you have entered this command, you can print anything that appears on the screen by pressing the f1 key on your Commodore 64.

The next step is to load your KoalaPainter pictures on the screen. That is accomplished with the following program, written by Bob Weissman of Koala Technologies, Inc. When entering this program, be sure to check the numbers in the DATA statements very carefully. These statements contain a small machine language program that properly locates the KoalaPainter picture in the correct memory locations for the printer software to work:

```
1 REM DISPLAY A KOALAPainter [TM] SCREEN
10 IF A=1 GOTO 130
20 FOR A=49154 to 49326
30 READ I:T=T+1:POKE A,I
40 NEXT
50 IF T=23541 GOTO 80
60 PRINT "ERROR IN DATA STATEMENTS"
70 STOP
80 INPUT "WHICH PICTURE";A$
90 A$=A$+" ":REM 14 SPACES
100 F$=CHR$(129)+LEFT$(A$,14)
110 FC=PEEK(53281):CC=PEEK(646)
120 PRINT "LOADING . . .";A = 1:LOAD F$,8,1
130 SYS 49154
140 WAIT 653,1:WAIT 653,1,1
150 POKE 53265,PEEK(53265) AND 223
160 POKE 53272,(PEEK(53272) AND 240) OR 4
170 POKE 53270,PEEK(53270) AND 239
180 POKE 53281,FC:POKE 646,CC
190 PRINT CHR$(147);
200 END
49154 DATA 173,17,208,41,239,141,17,208
49162 DATA 173,17,208,9,32,141,17,208
49170 DATA 173,22,208,41,23,9,16,141
49178 DATA 22,208,173,24,208,41,240,9
49186 DATA 8,141,24,208,76,49,192,173
49194 DATA 17,208,41,239,141,17,208,162
```

```
49202 DATA 127,160,64,134,252,132,251,162
49210 DATA 4,160,0,134,254,132,253,162
49218 DATA 131,160,39,32,133,192,162,131
49226 DATA 160,40,134,252,132,251,162,216
49234 DATA 160,0,134,254,132,253,162,135
49242 DATA 160,15,32,133,192,173,16,135
49250 DATA 141,33,208,162,96,160,0,134
49258 DATA 252,132,251,162,32,160,0,134
49266 DATA 254,132,253,162,127,160,63,32
49274 DATA 133,192,173,17,208,9,16,141
49282 DATA 17,208,96,142,1,192,140,0
49290 DATA 192,160,0,177,251,145,253,165
49298 DATA 252,205,1,192,208,8,165,251
49306 DATA 205,0,192,208,1,96,230,251
49314 DATA 208,2,230,252,230,253,208,227
49322 DATA 230,254,76,141,192
```

Once you have entered this program, you should save it on a diskette so that you won't have to type it in again.

To print a KoalaPainter picture, run this program. When the screen shows the message

#### WHICH PICTURE?

enter the name of the picture you want to see. This name can be abbreviated. For example, if you want to see a picture named, for example, PIC C FLOWERS, you could load this picture by typing PIC C\* and pressing the RETURN key.

Once your picture is displayed on the screen, you can print it by pressing the button marked f1. When you are done with the picture, press and release one of the SHIFT keys, and you will be returned to BASIC. If you want to load another picture, just type RUN, and the program will start over again.

It is unfortunate that there is so much labor involved in printing pictures from your Commodore 64 computer, but once you have all the programs together on disk, the task moves pretty smoothly.

## Using the IBM PC Computer System

Of the four brands of computers that presently use the KoalaPad, the IBM PC is the easiest one from which to print pictures. Assuming that you are using an Epson printer with graphics capabilities connected to the IBM parallel printer interface, you have to follow only a few steps to get your images on paper: First, you must bring the image you want to print onto the display screen using the KoalaPainter software. Once this is done, you can print the image by holding down the SHIFT key and pressing the key marked PrtSc. As soon as this key is pressed, the printer will make a copy of the screen for you. If you want one picture per sheet of paper, you should press the ON LINE button on the printer when it is finished with the picture, and press the printer button marked FF (Form Feed). When you are ready to print your next picture, press the ON LINE button again so that the printer is ready to receive data from the computer.

### Screen Prints from Any Computer

While there are printer interfaces and printers that let you capture your KoalaPad images on paper for each of the four computers we described, there is also a printer available that lets you capture an image from *any* video source. If you can display an image on your monitor screen, you can get a copy of it on paper using a special screen printer made for Axiom by Seiko. The Axiom model EX-855 printer generates dot matrix screen prints of your video image on special aluminized paper. The resulting image is made of black dots on a silver background—admittedly a bit strange looking at first. However, this image can be copied on an ordinary copier to produce a very crisp image.

The nicest feature of such printers is that they don't require any special software or printer interface. To connect the printer to your computer, you need only purchase an inexpensive Y connector that lets you tap the printer input into the same cable that goes to your monitor. When you see the image you want on the display screen, you press the PRINT key on

the printer and, within a few seconds, a copy of the image is in your hands.

Screen printers of this sort operate very fast—typically requiring under 10 seconds to print a full screen image. They are more expensive, however, than traditional dot matrix printers, and they are limited in that they can *only* be used to copy images shown on the display screen.

Even so, if you find that you want to make many screen prints, this type of printer can be well worth the cost.

## Photographing Your Pictures

There are several ways of making color photographs of your computer-generated artwork. The easiest technique is to photograph the image directly from the television screen with a camera. Although many types of cameras can be used effectively, I prefer the use of a 35 mm single lens reflex camera so that I can see the image exactly as it will appear on the film.

To photograph the screen, you will have to use an exposure of 1/30 of a second or longer. The reason for this is that the image you see on your television is formed from two interlaced scanned patterns, each of which takes 1/60 of a second to form. It takes two scans to build the whole image, so a shutter speed of 1/30 of a second is the absolute minimum for capturing the whole image, and longer exposures are preferred. The length of your exposure will also be determined by the brightness of your television screen and the speed of the film you are using. Because long exposure times are needed, you must have your camera mounted on a stable tripod to prevent blurring of the images.

The tripod height should be adjusted so the camera lens is perfectly centered on the screen. By centering the lens this way, you eliminate an undesirable effect called *keystoning*. Keystoning occurs when an image is photographed or projected at an angle. The result is that one edge of the image appears larger than the opposite edge. A square, when photographed this way, will take on the trapezoidal shape of a keystone—hence the name. So remember, if you want your pictures to be

as accurate as possible, you will have to adjust your tripod height accurately.

When you make your photographs, you will be capturing everything that appears on the television screen. This includes the image you want as well as fingerprints on the screen and any reflections from other light sources. Before photographing any images, clean your display screen with a damp cloth and mild soap. If the screen hasn't been cleaned in a long time, you may be surprised at the accumulation of dirt. Because of the high voltages used in television tubes, the display screen usually acquires a static charge that acts like a dust magnet.

When you are ready to start photographing your images, the only source of light in the room should come from the display screen itself. I find that I get my best results at night in a completely darkened room. If adjacent rooms are illuminated, you can seal light leaks around doors with masking tape. Also, if your television has an illuminated channel selector, block its light with tape as well.

The choice of film type is largely up to you. For color prints, films such as ASA 100 Kodacolor VR give fine results. For slides, you may wish to use a high-speed Ektachrome (ASA 400) or a slower-speed Kodachrome. The main difference you will notice between these films is that Kodachrome tends to produce brighter and warmer colors than Ektachrome does. You should experiment with film types to see which you like best.

The distance between the camera and the TV set should be chosen so the computer image perfectly fills the viewfinder. If the image is too small, move the camera forward; if it is too large, move the camera back. As you adjust the focus on the camera, the image may get smaller or larger. Once the focused image is the right size, you might want to mark the tripod location on the floor with masking tape to simplify setup the next time you are ready to take photographs.

The next step in your picture-taking experience is to adjust the lens opening for the correct exposure. You should never rely on the light meter built into your camera when photo-

graphing a screen image. You will want to control both the shutter speed and the lens aperture controls manually. Your best bet is to use a separate light meter and take your readings from the front of the TV screen. You should take readings from several areas of the screen. Once you have made your readings, follow the instructions on your light meter for adjusting your camera. If you can't find an appropriate lens opening for a shutter speed of  $1/30$  of a second, set the shutter to a slower speed (e.g.,  $1/10$  of a second) and adjust the lens opening to the correct value. You will find that aperture settings in the range of  $f/4.0$  or higher will provide you with some tolerance in focusing. If you have your lens set at an opening below  $f/2.0$ , be sure that your camera is well focused before taking any pictures.

The first time you photograph a series of images, you should repeat the same shot several times with different lens openings or shutter speeds. Keep a log of your settings so that when the film is developed you will know the optimal settings for your camera and display.

Although the technique described above is perfect if you already have a camera, it is rather cumbersome—especially if you are going to take hundreds of pictures. There are special cameras designed just for taking pictures of TV images. These professional camera systems are fairly expensive (typically more than \$2000), but they produce results far superior to images photographed directly from the TV screen.

Some of the images in this book were photographed with an Image Resources Videoprint 5000 system. Other camera systems, such as those made by Lang Systems, Inc., operate in similar fashion. Rather than displaying the image on a color television tube, these systems electronically separate the display signal into its red, green, and blue components. Each signal is then displayed on a black-and-white monitor, one signal at a time. A color filter wheel is placed between the display screen and the camera lens. When the red image is displayed on the black-and-white screen, the image is recorded on the film after passing through the red filter. This process is repeated for the

green and blue filters. By exposing each component separately, the full-color image is reconstructed on the film. Since color filters can match the primary colors far more accurately than can the phosphors used in color televisions, the result is a photograph with far greater brilliance and depth than can be obtained otherwise.

Although you would want to be quite serious about your interest in computer graphics before investing in such a system, the results easily justify the cost for the serious graphic artist.

## **Videotaping Your Pictures**

Besides the television set itself, one of the most popular entertainment products seems to be the video cassette recorder (VCR). Normally, you might expect a VCR to be used for playing back prerecorded movies or for recording programs that you would like to view at another time. In addition, however, by connecting your computer system to a VCR, you can capture your images on tape for others to see without having to wait for film to be developed.

There are many advantages to using a VCR to record your video masterpieces. First, you can see the results immediately and re-record sequences that don't look right. Second, because of the low cost of videotape (compared to film) you can record hours of computer graphics inexpensively. Also, unlike your experience with photographing the screen, the VCR can be used in broad daylight. If you don't yet own a VCR, you might want to borrow one from a friend to see how you like using it.

There are two major videotape formats commonly used in the home—Beta and VHS. Because most video recorders have the same overall features, it doesn't matter which format you use. Be aware, however, that these tapes are not interchangeable. You can't play a VHS tape on a Beta machine, and vice versa.

One feature to look for when shopping for a VCR is direct video input and output jacks. These let you record from your computer directly, without using the radio frequency (RF) modulator. Most people feel that direct video input produces a

higher-quality image. To use this feature, you may also have to buy a video monitor cable for your computer. This is available from your dealer.

Aside from improved video quality, the use of direct video input lets you use some special-effects equipment to enhance your images.

Once you have acquired your VCR (and some blank tape) you are ready to connect it to your computer. The easiest way to do this is to use the TV signal cable (if your computer normally connects to a TV set) and connect it to the VCR antenna terminals, as shown in the manual that came with your video recorder. Your television set should also be connected to the VCR so that you can see the images as they are being recorded.

Now that everything is hooked up, you are ready to start recording your images. You might start with a "slide show" of your artwork. By now, you probably have quite a few pictures saved on your diskette. To record these images on the videotape recorder, you might first want to make a procedure that displays a "title page."

The easiest way to make a title screen would be to use a short BASIC program to print the title on the screen. For example:

```
10 REM:PUT THE CLEAR SCREEN COMMAND HERE
20 PRINT
30 PRINT
40 PRINT
50 PRINT "REFLECTIONS ON A SILVER TREE"
60 PRINT
70 PRINT "A COLLECTION OF COMPUTER"
80 PRINT "GRAPHIC IMAGES BY"
90 PRINT
100 PRINT "AMY DOAKES"
110 PRINT
120 PRINT "1984"
130 END
```

Starting with this title procedure, you can design even better ones for your own use. You might also want to create another procedure that provides more credits at the end of the show.

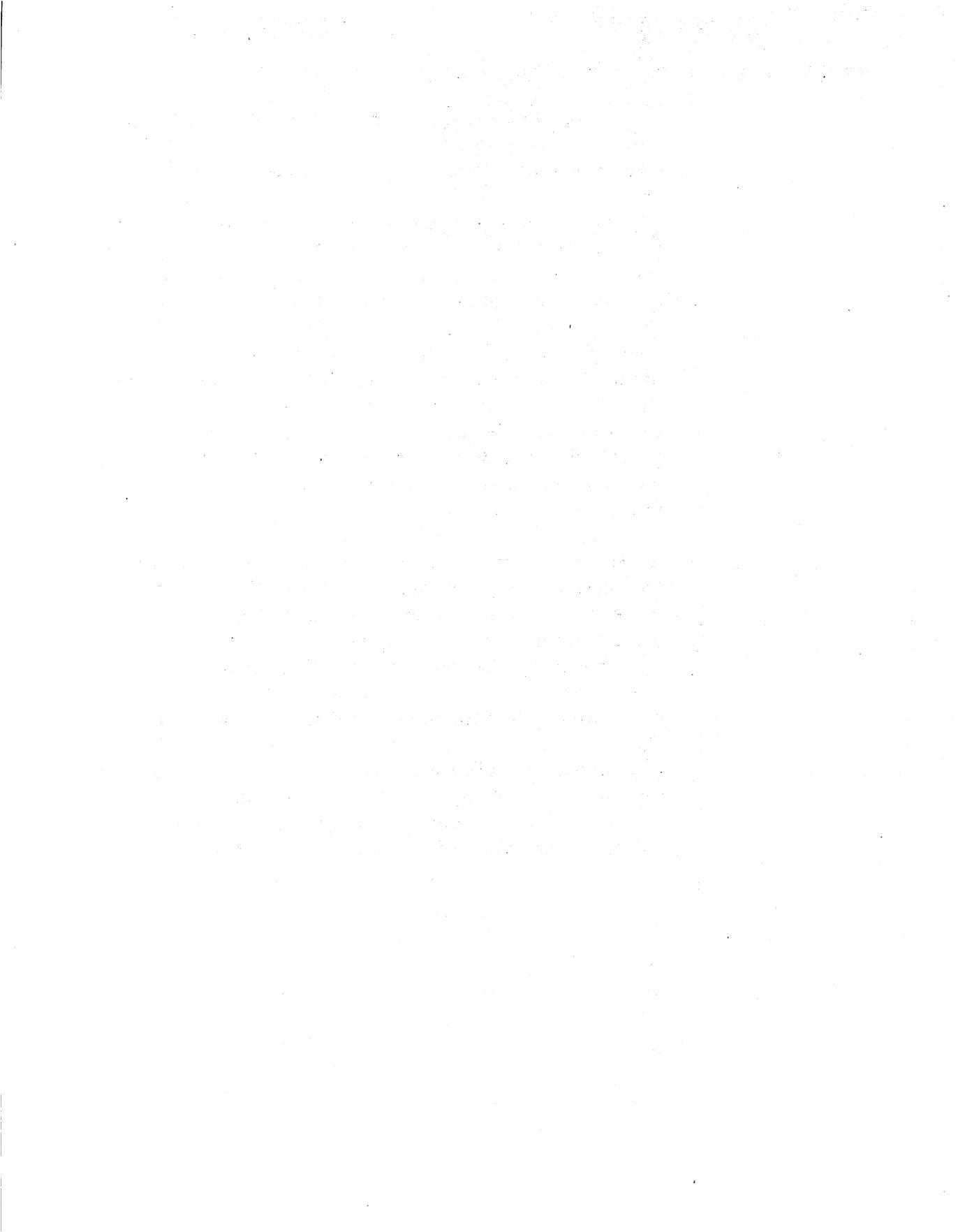
Let's suppose that you have several pictures in your computer that you want to record. Load the tape in the VCR, make sure it is rewound, and then run the title page program.

The screen will clear and you will see your title image on the TV screen. At this point, press RECORD and PLAY on your VCR (or press whichever combination of buttons is needed to start the recording process for your machine). After enough time has elapsed to make sure everyone can read the title page, press PAUSE, and use your illustration program to load the first picture you want to record. When this picture is on the screen, release the PAUSE key to start recording the image.

Keep each picture on the screen long enough for everyone to look at it before advancing to the next image. Keep repeating this process until you have come to the end of your show.

Remember always to press PAUSE on the VCR and load the new pictures into the computer.

After completing your first recording, rewind the tape and play it back. Pay attention to details. Are the pictures on the screen for the right amount of time? Are they on too long? Is there one picture that isn't shown long enough? Are the pictures in the correct sequence? Try recording the same set of pictures in a different sequence to see if the result is better or worse. Remember that the advantage of the VCR is instant playback—use this feature to help you perfect your technique.



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# IV.

## More Than Pretty Pictures: Other Applications for the KoalaPad

### Overview

Because of the popularity of the KoalaPad's graphics software, many of its users tend to think of this device as merely a tool for creating pictures on the display screen. Although this is a perfectly appropriate and natural use for the KoalaPad, it is by no means its only use. The KoalaPad has been chosen as an input device for many different types of applications, both by Koala Technologies, Inc., and by other software development companies.

This chapter is devoted to a description of some of the various software products that are used with the KoalaPad. More applications are being developed all the time, so this list is incomplete. (The addresses of the vendors whose products are described can be found in Appendix A.) As you will see in this chapter, the KoalaPad has found utility in many areas of application, and new uses for it are being explored daily.

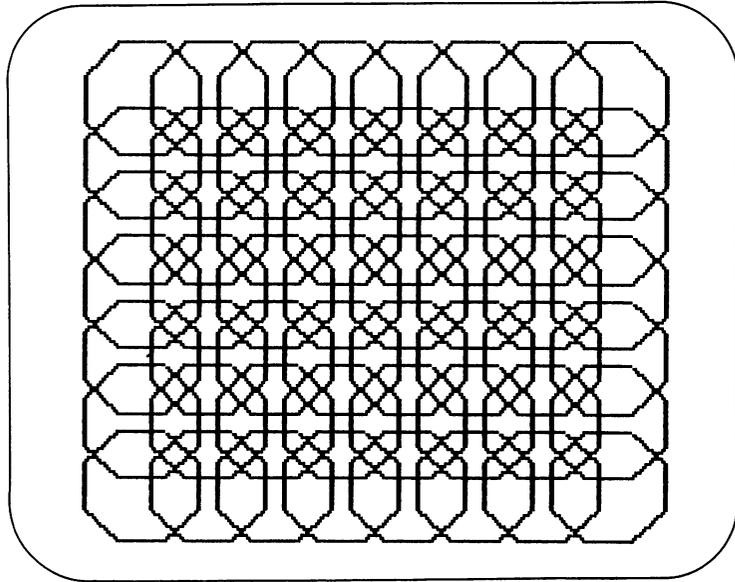
### Coloring Series I: Geometric Designs

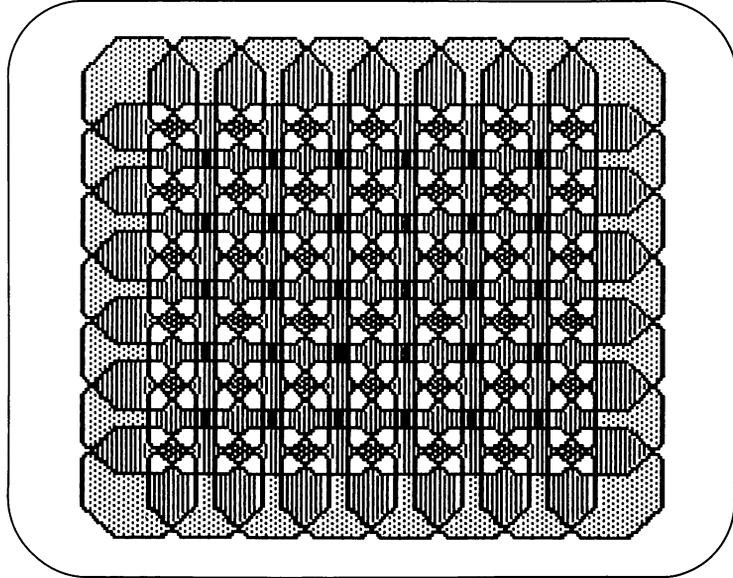
*Koala Technologies, Inc.: Available for the Apple II Series, Atari, and Commodore 64 Computers*

This product consists of a coloring book and a disk full of images that can be colored with the KoalaPad, using the illustration software shipped with the tablet. The coloring book images are based on geometric patterns that display different types of symmetry. Some of the patterns are easy to color, while others are quite challenging. As a result, this coloring book can be used by computer users of almost all ages.

To use this product, the user loads any of 25 images to be

colored into the computer through the picture-loading capabilities of the KoalaPainter illustration software. These images can then be colored with a brush or with the Fill function, depending on the skill level of the user. For example, the ornate tiling pattern shown in the following figure was colored to produce the second figure:





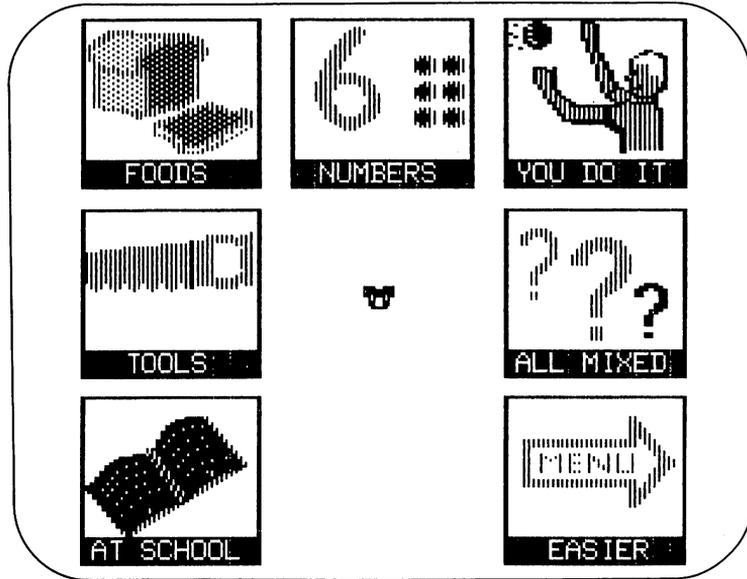
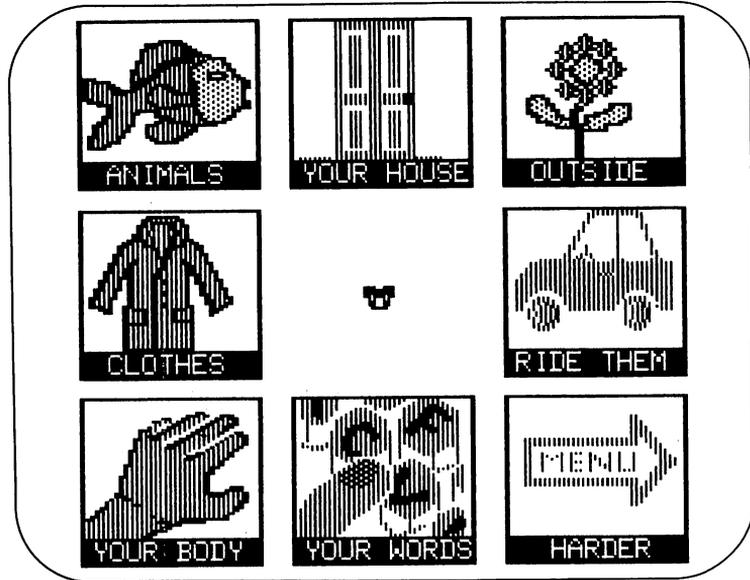
The accompanying coloring book contains copies of the images so that the user can color them with pencils or paints if desired. All the patterns in this series are geometric designs created with programs written in Logo. (See Chapter VI for a discussion of using the KoalaPad with Logo.) The KoalaPad manual includes a discussion of symmetry and suggests coloring projects for the user.

### **KoalaGrams Spelling I**

*Koala Technologies, Inc.: Available for the Apple II Series  
and Commodore 64 Computers*

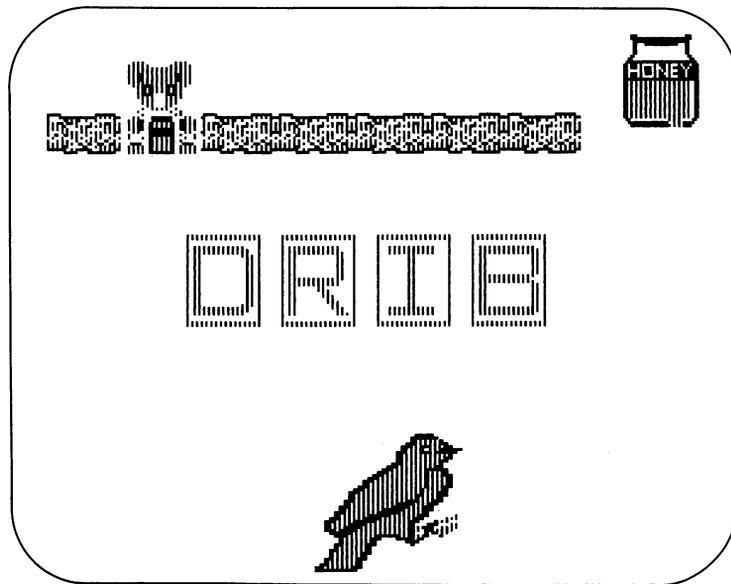
KoalaGrams is a game that is designed to help children build a broad range of language skills. The object of the game is to unscramble words that are presented with their letters in random order. All the words are things that can be pictured, and a color picture of each is presented as a clue.

The word lists in KoalaGram's vocabulary are divided among 13 categories presented on two menu screens.



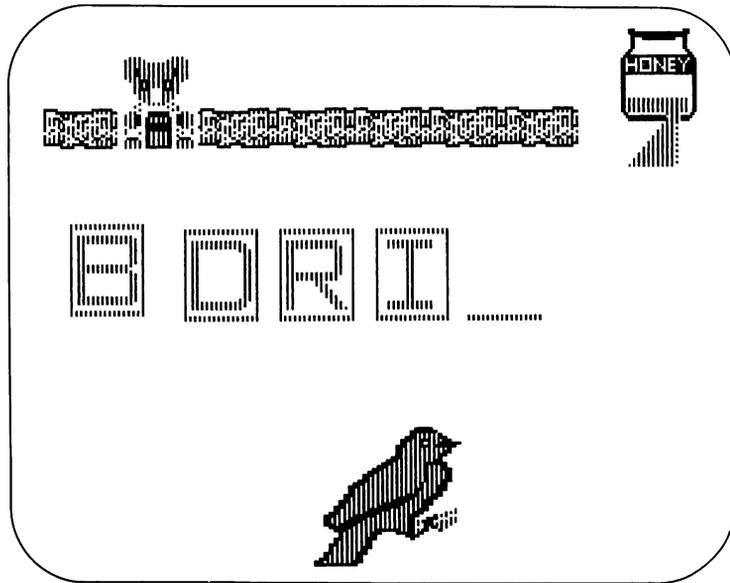
The word lists on the second screen are more challenging than those on the first list.

A word list is selected by using the KoalaPad to point to one of the categories. Once a category is selected, the player is presented with a scrambled word, along with a picture clue.

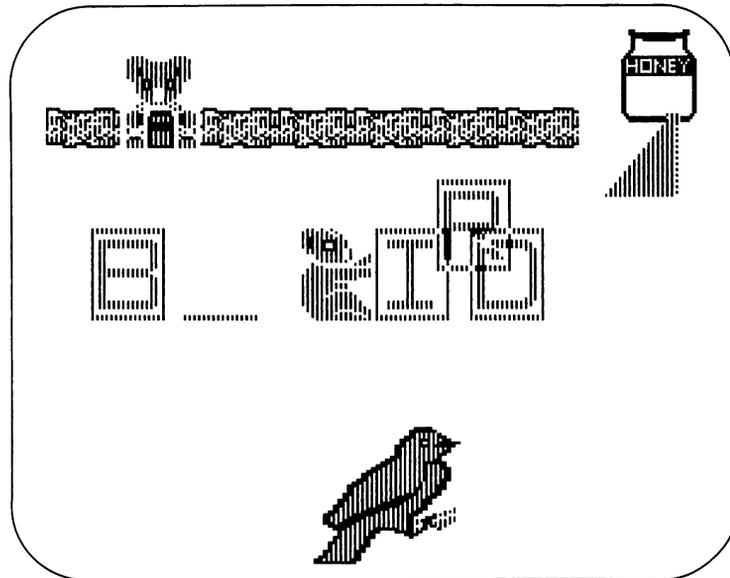


As time elapses, honey drips from the bottom of the jar in the upper right corner of the screen. The player's goal is to unscramble the word by rearranging the letters before the honey drips out of the jar.

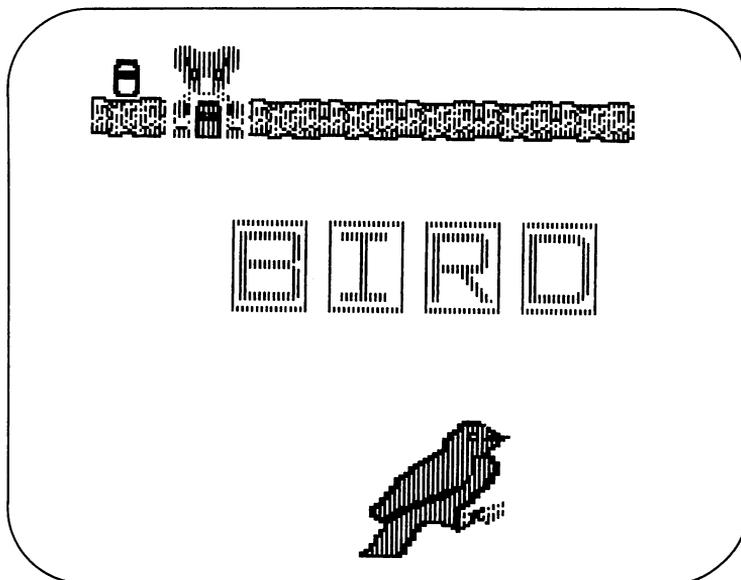
The large block letters "stick to your finger" when you touch the KoalaPad. After letters are moved, they can be dropped by taking your finger off the tablet surface. For example, the letter B can be pulled off the list (leaving a space behind) and dropped near the first position:



Then, after rearranging the D to the last position, the R can be dropped in between the I and the D, at which time a Koala will pull the I to its new position!



At this point, the B can be moved to its final position, and the puzzle is solved.



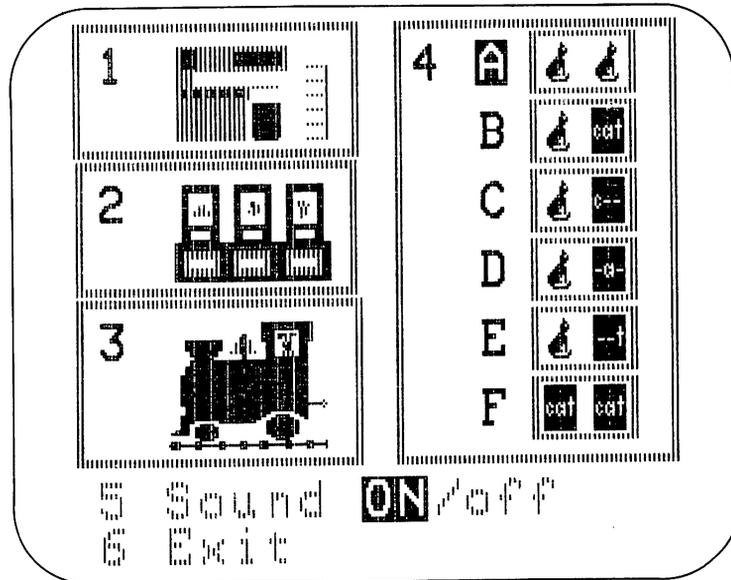
The bear at the top of the screen gets a jar of honey each time a word is unscrambled.

KoalaGrams will give the player hints, if needed, and will also allow players to use their own word lists (with no pictures). This product can be used with weekly spelling lists from school as well as with the word lists provided on the diskette.

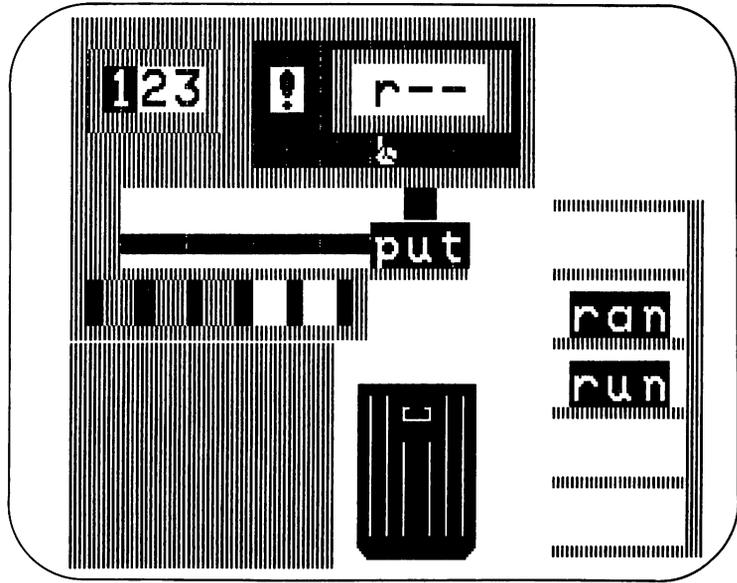
### **Reader Rabbit and the Fabulous Word Factory**

*The Learning Company (TLC): Available for the Apple II  
Series Computers*

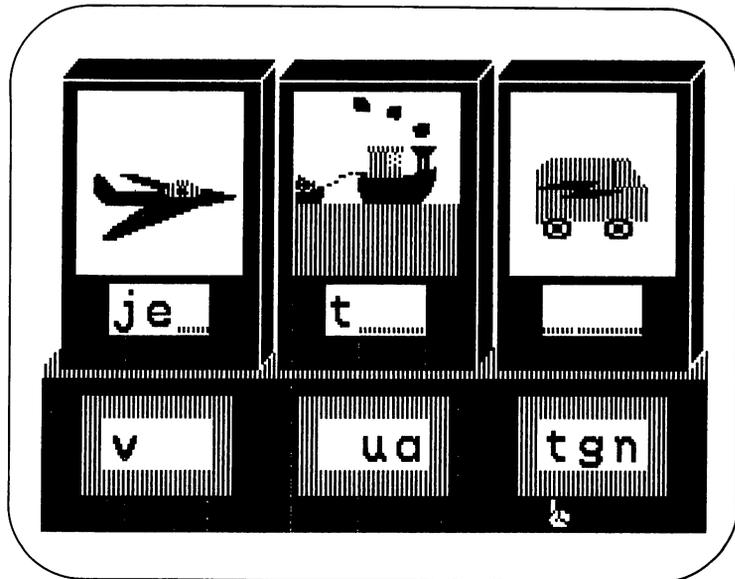
Reader Rabbit consists of a set of programs designed to improve reading skills in young children. Each of the four programs included in this product can be controlled with the KoalaPad using an overlay that is printed in the Reader Rabbit manual. The menu portion of the disk lets you choose which of the four activities you want to explore.



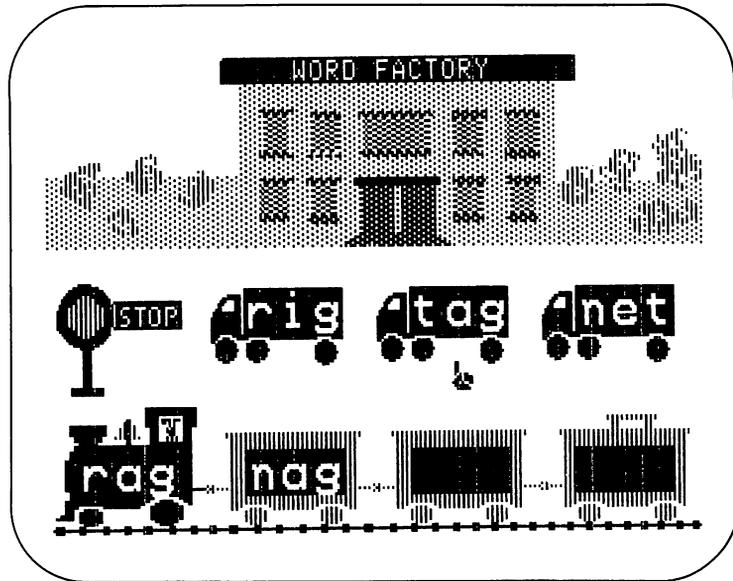
The first activity is a word sorter, in which you must save only words that contain the chosen letter in the correct position. In the example shown, we must save words that start with R. Words that start with other letters must be thrown in the trash can.



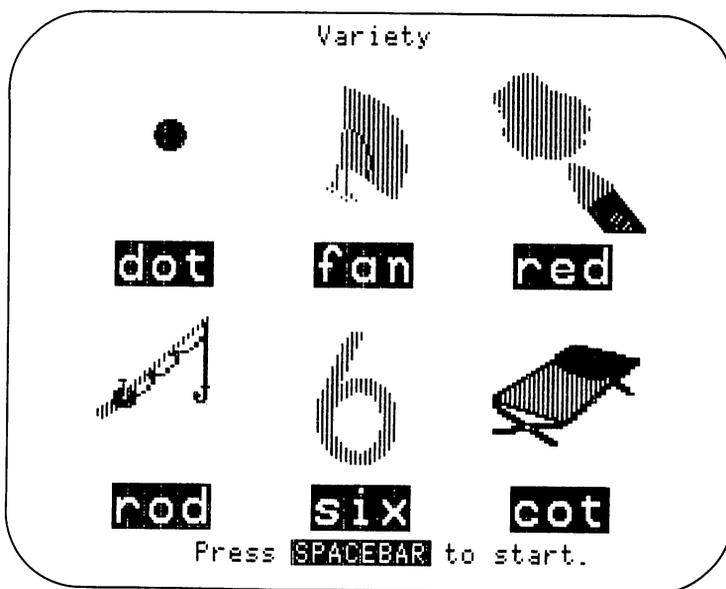
In the second activity (called Labeler), you are shown three pictures and three clumps of letters corresponding to first letters, second letters, and third letters. You must match the right letters with the right pictures in the correct order.



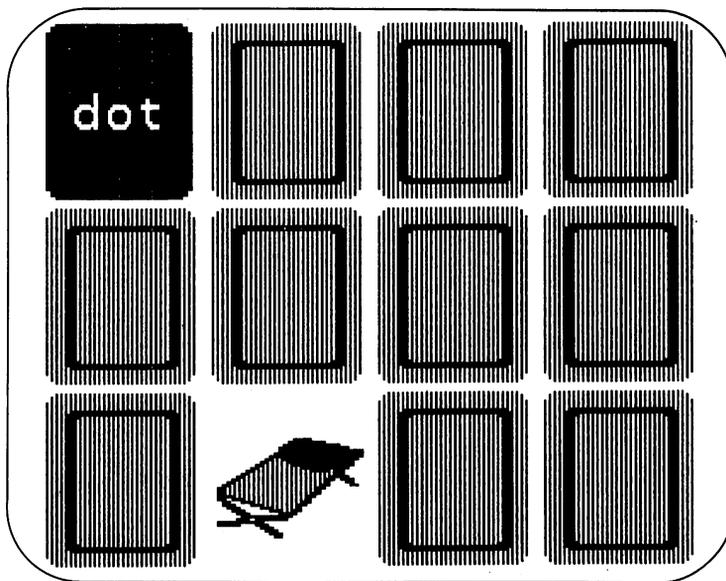
Word Train is an activity in which you must select words from the trucks so that each new word in the train is different from the previous word by one letter. Once the train is "filled," it pulls across the screen.



Matchup is a matching game that lets the players match pictures with pictures, pictures with words, or words with words in any of several options. For example, the screen might contain the following objects:

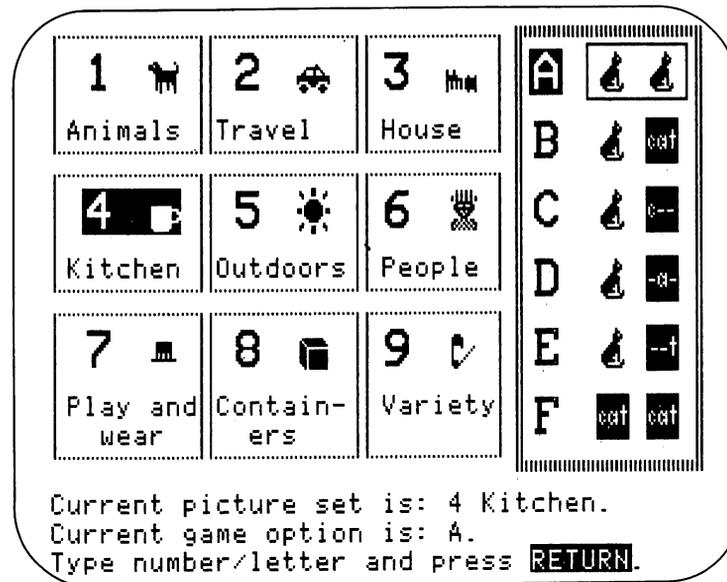


When the game is played, the objects are mixed up on the screen and are covered. The player then chooses two objects to see if they match:



Play continues until all the pairs have been matched.

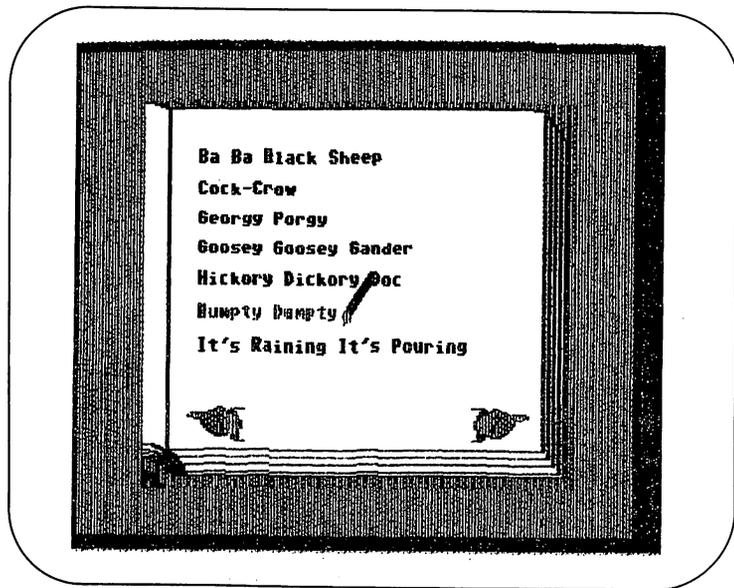
The Reader Rabbit diskette contains several word lists that can be chosen by the player.



## Paint-A-Rhyme

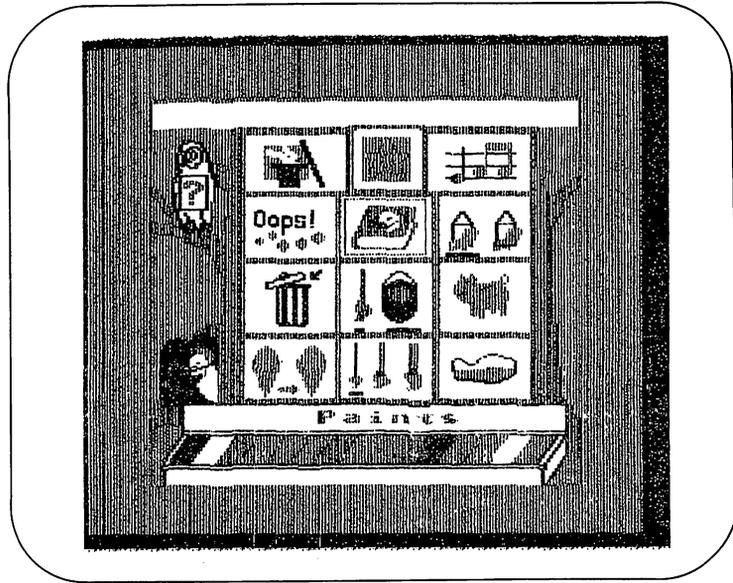
*Koala Technologies, Inc.: Available for the Commodore 64 Computers*

Paint-A-Rhyme is an activity designed for young computer users. It consists of a series of illustrated nursery rhymes, any of which can be selected by using the KoalaPad to point to the rhyme's name and pressing either KoalaPad button.

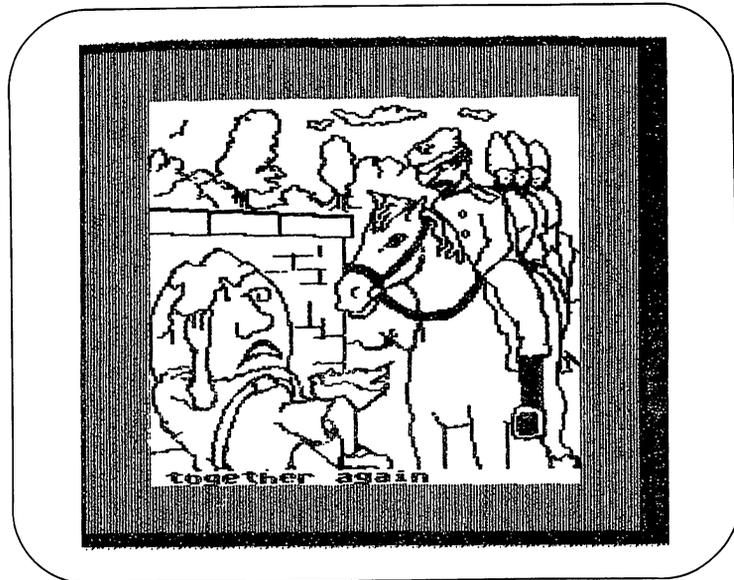


Once a rhyme and its picture have been loaded into the computer, the user can choose among various colors and brushes with which to paint the picture. In addition to painting the picture with a brush, Paint-A-Rhyme also provides a Fill function.

If the user makes a mistake, selecting the Oops box from the menu will "undo" the most recent coloring step. The Oops function will even let you recover from accidental erasure of the entire picture.



In addition to painting the picture, the user can have the computer play the nursery rhyme song while the words to the rhyme are shown on the screen.



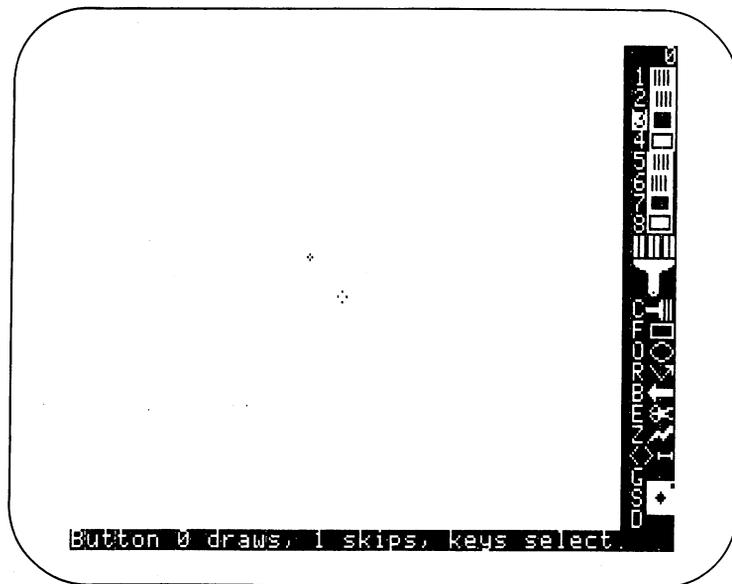
For younger users, there is a "magic" mode in the program that automatically paints the picture and plays the song.

## PictureWriter

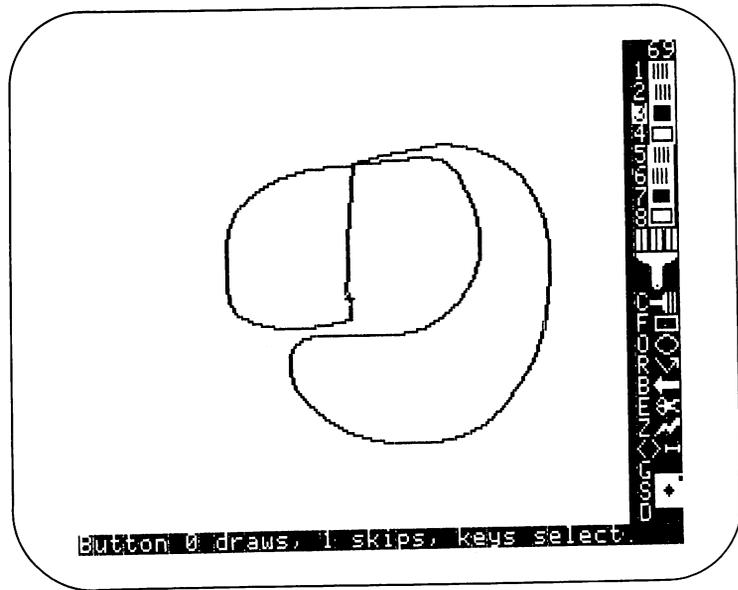
*Scarborough Systems, Inc.: Available for the Apple II Series Computers*

PictureWriter is an illustration program that lets you create pictures in ways completely different from those used with the KoalaPainter software. Pictures in PictureWriter are made from sequences of lines whose length is chosen by the user.

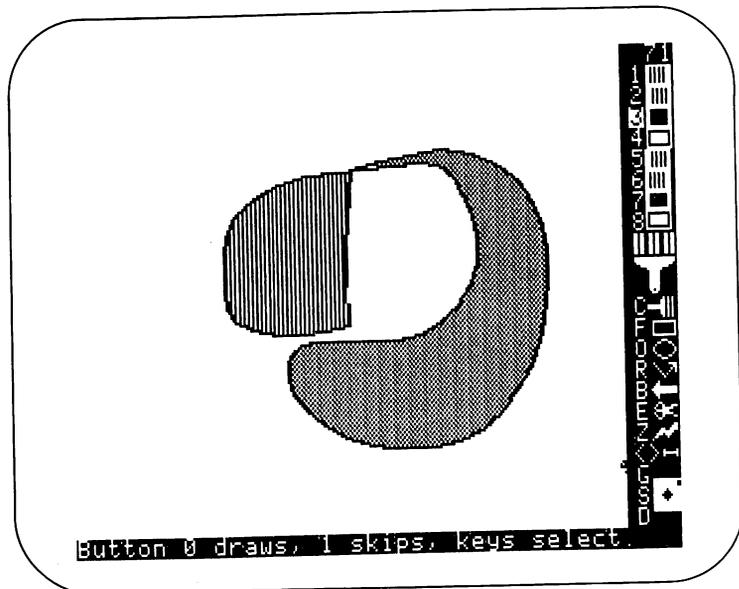
The PictureWriter screen contains a menu of choices on the right side.



By using the KoalaPad to control the direction in which each line segment is to be drawn, shapes can be created on the screen.

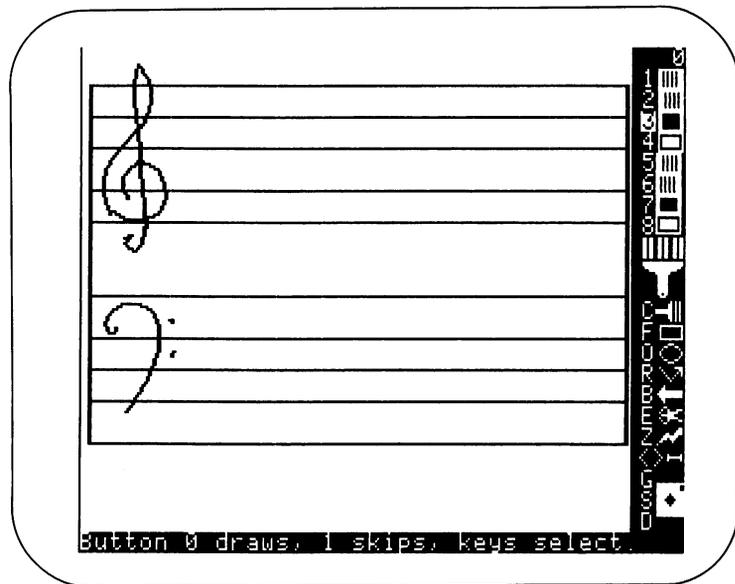


The user has the option of drawing a line or skipping, depending on which KoalaPad button is pressed. The user has full control of color choices and can fill enclosed areas with color.

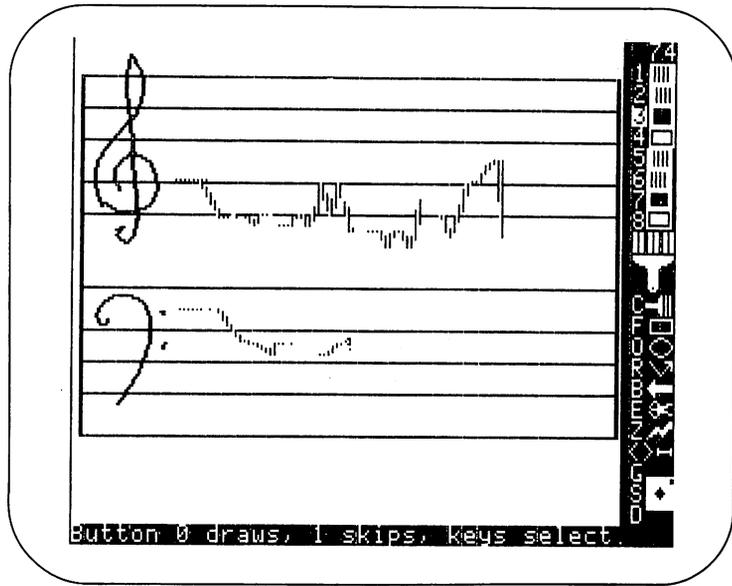


What makes this program interesting is that the picture is saved as the sequence of steps that created it. (The number of steps in a picture is shown in the upper right corner of the screen.) By saving the picture information this way, the user can “back up” or edit any picture step in the sequence. Also, pictures stored as step sequences take much less space on the disk than conventional picture images.

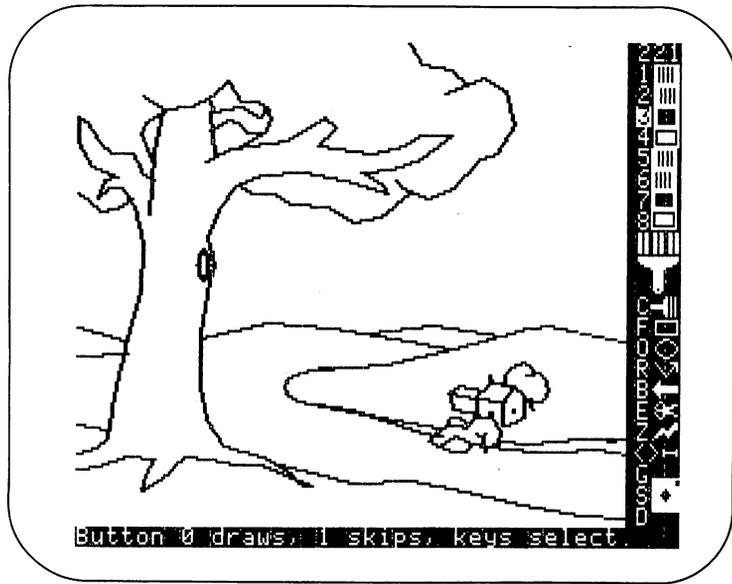
The step-wise creation of pictures in PictureWriter allows the user to add another feature—the picture can be “played” as a piece of music. The display screen is divided into a set of music staves.



Your picture is played in the sequence in which it is drawn. Horizontal line position is not important for the music; the height of the line determines the note played, and the line sequence determines the note order. You can either “play” pictures of houses and the like, or you can play traditional compositions. The following figure shows the “picture” of the beginning of a Souza march.



PictureWriter also includes a few pictures to color in with the KoalaPad and several good game ideas.

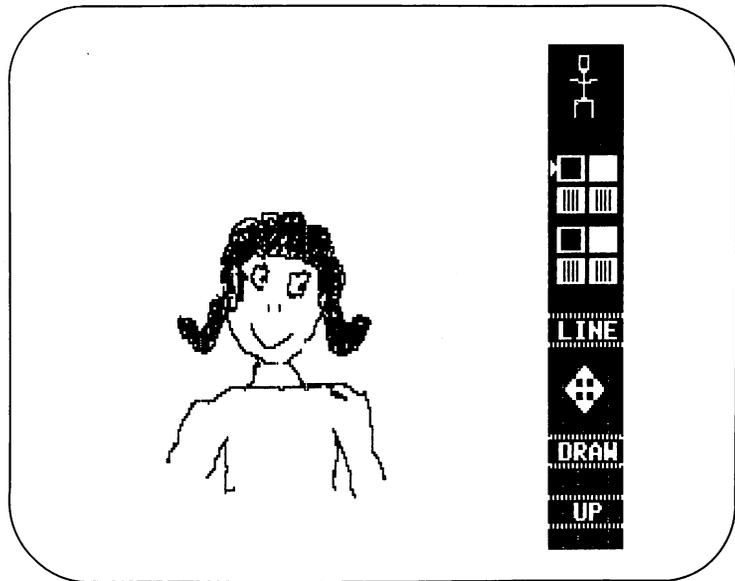


## The Graphic Solution (TGS)

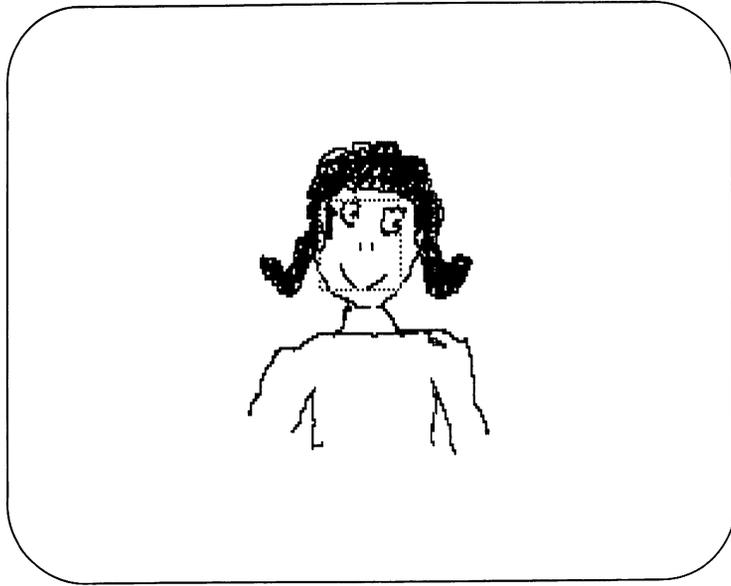
*Accent Software, Inc.: Available for the Apple II Series Computers*

The Graphic Solution (TGS) is a comprehensive graphics system that allows the creation of drawings, intermixed text and graphics, and animation. Through the use of an extension module provided by Accent, this system is made to operate with the KoalaPad as an input device. The principal use for the KoalaPad with this software package is the creation of graphic objects in either true or magnified scale. Its greatest application is in the creation of a library of shapes—character sets, special symbols, irregular shapes, and so on. These shapes can be used subsequently in the creation of animated sequences. The touch tablet also can be used to edit fixed background images.

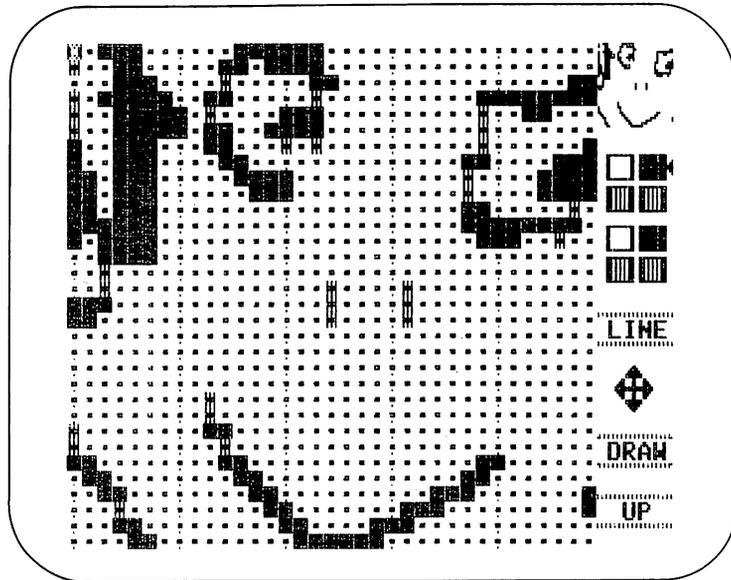
Using the high-resolution (hi-res) edit mode, the tablet can be used to draw a picture, such as this one of a girl.



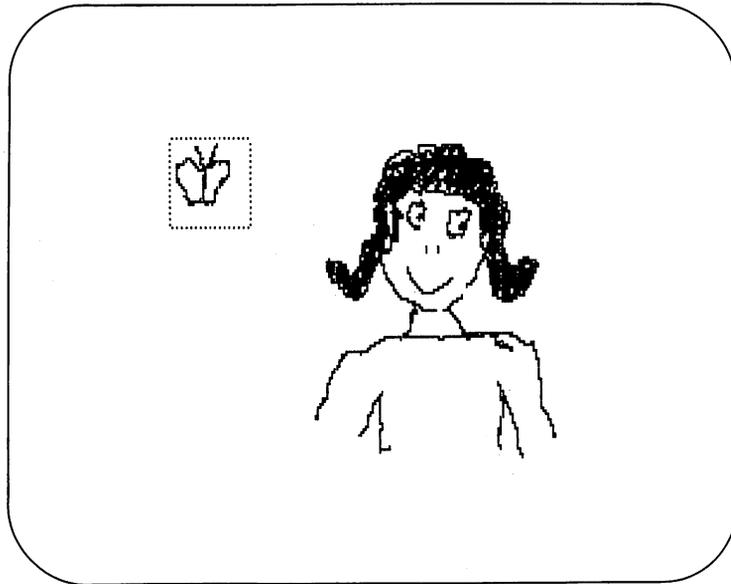
This picture can then be transferred to the final screen. The box outline (shown in the face) selects the area to be edited in the magnify mode.



When the magnify mode is selected, a magnified image is shown on the screen.

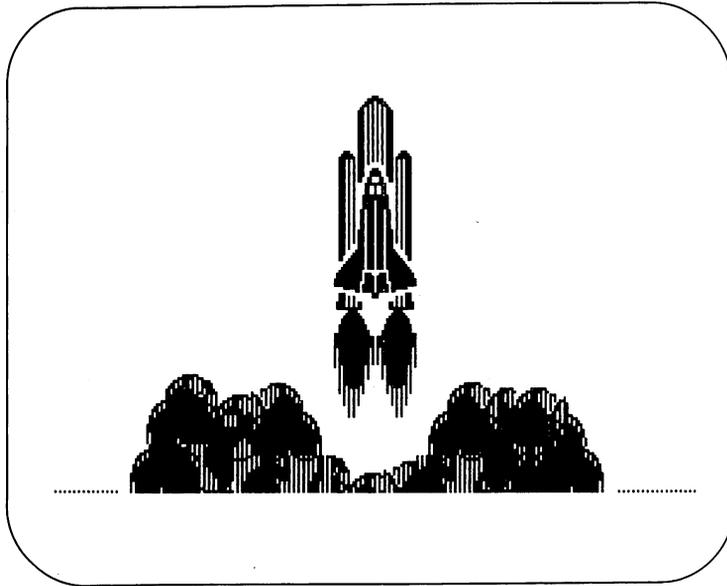


This image can then be edited with the KoalaPad and merged back with the original figure. Also, objects that reside inside the box can be defined as graphic shapes that can be animated.



In the preceding picture, the butterfly has been selected. It can be moved to different locations on the screen, and each movement can be recorded as a separate frame for an animated sequence. By using several shapes to describe several positions of a single object (e.g., different positions of a walking body), each frame can use a different shape to create very realistic animation.

Text (in different type sizes and styles) can be added to a picture or animated sequence. Animated shapes do not have to be simple outlines; in fact, they can be quite complex.

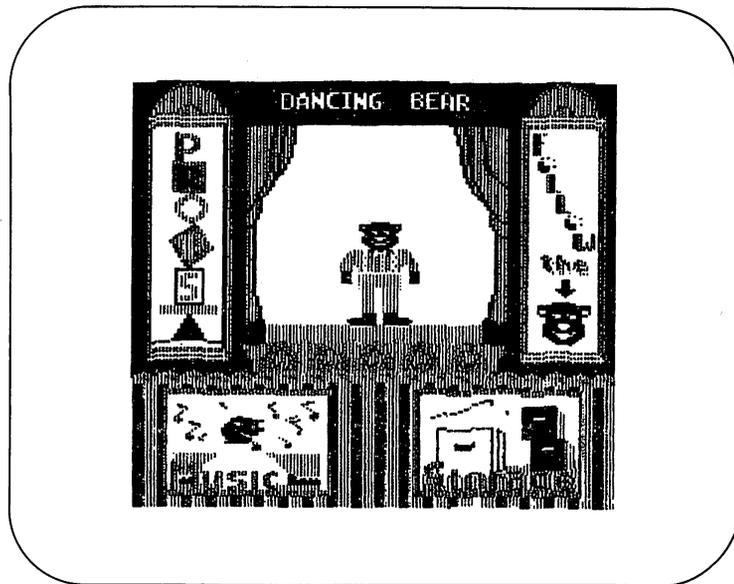


A special assembly language program that “projects” your animated sequences is provided on the TGS disk to let you incorporate animation and graphics from this system in your other programs.

### **Dancing Bear**

*Koala Technologies, Inc.: Available for the Commodore 64 Computers*

Dancing Bear is a program that lets you create your own animated dance routine for a programmable bear. Different parts of the program let you choose your own music, stage props, and dance motions.



In each of these activities, the KoalaPad plays an important role. For example, props are arranged on the screen by simply picking them up and placing them at the desired location. Music is composed by placing notes on a staff, and the dance itself is created by using the tablet to select various positions for the bear's head, arms, and legs, as well as for overall body motion across the stage.

By changing the bear's position for each step of the dance, the user is creating a program that can be edited, used, and saved on the diskette, along with the stage setting and musical score. Dancing Bear is one of the easiest animation tools to use. It also contains a memory game in which the bear makes a pattern of body movements that the player must copy by pressing the correct areas on the KoalaPad overlay.

### **Spider Eater**

*Koala Technologies, Inc.: Available for the Apple II Series, Atari, and Commodore 64 Computers*

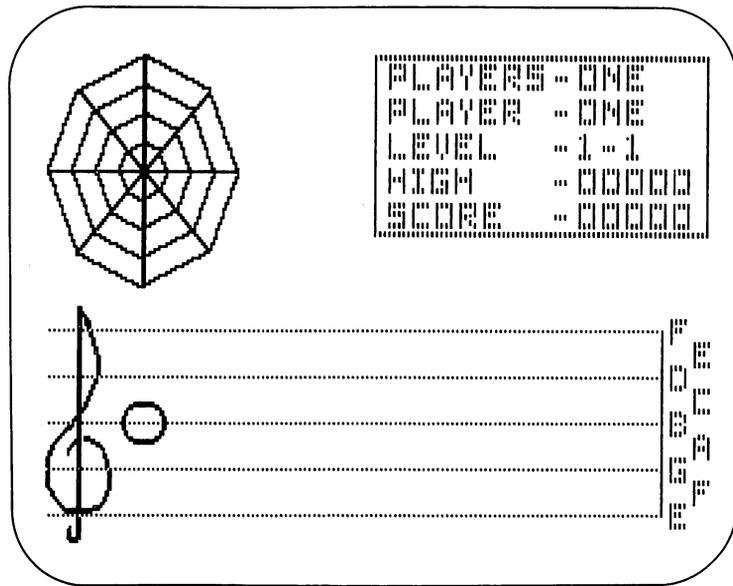
Spider Eater is an educational game designed to help develop skills in reading music. Some of the skills that Spider Eater

develops are sight reading, correlating note position on the staff with a piano keyboard, developing pitch recognition, and ear training in general.

The program uses the KoalaPad as a custom keyboard through the use of an overlay supplied with the product.



This overlay contains a copy of the key arrangement used by the Spider Eater game. When the program is first used, the player is asked to press the center key to make sure the overlay is inserted properly. When the player has chosen the appropriate skill level, the game begins. At the first level, the display screen shows a staff and a whole note, indicating that the player has four counts to solve the challenge.



The challenge comes from spiders that move along the bottom of the screen and jump onto one of the note positions on the staff. If the player presses the wrong key on the overlay, the "spider eater" will miss the spider, and the spider will escape to the web in the upper left corner.



Once 10 "whole note" spiders have jumped onto the staff, the game continues with dotted half notes (3 counts), half notes (2 counts), and quarter notes (1 count).

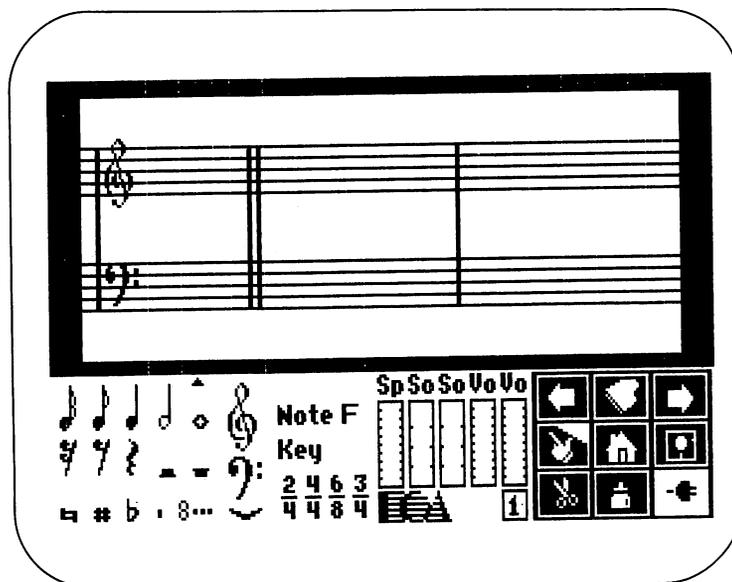
As the player gains proficiency with this game, the ability to read music improves as well.

## Music Construction Set

*Electronic Arts: Available for the Apple II Series, Atari, and Commodore 64 Computers*

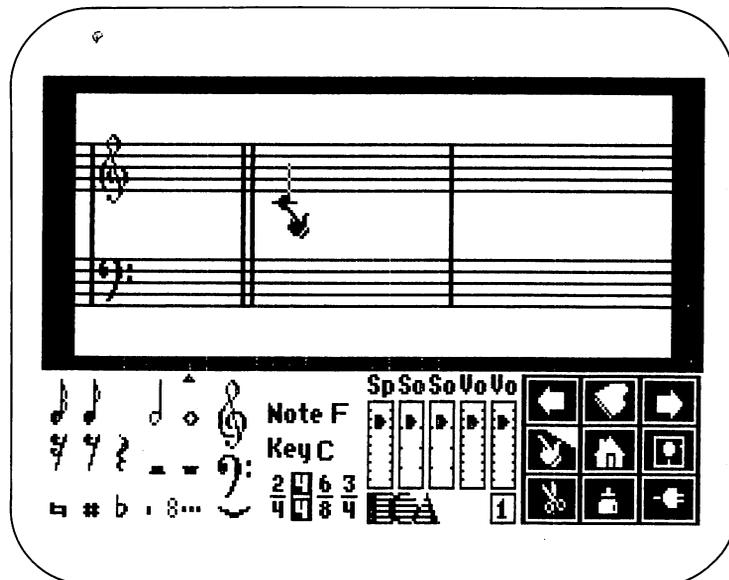
The existence of word processing programs has made life easier for those of us who write. People who compose music have a very laborious task to perform when they transcribe their musical ideas onto paper. Music Construction Set allows the user to compose music on the computer, to play the music, and to get a printout of the musical scores for later reference. Because the musical score is composed on the display screen, the KoalaPad is a natural input device to use with this program.

When Music Construction Set is first started, the user is shown two blank staves on which to assemble music.

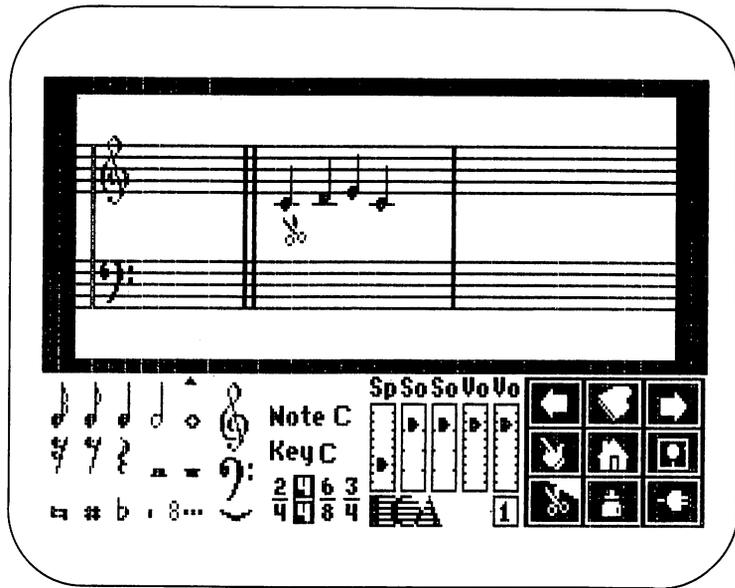


Each staff is set up for either the base or the treble clef, but these clefs can be changed if desired. The area below the music contains notes, rests, and other marks used in composing music. A set of gauges (the five boxes at the bottom of the screen) allows the user to set the tempo of the music, along with the types of sounds and volumes of the instruments played by the computer. The menu area to the lower right of the screen provides the user with various tools needed to compose music with this system—a hand, scissors, a paste jar, and so forth.

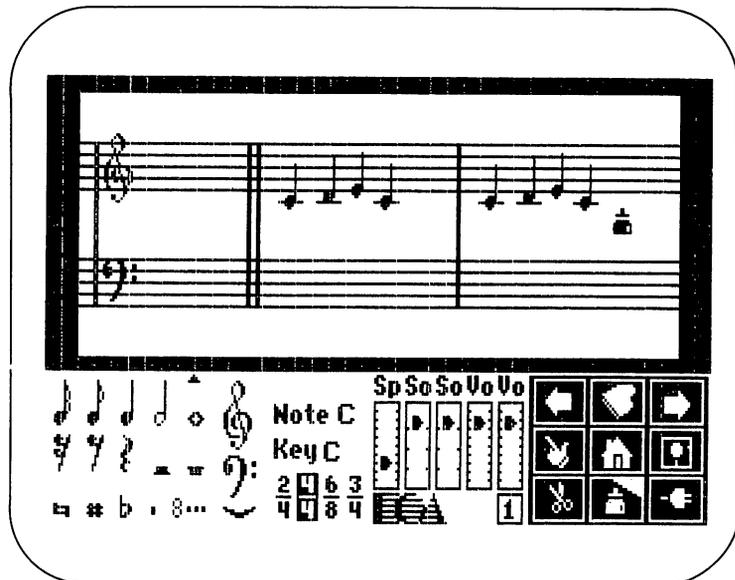
For example, the hand may be used to pick up notes or other markings and move them around on the screen. In the following figure, a quarter note has been placed at the location of middle C.



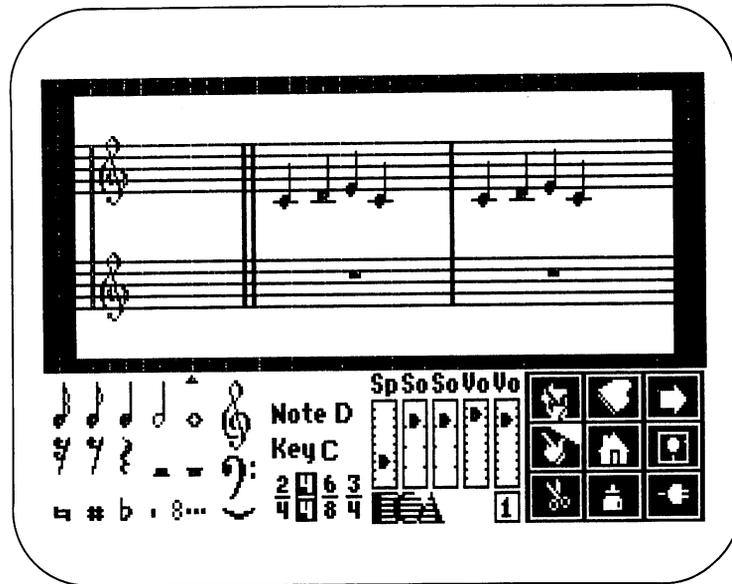
Let's suppose you wanted to create the music to "Frere Jacques." First, you might compose the first bar. Since the second bar is the same as the first, you can use the scissors to "cut" the first bar.



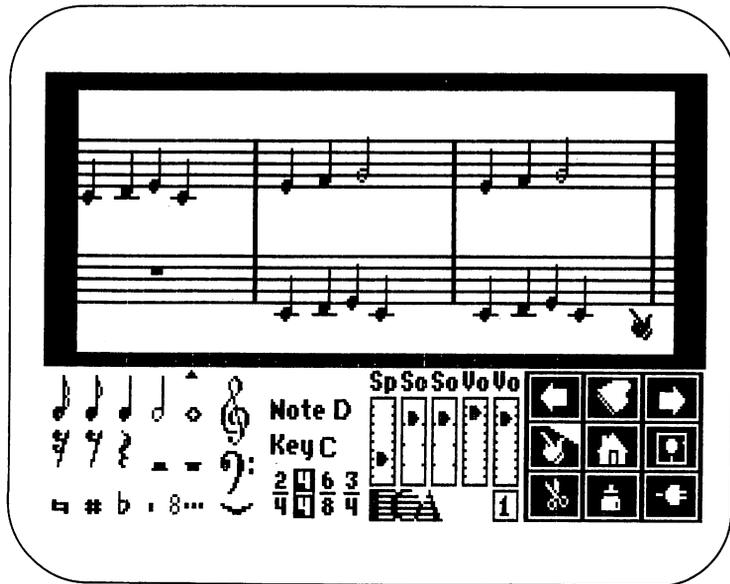
Next, you can use the paste jar to “paste” the bar you cut into both the first and second bars of the piece.



Next, since the song is a round, you can change the second staff to have a treble clef (using the hand), and you can place whole rests in the two bars at the bottom.



Using the cut-and-paste tools, the first two bars of the upper staff can be copied into the third and fourth bars of the lower staff. The next passage of the song can be created in the upper staff, and the process can be repeated until the song is finished.



Music Construction Set allows musical scores to be transcribed far more easily than they can be done by hand, and it also allows your scores to be played.

## Musicland

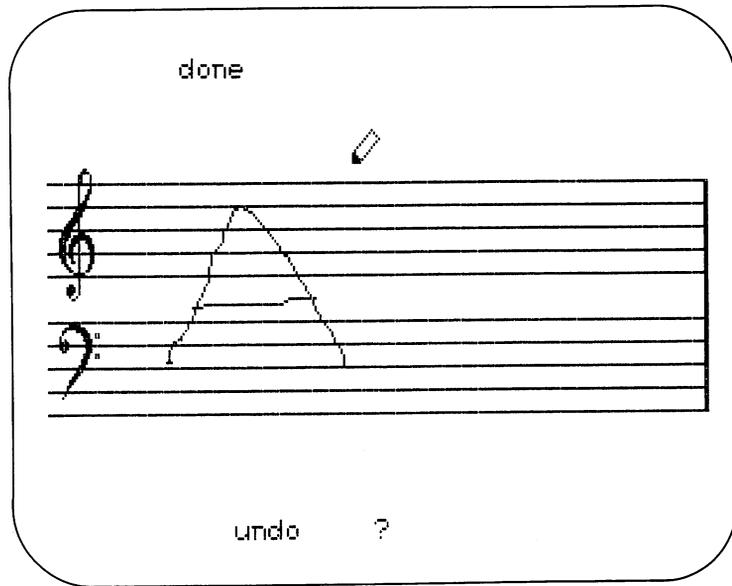
*Syntauri Corp.: Available for the Apple II Series Computers*

Musicland is a music exploration tool that lets you experiment and play with musical sounds and melodies with the ease of moving your finger on the KoalaPad. This product requires the MusicSystem cards from Mountain Hardware to let you hear your music (available with Musicland), and it uses the KoalaPad for almost all of its functions.

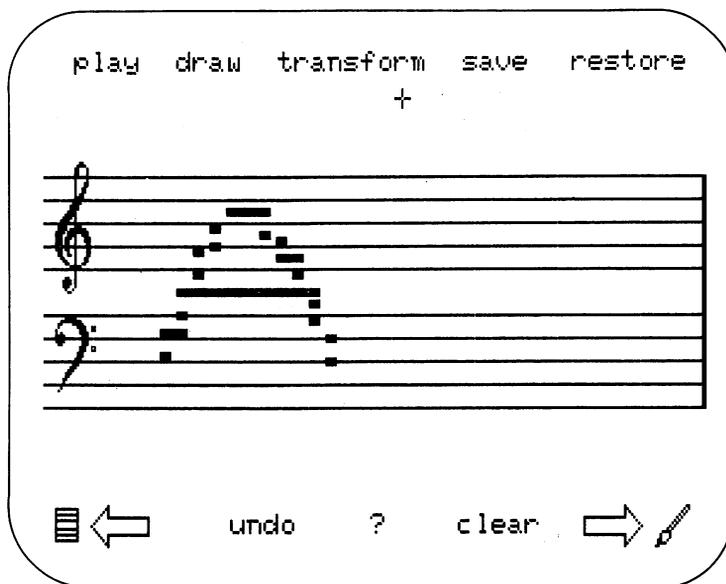
Musicland is divided into four activities: Music Doodles, Timbre Painting, Music Blocks, and Sound Factory. Although these activities have cute names and can be used by youngsters, this is a tool that will be equally useful for serious music experimenters.

Music Doodles lets you create motifs by "drawing" them on musical staves. For example, suppose that you want to hear

some music that looks like the letter A. All you would have to do is draw an A on the staves.

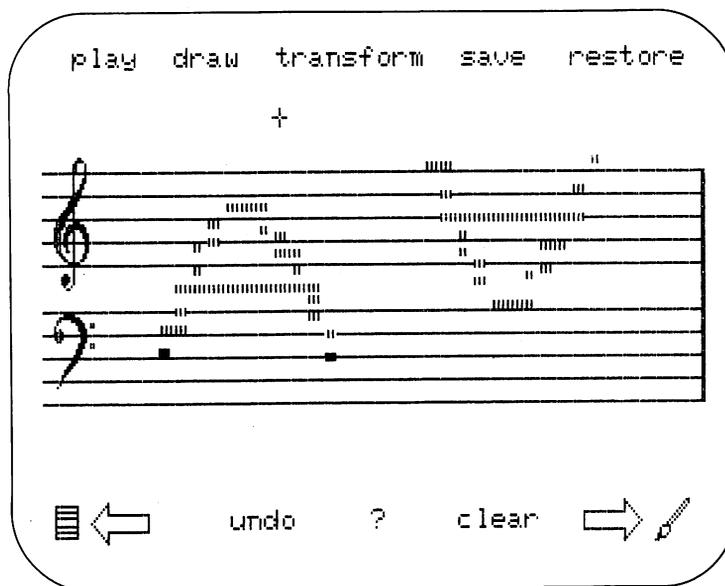


When you have finished this task, the shape you drew is translated into notes.

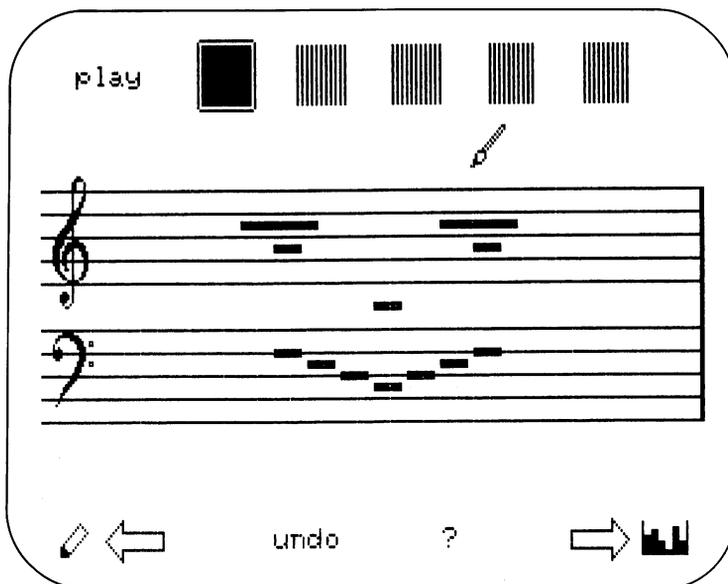


Sharps and flats are indicated by partial positioning on the staff, and note length is indicated by the length of the line, rather than by the use of traditional note symbols.

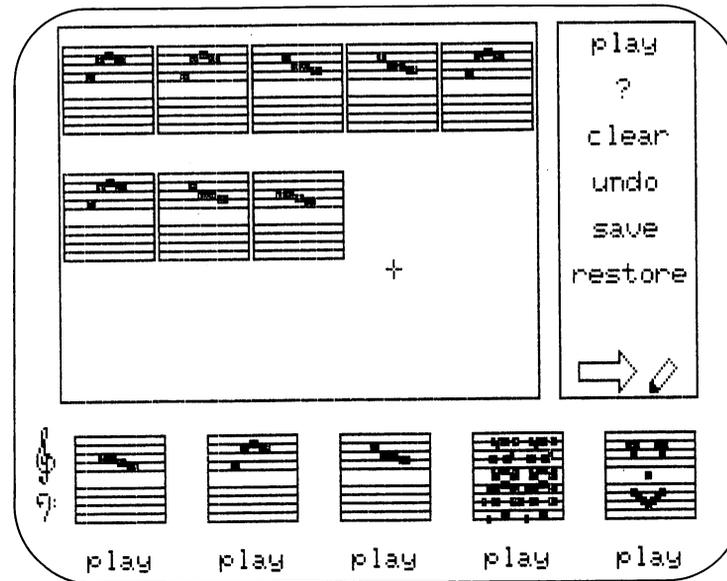
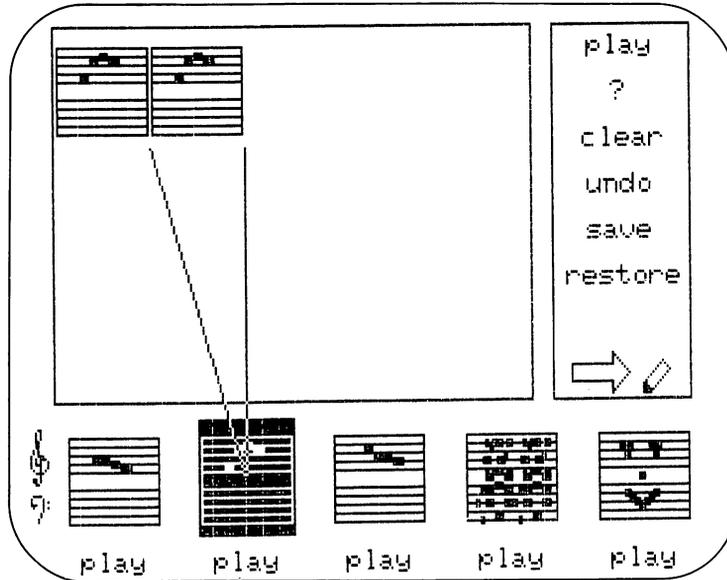
Once a motif has been drawn, you are free to experiment with it and to transform it in any way you want. A motif can be stretched or compressed in time (including making it play backwards), and it can be stretched or compressed vertically (including turning it upside down). A motif can be moved to any position on the staff (transposition), and, as a result, one musical idea can be transformed into all the forms used in the creation of music, from Baroque fugues to the 12-tone-scale music of Schoenberg! For example, in the following figure, our motif was transposed and inverted before being placed next to the original.



Timbre Painting allows you to add "color" to your music by letting certain notes or passages be played with different "instruments." Timbres are chosen by pointing to a color block and painting this color over the notes that are to have the chosen sound.

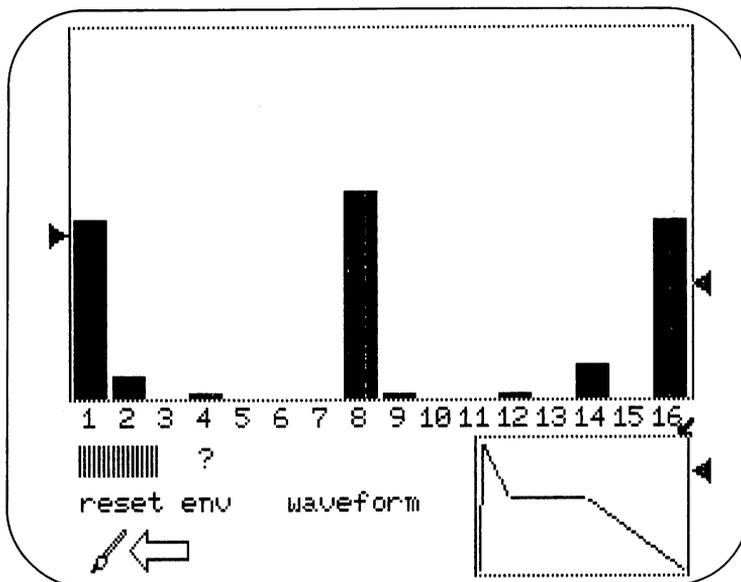


You can construct your own timbres using the Sound Factory (to be described later). Once you have created a motif using Music Doodles, you can create songs and melodies by bringing several music doodles to Music Blocks, a tool that lets you assemble a complete piece by building the composition from an assembly of any of five music blocks you have created with the Music Doodles tool. When you point at a block using the KoalaPad, the block is automatically placed at the next available location in the score.

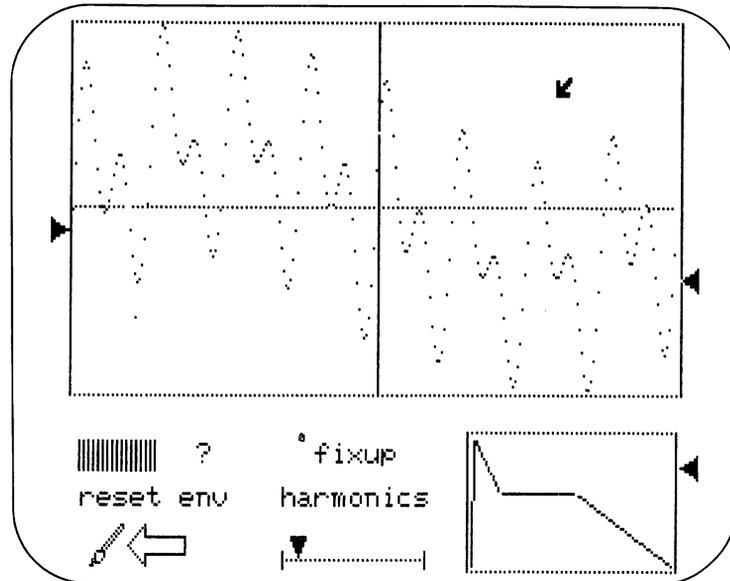


Once the blocks are in place, they can be switched around or deleted until the final composition meets your goals.

The Sound Factory lets you design the sounds themselves, rather than the melodies. You can adjust the intensity of various harmonics (in the upper window) and the "envelope" of the sound (in the window in the lower right of the screen) by moving lines around with the KoalaPad. For example, the envelope for this sound shows a rapid attack, a sustained sound, and a gradual decay.



Because of the ease with which changes can be made, you can experiment with many types of sounds. If you are interested in seeing the waveform of the sound you have built, Musicland will plot it on the screen for you.



The manual that accompanies this product shows how Musicland can be used not just as a tool for tinkering with music but also as a tool for exploring the physics and aesthetics of sound.

## Logo Design Master

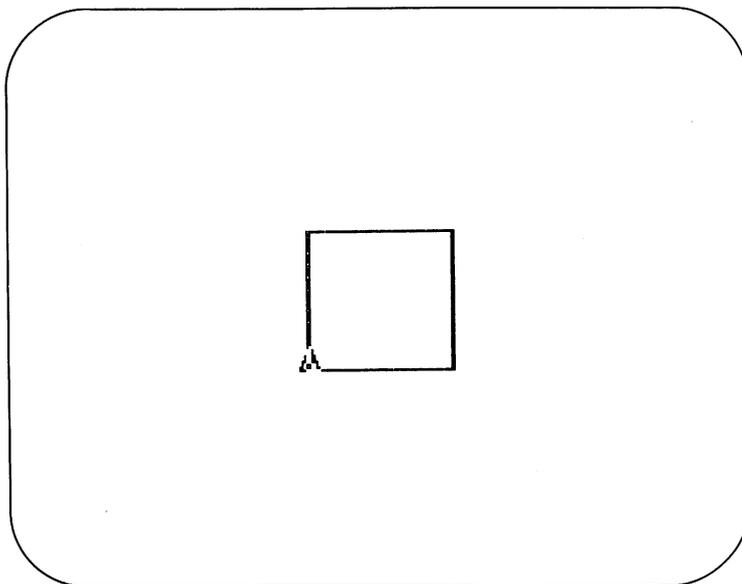
*Koala Technologies, Inc.: Available for the Apple II Series, IBM PC, and Commodore 64 Computers*

Logo Design Master is a tool that allows the KoalaPad to be used to create computer graphic programs in the Logo language. To use this product, the user must already have a version of Logo available.

One of the characteristics of Logo is that it contains a rich set of commands for creating graphic images by sending instructions to an imaginary "turtle" that resides on the display screen. For example, the command

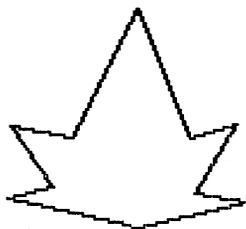
```
REPEAT 4 [FORWARD 60 RIGHT 90]
```

tells the turtle to repeat four times the commands to move forward 60 units and turn right 90 degrees. This causes the turtle to trace a square path, which is drawn on the display screen.



Although Logo's turtle graphics environment is quite easy to learn, and its graphics commands can be used to create stunning and complex pictures, there are many times when the user needs to create a graphics procedure to draw a specific shape (that of a leaf, for example) without knowing in advance what distances and angles are appropriate. The Logo Design Master file called LogoDraw allows a shape to be drawn line-by-line on the screen with the KoalaPad. Once the desired shape has been drawn, the user selects an appropriately marked area on the tablet overlay, and the picture is instantly transformed into a Logo program that is named by the user.

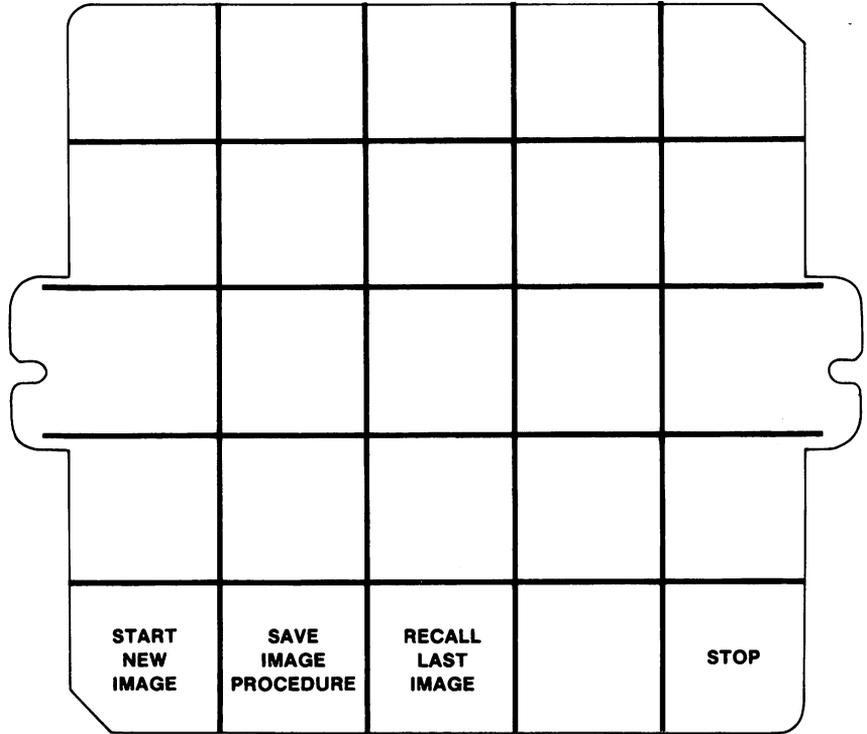
For example, the following picture was translated by LogoDraw into the accompanying turtle graphics procedure in a fraction of the time needed to type in these commands, even if the distances and angles were already known.



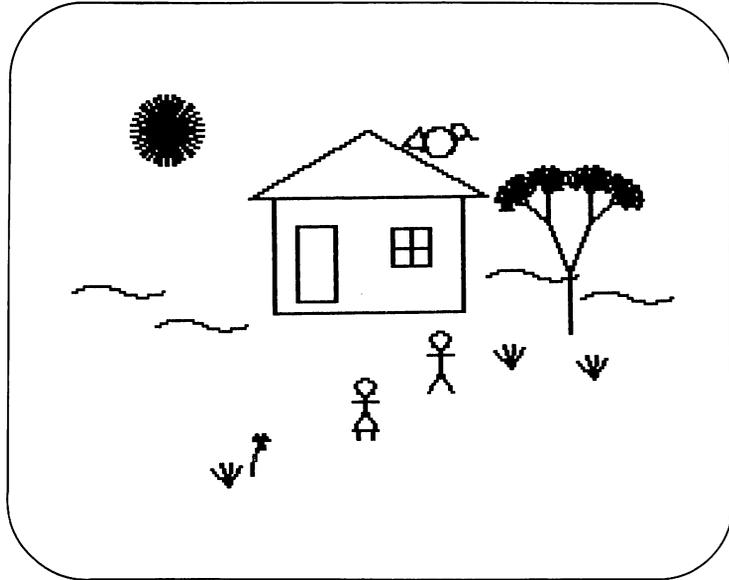
```
TO LEAF  
LEFT 78 FORWARD 52  
RIGHT 153 FORWARD 20  
LEFT 111 FORWARD 31  
RIGHT 137 FORWARD 26  
LEFT 74 FORWARD 60  
RIGHT 130 FORWARD 59  
LEFT 84 FORWARD 20  
RIGHT 138 FORWARD 33  
LEFT 113 FORWARD 22  
RIGHT 159 FORWARD 52  
END
```

LOGO EDITOR

A second utility program, LogoMaster, allows a collection of separate turtle graphics images to be assigned to blank areas on the KoalaPad overlay.



By selecting an appropriate location on the screen and then pressing the overlay box corresponding to the desired shape, a copy of the shape will be “stamped” on the display. The following figure was created with the set of shapes provided with the product.



As with LogoDraw, pictures created with LogoMaster are saved as Logo procedures. This means that LogoDraw and LogoMaster are, in reality, Logo programming tools. The procedures created by these utilities can be used just as if they had been typed in from the keyboard.

### **The Graphics Exhibitor**

*Koala Technologies, Inc.: Available for the Apple II Series, Atari, and Commodore 64 Computers*

The Graphics Exhibitor is a multipurpose software package that lets you do several powerful things with the illustrations you have created with your KoalaPainter software. The activities in this package fall in four categories: the "cut-and-paste" category lets you edit your pictures and select portions of a picture for incorporation elsewhere; the "printer" portion lets you print your pictures on any of a wide range of graphics printers (including both black-and-white and color printers), using any of a wide range of printer interfaces; the "text" portion lets you add text to your illustrations in a wide variety of type styles and

sizes; and the "slide show" portion lets you sequence images onto the display screen for presentations.

The function of this software package is to allow you to easily incorporate illustrations created with your KoalaPad into reports and presentations.

### **Instant Programmer's Guide**

*Koala Technologies, Inc.: Available for the Apple II Series, Atari, IBM PC, and Commodore 64 Computers*

The Instant Programmer's Guide is a manual and diskette containing utility programs of interest to those who want to incorporate the KoalaPad into their own programs. It describes the technique for "reading" tablet values, designing your own cursor shapes, using the tablet as a custom keyboard, and using the tablet to operate with text rather than graphic images.

The programs enclosed with the guide go a long way toward simplifying the incorporation of the KoalaPad into almost any type of program you might create.



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# V.

## Replacing the Joystick: The KoalaPad Alternative

### Overview

Although they are not specifically designed for use with the KoalaPad, you will find that many of the games and activities that use the joystick on the Apple or IBM computers, or the paddle controllers on the Atari and Commodore computers, will work well with the KoalaPad as an input device. This does not mean that the KoalaPad is a universal replacement for a joystick. In fact, many joystick programs do not work very well with the KoalaPad, so you should try different programs to see which ones work best for you.

Programs that use analog joysticks to control cursor motion typically function in one of two ways: *position* mode or *rate* mode. When the joystick is programmed as a position mode device, each position of the joystick causes the cursor to be located at a specific set of screen coordinates. In the rate mode, the joystick position tells the cursor in which direction to travel, and the extent of the joystick setting determines the joystick speed. In this mode, the joystick resembles a gas pedal—the more you push, the faster you go.

Experience has shown that the KoalaPad can be a useful replacement for the joystick in many programs that use it in the position mode and in fewer programs that use it in the rate mode. In the position mode, the KoalaPad tablet surface is just a map of the display screen, and you can move from one point to another merely by pressing your finger at the desired location rather than having to “drive” the cursor to its new position with the joystick.

This does not mean, however, that you can use the KoalaPad as a universal replacement for the joystick. When us-

ing the KoalaPad for a joystick activity, you will find that the cursor or gamepiece under your control will drift to the upper left corner of the screen when you lift your finger off the tablet. The reason for this is that, unlike joysticks, which keep their position when released, the KoalaPad transmits special coordinates to let the computer know when the finger or stylus has been lifted. Most joystick programs interpret this lifting signal as a command to move to the upper left corner of the screen. You also may notice some "jitter" with the KoalaPad that you don't see with the joystick. This results from the different smoothing techniques that are used with each device. Finally, there are some activities for which the physical motions of a joystick make it a more natural controller than the KoalaPad.

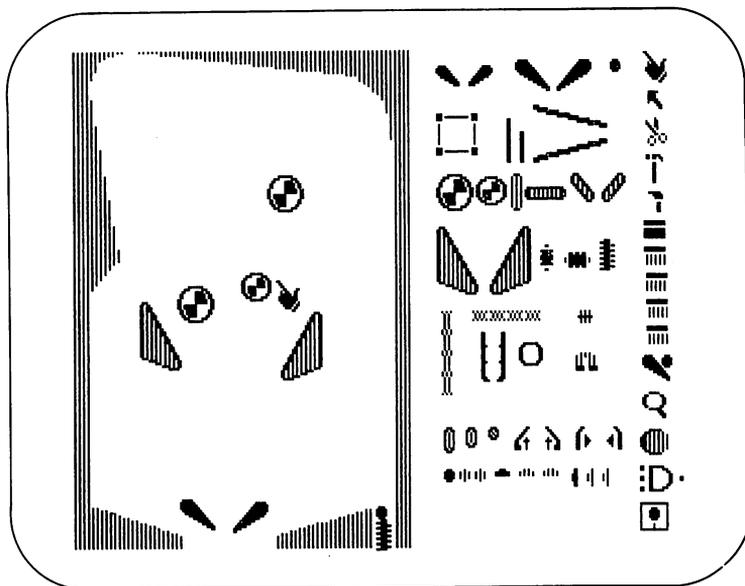
There are many games and educational software packages that can be used with the KoalaPad. The following is a sampling of programs for the Apple II series computers in which the KoalaPad is a useful input device.

## **Pinball Construction Set**

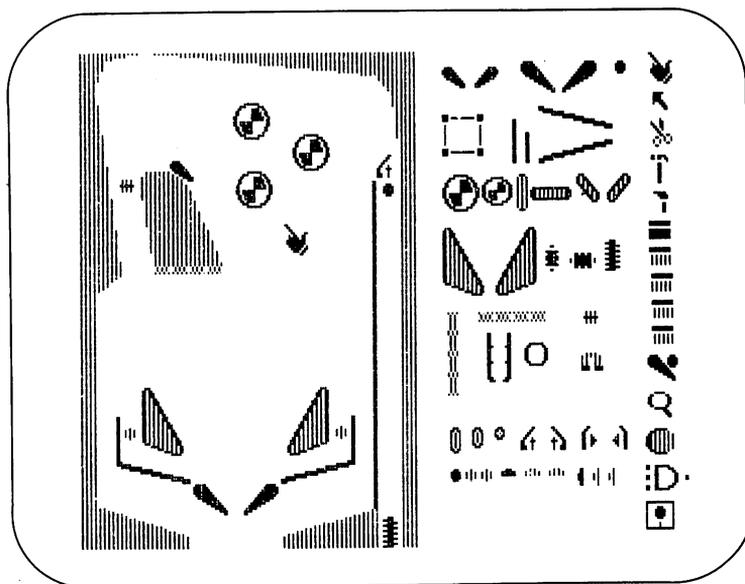
### *Electronic Arts*

Pinball Construction Set is an example of a new breed of software—the video game that you create as well as play. Although it is designed for use with a joystick in the rate mode, it can be used with the KoalaPad instead.

The first object of this program is to allow the player to construct pinball machines using a variety of tools and components, such as a hand, scissors, a hammer, and so on. The tools and components are shown on the right side of the display screen, and the playing field of the pinball game is shown to the left. To build a game, the player uses the hand to pick up game parts and place them on the screen.



Once a pinball game has been assembled, it can be played.



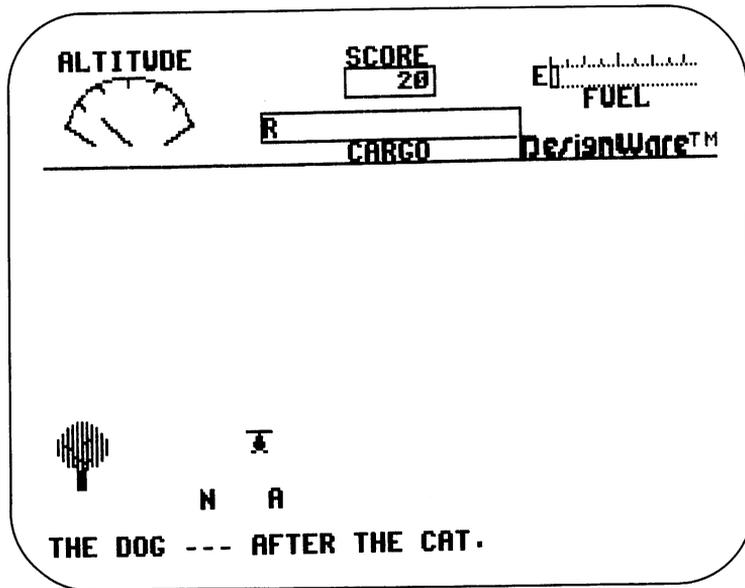
Other tools allow the player to modify the shape of the playing surface boundaries, to change the scoring value for bumpers, and to set up complex scoring systems. In addition to these mechanical aspects of the game, the user can also change the "gravity" (simulating a pinball game on the moon, for example) and can adjust the bounce of the walls, flippers, and bumpers. Parts can be colored, and finished games can be saved on the user's own disks for others to play.

Just as the KoalaPad can be used to construct the games, it can also be used to play them. The two KoalaPad buttons control the game flippers, and the ball spring is pulled back by sliding your finger down the KoalaPad surface.

## Spellicopter

### *DesignWare*

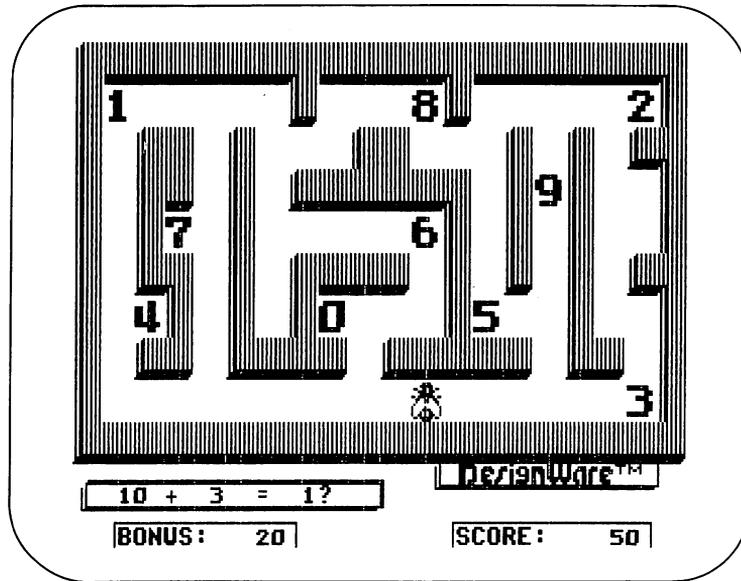
Spellicopter is an educational game that blends eye-hand coordination with the acquisition of improved spelling skills. The player has to fly a helicopter through an obstacle course to a field of scrambled letters. These letters must be picked up by the helicopter in the correct sequence to spell a word. A context sentence (with the chosen word left blank) is provided as a hint. Once the word has been loaded as "cargo," the helicopter must be flown back to the base and the word must be unloaded. In addition to several word lists that range from such words as *can* to such words as *fascination*, the player can add his or her own lists and context sentences. This makes this program useful with weekly spelling lists.



**Math Maze**

*DesignWare*

Math Maze is an activity designed to help children gain mastery of addition, subtraction, multiplication, and division facts. The player uses the KoalaPad to control a fly that moves through a maze. The object is to solve the problem presented at the bottom of the screen and to move the fly to pick up the correct answer, in sequence. For example, for the problem shown in the following figure, the fly has already touched the 1 and is on the way to touching the 3 for 13.

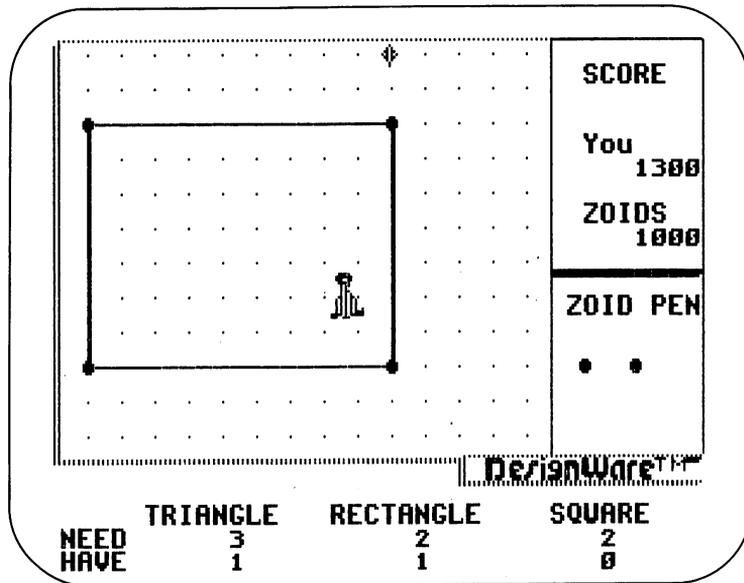


There are several levels of complexity in this activity, both in the types of problems to be solved and in the complexity of the maze. The player can modify the game and can even create his or her own mazes.

## Trap-A-Zoid

### *DesignWare*

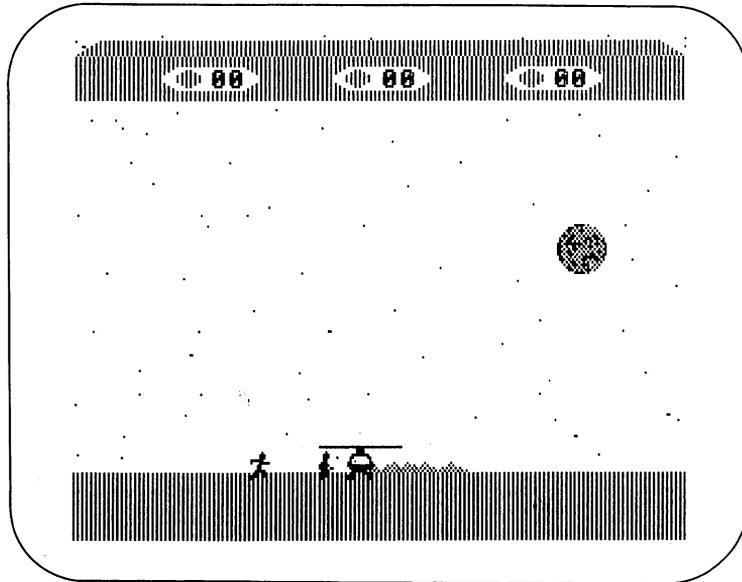
Trap-A-Zoid is an action game in which the player can use the KoalaPad to trap the moving "Zoid" inside a polygon. Depending on how the game is set up, the player can be required to trap the Zoid with triangles, rectangles, squares, or other specific polygons. Within the domain of triangles, for example, the player can be required to trap the Zoid with a right, isosceles, or scalene triangle. The time pressures of the game, coupled with the need for knowledge of specific types of polygons, make this program useful for learning the names and characteristics of these figures.



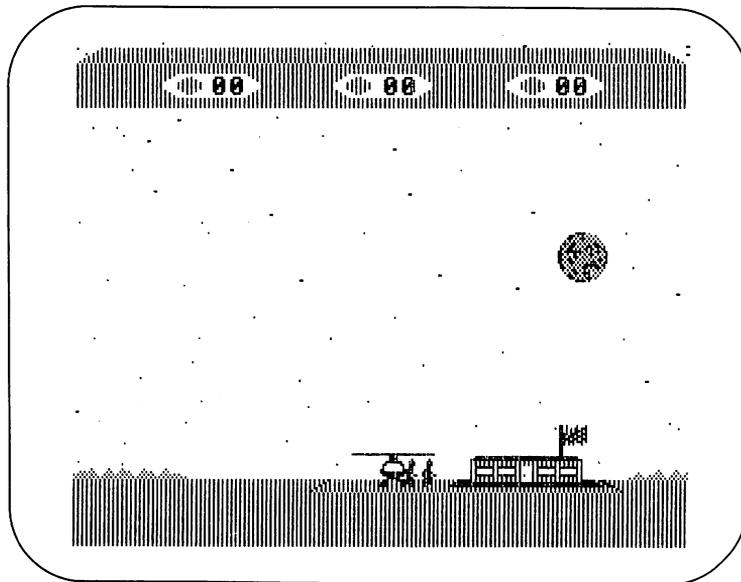
## Choplifter

*Brøderbund Software*

Choplifter is an action game in which, with the KoalaPad, you fly a helicopter on missions to rescue people who are trapped in enemy territory. As you fly toward the people in trouble, you will encounter tanks and airplanes that will try to shoot you. You can shoot back, but your score comes from picking up the trapped people and returning them to safety. When you fly over people to be rescued, you must land the helicopter, and they will climb on board.



When you return to safety (and land), the rescues will depart so that you can go back for more of them.

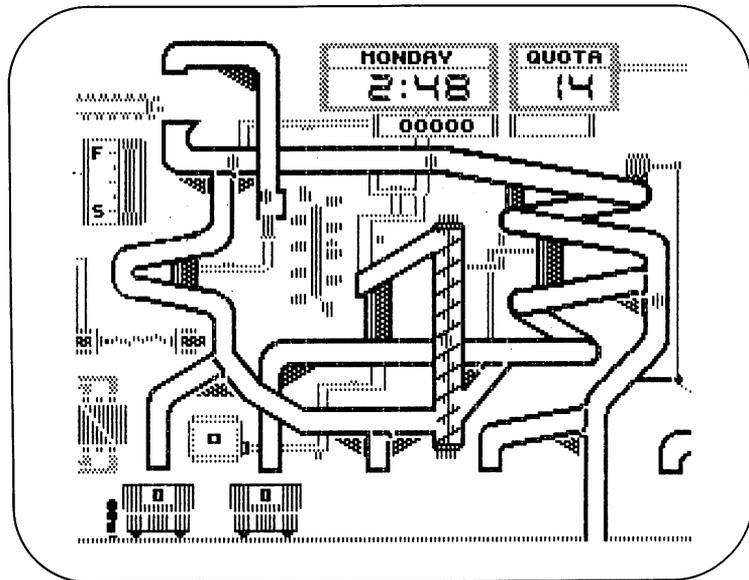


As they depart to safety, some of the rescued people will stop to wave goodbye!

## Gumball

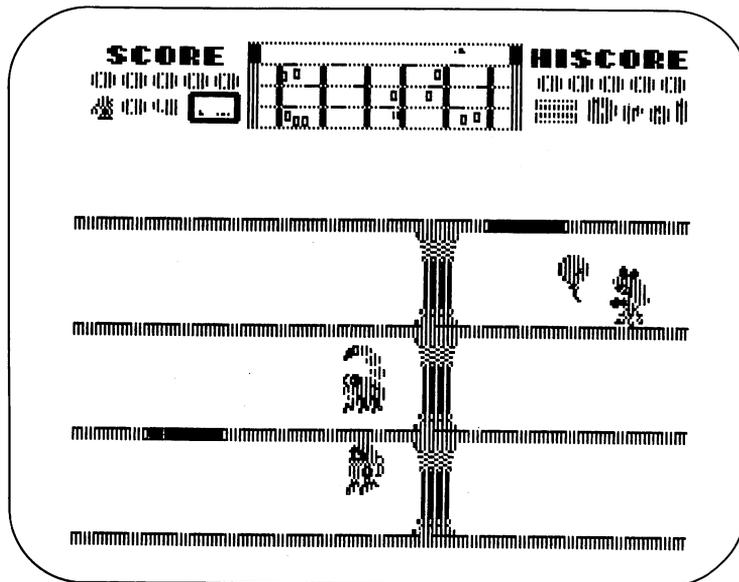
### *Brøderbund Software*

The Gumball game requires that your eyes be in several places at once and that you have good control over your eye-hand coordination. An assembly line that produces gumballs is under your control. Your job is to make sure that the right gumballs end up in the right buckets by controlling the trap doors in the piping through which the balls roll and by controlling the location of the gumball buckets. The trap doors are controlled by the KoalaPad buttons, and the positions of the gumball buckets are controlled by sliding your finger along the tablet surface. If you accidentally get a wrong-colored ball in a bucket, a man comes to dump out all the gumballs you have collected thus far. You are given a daily quota and are working against the timeclock.

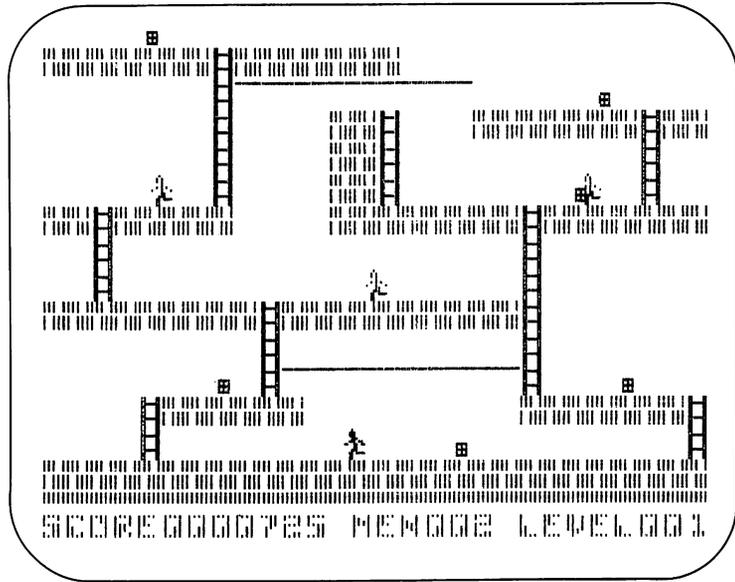


**Drol***Brøderbund Software*

Drol takes place in a nightmare in which you have to rescue people (and their pets) who are lost in a series of passages. There are all sorts of gremlins that you must avoid or destroy on your quest. The animation in this game is quite amusing, and the KoalaPad works with it quite well.

**Lode Runner***Brøderbund Software*

Lode Runner is an action game that challenges your ability to solve mazes on the run. You must retrieve gold that has been deposited in various locations without allowing yourself to be touched by your pursuers. The pursuers occasionally will pick up gold themselves and move it about.

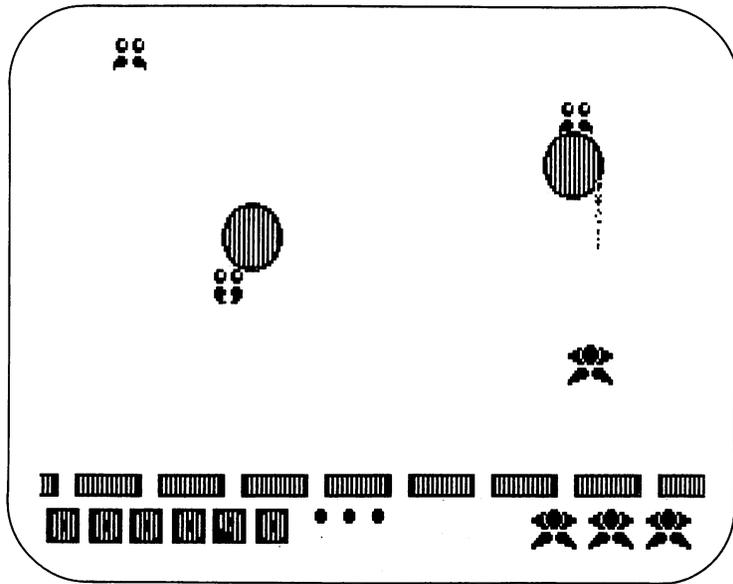


In addition to the various complexity levels that come with the program, Lode Runner allows you to create your own levels, which can be saved on a disk for later play. This adaptive feature of Lode Runner makes it quite appealing, since you can create a challenge that is as easy or hard as you want it to be.

## Lancaster

*Silicon Valley Systems, Inc.*

Lancaster is a more abstract target game in which you control a craft that is to shoot creatures that lay bubble eggs. When these eggs land, you can hatch them to get more targets. The smooth action of the game makes it appropriate for play with the KoalaPad.



The programs described in this chapter are just a few of the many examples of joystick-based software that can be used effectively with your KoalaPad. As you experiment, you will find many more examples of your own.

---

# VI.

## Using the KoalaPad with Your Own Programs

### Overview

Although it can be very rewarding to use the KoalaPad with existing programs, you may find that you have your own applications for this device that haven't been addressed by commercially available software. If this is the case, you will want to create your own programs for the KoalaPad.

Fortunately, this is easy to do. The KoalaPad can easily be incorporated into your programs, regardless of the programming language you are using. We will show examples of KoalaPad programs written in Logo, PILOT, and BASIC—three popular languages for personal computers. If you are writing programs in Pascal or FORTH—or in any of the other available languages—you will be able to use similar techniques to incorporate this device into your software. Because it is not the function of this book to teach programming, I will simply illustrate the techniques used to incorporate the tablet into your programs. It will be assumed that you are already somewhat familiar with the language being described.

From your computer's perspective, there are four values that your program must measure to make full use of the KoalaPad. These values correspond to the status of the two KoalaPad buttons as well as the  $x$ - and  $y$ -coordinate positions of the stylus or finger on the tablet surface. Because of the way the KoalaPad sends information to the computer, your program will be able to make these four readings by using your language's commands that read the status of the paddle controllers (or analog joystick). Once this data has been read into your program, you can use it to position a line on the screen or to perform any of a wide range of activities.

The best way to see how to introduce the KoalaPad into your programs is by example. The remainder of this chapter illustrates the tablet-reading process in Logo, PILOT, and BASIC. These languages are presented in this order because Logo and PILOT are the easiest to understand. Logo is a particularly powerful language to use with the KoalaPad, in part because of its rich graphics commands.

### Using the KoalaPad with Logo

The Logo primitives that read the status of the tablet and its buttons are PADDLE and PADDLEB. These names are chosen because the KoalaPad is read by Logo in the same fashion that one would read a set of paddle controllers. Because the exact form of these commands will depend on the computer you are using, you should check your computer's manuals for their proper form. For the purposes of this chapter, we will explore programming in Atari Logo. You will find the translation to Apple Logo, Commodore Logo, and IBM Logo to be quite easy.

The Atari computer has several jacks that can accept a KoalaPad. If the touch tablet is plugged into the first controller jack, PADDLE 0 will indicate the  $x$ -coordinate of a stylus on the tablet surface, and PADDLE 1 will indicate the  $y$ -coordinate value. PADDLEB 0 will show the state of the left tablet button, and PADDLEB 1 will show the state of the right button.

The first thing to try with your KoalaPad is a small program that displays tablet readings on the screen. For example, the following procedure will print two columns of numbers that correspond to the tablet coordinates of your finger or stylus as it is moved around on the tablet surface:

```
TO TABLET
PRINT SE (PADDLE 0) (PADDLE 1)
TABLET
END
```

If you experiment with this procedure, you will find that the PADDLE 0 values vary from the mid-220s on the left side

to near 0 on the right side. For PADDLE 1, these values correspond to points near the top and bottom of the tablet surface. Notice that when your finger is *not* touching the tablet, the values are in the mid-220s or higher. By looking for coordinate values in this range, you can detect when the tablet is not being touched. This is useful in many programs.

Suppose we wanted to use the tablet to create a simple sketching program. To translate the tablet coordinates into useful screen positions, we need to perform some simple calculations. These are performed as part of a simple sketching procedure called SKETCH:

```
TO SKETCH
IF PADDLE 0 [PD] [PU]
MAKE "X 1.3 * (110 - (PADDLE 0))
MAKE "Y (PADDLE 1) - 110
SETPOS SE :X :Y
SKETCH
END
```

The IF command in this procedure places the graphics pen down if the left tablet button is pressed and lifts the pen otherwise. The SETPOS command sets the display screen cursor to the coordinates given by the values in the variables X and Y. If the pen is down when the cursor is moved, a line is drawn. The calculations that are performed for the X and Y values have the purpose of correctly mapping the tablet coordinates onto the display screen coordinates. In Atari Logo, the origin of the display is in the middle of the screen; X values range from -158 on the left to 161 on the right, and Y values range from 120 at the top to -119 at the bottom. These computations convert the tablet values to the corresponding screen position values. When performing your own computations, it is a good idea *not* to require that the user gain access to points very close to the tablet boundaries, as these may be hard to reach without a stylus.

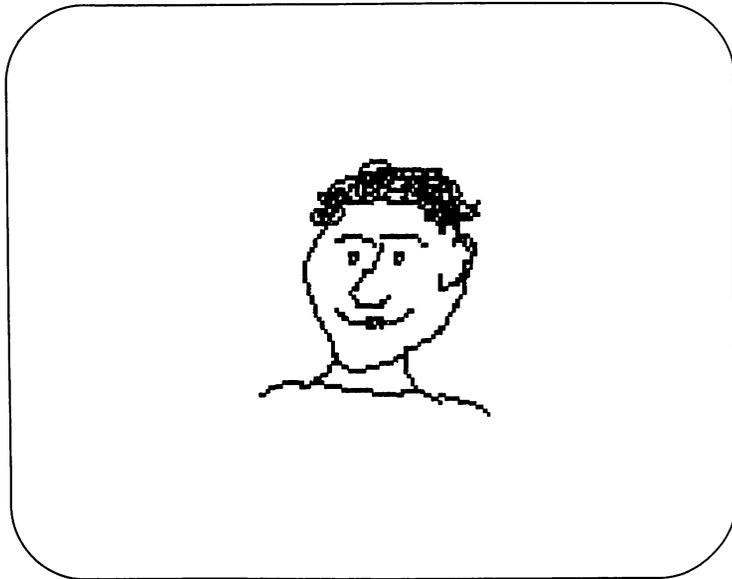
The best way to test this procedure is to use it. Enter

## CS FS SKETCH

Move the cursor around on the screen for a minute or so to get a feel for its motion. If the cursor pauses once in a while, this is just to allow Logo to perform some internal bookkeeping; it should not interfere with your work. When you are ready to start drawing, move the cursor to your starting place and hold the left button down while drawing your line. Let the button up when you have finished drawing each line.

Once you have completed your picture, press the **BREAK** key to stop the **SKETCH** procedure.

**SKETCH** is just the beginning of a very powerful picture creation tool you can build with Logo. You should expand this procedure yourself. For example, you might modify it to start over each time you press the right button (**PADDLEB 1**) or to change pen colors each time a line is drawn. There is no end to the things you can do with this procedure. The following picture is but one modest example of a sketch made with **SKETCH**.



## Using the KoalaPad with PILOT

Because of the similarities between the graphics portions of Logo and Atari PILOT, or Apple SuperPILOT, the procedures discussed in the preceding section can serve as a useful model for PILOT activities.

In Atari PILOT, the relevant functions for tablet and button position are %P and %T (for Paddle and Trigger). Assuming that the tablet is plugged into the first joystick port, the  $x$ -coordinate of the tablet can be read with %P0, the  $y$ -coordinate with %P1, and the left and right tablet buttons with %T0 and %T1, respectively. The following two PILOT modules correspond to the two Logo procedures shown in the previous section:

```
*TABLET
T: %P0 %P1
J: *TABLET
E:
```

```
*SKETCH
C:#X = 80 - %P0
C:#Y = %P1 / 2 - 50
GR: PENUP
GR(%T0 > 0): PENYELLOW
GR: DRAWTO #X, #Y
J: *SKETCH
E:
```

To use either of these programs with Atari PILOT, enter

```
U: *TABLET
```

or

```
U: *SKETCH
```

When you have finished with either of these procedures, you can stop them by pressing the BREAK key. Notice that the X and Y values for the PILOT version of SKETCH are calculated differently from the corresponding Logo values. The reason for this is that Atari PILOT uses a different numbering system for measuring screen position. As with Logo, you should experiment on your own to find the correct values for your tablet.

### Using the KoalaPad with BASIC

Although BASIC is one of the most commonly available languages for personal computers, it does not have as rich a graphics environment as Logo or Atari PILOT. However, this does not keep it from being a useful language for implementing KoalaPad programs. In this section, we will assume that you are using Applesoft BASIC. If you are using a different version of BASIC on a different computer, you will have to make changes in these programs. Because of the way BASIC works, some of the things you have to include in your programs may seem a bit cryptic.

To read the  $x$  and  $y$  coordinate values from the tablet, you simply use the same commands that read the game paddles or joystick: PDL(0) and PDL(1). You must exercise some caution, however, in the use of these commands. To see why, run the following program:

```
10 REM TABLET TEST PROGRAM
20 X = PDL (0)
30 Y = PDL (1)
50 PRINT X,Y
60 GOTO 10
70 END
```

This program should give the  $x$ -and  $y$ -coordinate values for the position of your finger or stylus on the tablet. You may notice that the  $y$  reading is affected by the  $x$  value. This problem occurs because the Apple computer is being asked to read the  $y$

value before the circuitry has had a chance to settle down after reading the  $x$  value. The way to fix this is to insert an intentional delay between the two tablet readings. For example, if you add this line:

```
40 FOR I = 1 TO 10 : NEXT I
```

and run the program again, both X- and Y-coordinate values will be accurate.

To read the status of the tablet buttons, you must examine the contents of the computer memory at location -16287 for the left button and -16286 for the right. To sense if either button has been pressed, you would use a line such as the following:

```
1000 IF PEEK (-16287) > 127 or PEEK (-16286) > 127 THEN 2000
```

If either button is pressed, this line would send BASIC to execute the commands on line 2000.

To see how this is all incorporated into a simple sketching program, enter the following program and see how it works. (Note that, in Applesoft BASIC, you *must* trap  $y$  values greater than 191 or your program will stop.)

```
10 HGR
20 GOSUB 100
30 HCOLOR = 0: HPLOT X,Y
40 IF PEEK (-16287) > 127 THEN HCOLOR = 3: HPLOT X,Y
50 GOSUB 100
60 IF Y < 190 THEN HPLLOT TO X,Y
70 GOTO 30
80 END
100 REM READ TABLET
110 X = PDL (0)
120 FOR I = 1 TO 10:NEXT I
130 Y = PDL (1)
140 RETURN
150 END
```

As you use any of the sketching programs, you may see occasional spikes drawn to the upper left corner of the screen. These are caused when the pressure on the tablet surface is not firm enough to ensure good contact between the plastic sheets that contain the KoalaPad circuitry. You can eliminate these spikes by checking the data before plotting it. If the data indicate that the tablet isn't being touched, then you should not draw a line.

These examples are just the barest beginnings of the types of programs that you can write for the KoalaPad. You can use this device to work with text and sound as well as with graphics. It can be used as a pointing device, as a custom keyboard, and for many other purposes.

The next chapter touches on some of the diverse applications you can create for the KoalaPad on your own!

---

# VII.

## What's Next? Some Ideas for Your Own KoalaPad Applications

### Overview

As the preceding chapter showed, it is quite easy to get information from the KoalaPad to the computer—in fact, you can read the position of your finger or stylus on the KoalaPad many times per second. The real challenge is to find ways to use this information to create programs that no one else has tried. We explored graphics first, simply because it is the most obvious application for the KoalaPad. However, if you have read Chapters IV and V, you know that the KoalaPad can be used to control many different types of programs, ranging from games to educational and professional applications. In this chapter, I will make a few suggestions about ways you might use the KoalaPad to do things no one else has taken advantage of. Perhaps these modest suggestions will stimulate you to create new ideas of your own. It is quite possible that you will develop a new application for the KoalaPad that will turn into a commercial product! In any event, you will find yourself pleasantly challenged just to *list* the numerous activities in which the KoalaPad can be used.

### Using the KoalaPad as a Game Board

The fact that the KoalaPad can be used with overlays of your own design lets you use this device in many novel ways. The  $4\frac{1}{4}'' \times 4\frac{1}{4}''$  surface of the tablet can be used with any overlay image you might want to create.

For example, you might want to write a program that uses an overlay like a checkerboard; or you might want to create a race track overlay for other types of games. An adventure game might use an overlay that looks like the map of a city—or the

floorplan of an old mansion. You can create maze overlays or overlays with physical barriers that keep you from sliding your finger or stylus from one region to the other.

When you have created your overlay, there is something else you can do. You can create a game piece that sits on the KoalaPad. If the piece is heavy enough, the pressure-sensitive surface of the KoalaPad will be able to detect its position. Because the KoalaPad has been designed to be relatively insensitive to pressure applied over a large area, your game piece should have a small pressure-contact point in its bottom. The best way to design such a piece is by experimentation. For example, measure the amount of force needed to signal your position to the KoalaPad when using the stylus. Then cut a small piece of brass or other heavy metal to serve as the playing piece. This metal part should weigh an ounce or two more than the minimum weight needed to trigger the tablet. Once you have cut the shape to the size and form that you want, drill a hole in the center of the bottom of the piece to accept a short rod that will protrude just enough to provide a clearly defined contact point for the tablet. This may take a little tinkering to get just right.

When you have built your playing piece, you can read its position anywhere on the tablet surface. The KoalaPad is capable of measuring only one location at a time (although we will see some interesting things to do when two points are pressed at once), so you should invent some games that only use one playing piece.

### **Using the KoalaPad as a Musical Instrument**

Most of the personal computers on the market (such as the Commodore 64 and the Atari computers) have excellent sound capabilities. I believe that the KoalaPad can find as much utility in musical expression as it can as a graphics input device. The goal here is not to make a music transcription system, such as Music Construction Set (see Chapter IV), but rather to use the tablet as a tool for playing music.

For example, most of the music commands in various programming languages assign numeric values to pitches. By scal-

ing these values appropriately, you could have different pitches being created as a function of your finger position on the tablet. Low sounds might come from regions near the left side of the tablet, and high pitches would come from the right. If you are using a computer and a language that allow more than one tone to be produced at once, you could have one sound increasing in pitch from left to right and another increasing from bottom to top. By tapping your fingers in the right places on the KoalaPad, you could not only play music, you could play some two-part harmonies as well. Once you have your program working to your satisfaction, you might want to make an overlay that corresponds to various positions of the various musical notes.

For example, the following Atari Logo procedure assigns a voice to each axis of the KoalaPad and plays a pair of short notes each time the tablet is tapped. The IF condition tests to see if the tablet is being pressed. (You may have to use a value other than 31 for your tablet.) This procedure isn't glamorous, but it does illustrate that the KoalaPad can be used as a musical instrument:

```
TO MUSIC
MAKE "X 2 * (255 - PADDLE 0)
MAKE "Y 2 * PADDLE 1
IF :X > 31 [TOOT 0 :X 15 10 TOOT 1 (:Y + 20) 15 10]
MUSIC
END
```

As an alternative to placing a second musical voice on the *y*-axis of the tablet, you might want to take advantage of other musical features of your computer. For example, you might find that your computer language provides you with commands that let you change the volume or character of the sound being produced. You might want to experiment by letting the tone be selected by the *x*-axis position on the KoalaPad and having the volume increase as you move from bottom to top.

There are many ways to “play” the KoalaPad, depending on the sounds you are producing and the way you have the tablet response programmed. For example, you can play it as if it were a piano keyboard (you would want to make an overlay in this case). You could also play it like a set of bongo drums (don’t be too rough, though). This latter method can produce some very interesting effects if you have written a program to make various percussive sounds. I have even experimented with short drumsticks that have soft rubber balls on the ends.

Keep in mind that, just as tablet position can be used to create a single sound, it can be used to trigger a sequence of sounds. For this type of program, you might want to create a set of sound subroutines that would produce everything from bird chirps to truck horns and the sounds of explosions. By using the KoalaPad as a custom keyboard, your program can transform your tapping on the touch tablet into an extraordinary sequence of sound events.

### Other Ideas for You to Try

Measuring finger or stylus position on the KoalaPad is easy. What you may not realize is that the KoalaPad can be used to measure the *speed* with which you move your finger or stylus on the surface. The key to measuring the speed of your motion is to create a small program or procedure that makes a series of tablet position measurements at fixed time increments. By calculating the difference between successive tablet position readings, you can get a measure of the speed with which the finger or stylus is moved across the surface.

This can be illustrated with a short procedure written in Atari Logo (you can easily translate this procedure into its equivalent in BASIC or another language of your choice):

```
TO RATE: DELAY
MAKE "START PADDLE 0
WAIT: DELAY
MAKE "END PADDLE 0
PRINT :END - :START
END
```

This procedure measures an initial  $x$ -coordinate reading, waits for a time given by DELAY, makes a second reading, and prints the difference between the two readings. In this example, the WAIT command pauses for a period of time measured in "jiffies." Each jiffy is 1/60 of a second. So, for example, the command

```
REPEAT 25 [RATE 5]
```

would produce 25 speed readings, using a 1/12 of a second delay between each reading. Moving the stylus slowly from right to left gave me the following readings:

```
4 6 5 8 7 7 7 5 6 7 7 7 7 8 7 . . .
```

When I moved it quickly, I got these results:

```
14 17 20 21 22 21
```

Obviously, the fast movement gave fewer readings, since I ran out of tablet before the measurement was finished!

How can you use speed measurements in your programs?

Suppose you wanted to create a game in which a computer character had to jump over a car or a canyon. You could use the player's *speed* in moving his or her hand or stylus over the tablet to determine how far the jump would be.

Average speed measurements can be used in other applications as well. Just as you might use the tablet to let someone select an answer to a question, you can use speed measurements to see how quickly the answer was found. One action game that might be fun to create would be a maze in which the player would have to keep moving at greater than a minimum average speed or the maze would evaporate!

For some really interesting effects, you could use speed to set the pitch of a musical tone—slower speeds would produce

lower tones, and faster speeds would produce higher tones. If you were to write a program of this sort, could you play a tune? It might be worth a try.

As I mentioned earlier, the KoalaPad was designed to measure just one point at a time. This does not mean, however, that you can't benefit from using two fingers on the tablet at once.

Try the following experiment: Using the KoalaPainter software, touch the tablet near the center with one finger. The cursor should be near the center of the screen. Next, without lifting the first finger, place a finger from your other hand at a point above and to the right of the first finger. The cursor will move toward this new direction; but if you now remove your first finger, you will see the cursor move some more to its final location.

The fact that the tablet reading can be influenced by having two (or more) fingers on the tablet at once suggests some interesting ideas. For example, you could create cooperative two-player games where *both* players must have a finger on the tablet at the same time and must move the cursor through a maze cooperatively. One false move (or accidental lifting of the finger) and the game is lost.

Many of the KoalaPad applications use overlays. By breaking the tablet surface into discrete regions, it can be made to function as a special-purpose keyboard. When designing a keyboard overlay, it is generally advisable to divide the surface into no more than 49 keys (7 on each axis).

For very young computer users, you might want to divide the tablet in half, with the top portion of the overlay marked UP and the bottom part marked DOWN. You could then write a program for preschoolers that would ask them to identify whether a particular object on the screen was up or down. A similar program (and corresponding overlay) could be used to distinguish between left and right.

The beauty of using the tablet this way is that it keeps young computer users from having to deal with the clutter of a conventional keyboard. Each program can have its own overlay (made from paper and then laminated in plastic, if you wish).

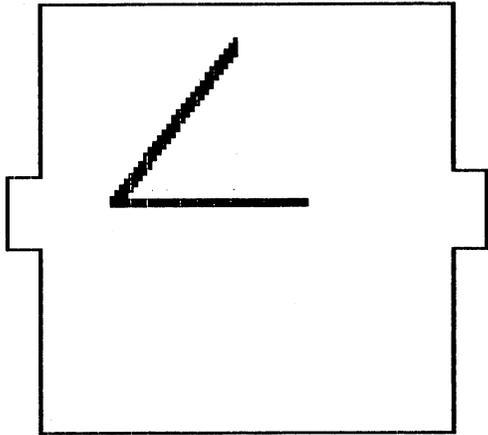
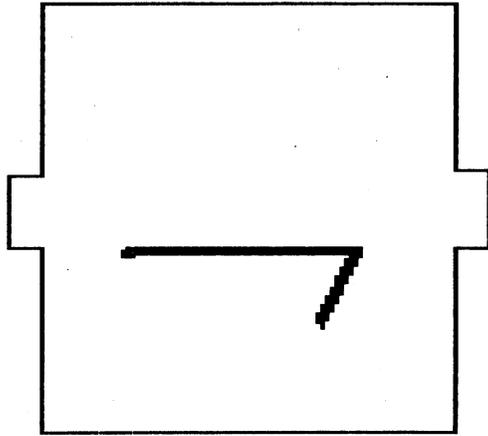
Separate overlays for each program ensure that the user is never confronted with irrelevant choices.

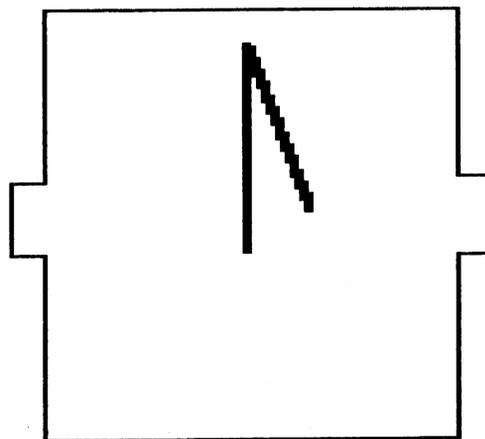
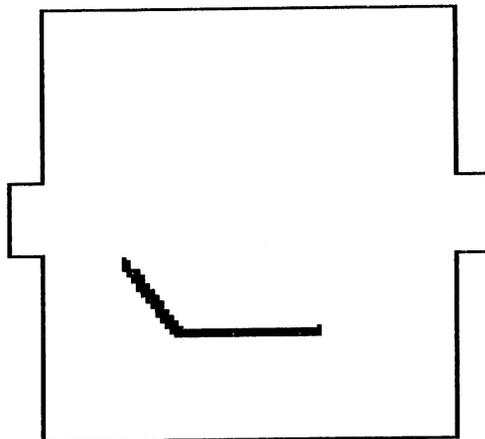
The ruggedness and compactness of the KoalaPad make it a natural device to use with the very young. You can even use the KoalaPainter software to help youngsters learn to draw letters of the alphabet. To do this you would first make 26 overlays with nice large block letters to be copied. Next, you would load the KoalaPainter software and use the Draw mode as the child traces the letter on each overlay onto the screen. As each letter is traced, the child can see the overlay image and then look at the screen to see how the tracing looks. It is important that a parent or teacher be at the child's side when this is being done, so that the child can be encouraged and rewarded for his or her efforts.

Of course, custom keyboards and overlays are not restricted to children's programs. Many applications can benefit from using the KoalaPad as a custom keyboard. Complete commands can be assigned to a single region of the tablet, thus saving a great deal of typing by the user and making the system far easier to use.

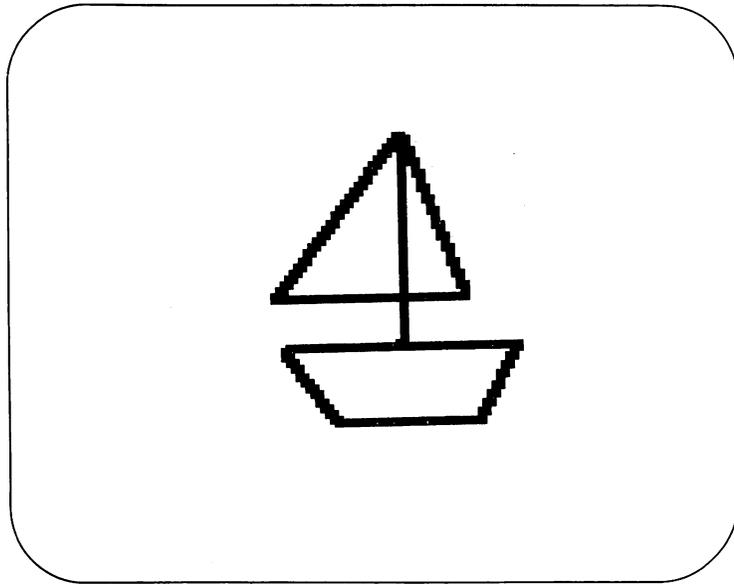
If you really like making overlays (use your KoalaPainter program and printer—it makes the task easier), you can create an interesting shape game that uses overlays to make a hidden picture. As the game designer, you start with some picture that you want others to create. Once you have a picture in mind, you create a set of overlays that contain parts of the final picture. Each part should be aligned on each overlay so that when each pattern is traced (using the KoalaPainter software), the original picture is reproduced. The goal of the game is to guess what the final picture will be by just looking at the overlays.

For example, suppose you saw the following overlays one at a time:



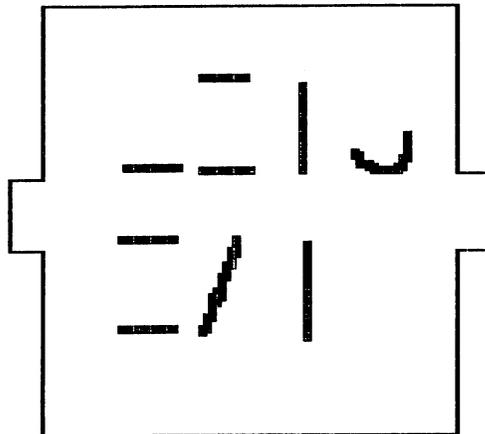


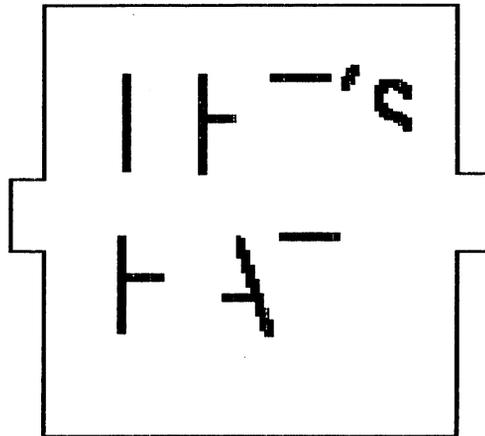
Would you have guessed that they would combine to produce this picture of a boat?



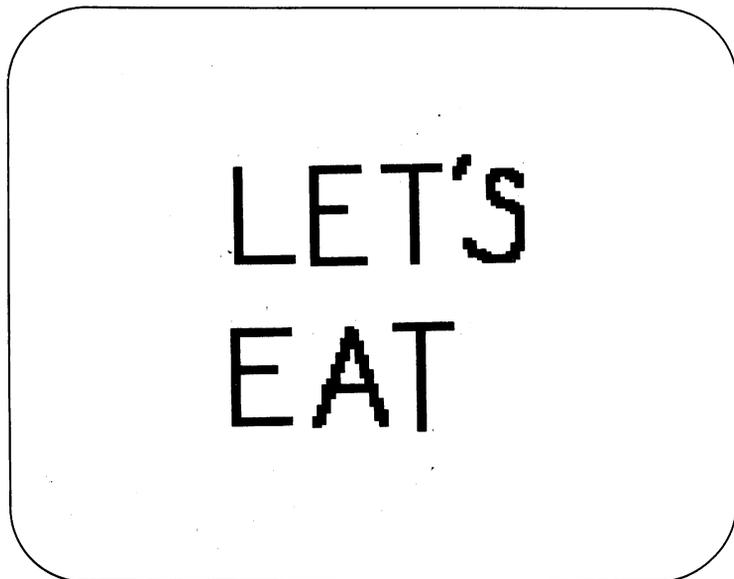
The use of such compound overlays lets you create puzzles of many types to interest grown-ups and children alike.

You can even use this technique to generate messages that can be decoded only when both overlays are traced:





Did you know that these would combine to form this message?



Yes, even KoalaPad users must stop for meals and sleep, but I wouldn't be surprised to find that your ideas for the KoalaPad have kept you busy enough to lose track of time.

As you can see, there is no limit to the number of ways the KoalaPad can be used. This is one of its greatest assets—the one that excites me the most.

Now that we have come to the end of this book, it is time to say goodbye. I sincerely hope that you enjoy the KoalaPad touch tablet and that you create some exciting applications for it.

Happy computing!

---

# Appendix A: References and Resources

## References

The following books were chosen for this list because they discuss computer graphic techniques or because they include information on ways of conveying positional information to computers.

*Computer Art and Animation: A User's Guide to Atari Logo*, D. D. Thornburg, Addison-Wesley, 1984.

*Computer Art and Animation: A User's Guide to Commodore 64 Logo*, D. D. Thornburg, Addison-Wesley, 1984.

*Computer Graphics: A Programming Approach*, S. Harrington, McGraw-Hill, 1983.

*Discovering Apple Logo: An Invitation to the Art and Pattern of Nature*, D. D. Thornburg, Addison-Wesley, 1983.

*Fundamentals of Interactive Computer Graphics*, J. D. Foley and A. Van Dam, Addison-Wesley, 1982.

*Microcomputer Graphics*, R. E. Myers, Addison-Wesley, 1982.

*Principles of Interactive Computer Graphics*, W. M. Newman and R. F. Sproull, McGraw-Hill, 1979.

## Resources

The following is a list of addresses of companies whose products are described in this book. If you are interested in any of their products, contact your local dealer. The addresses are given in case your area has no dealer for the products described.

**Accent Software, Inc.**  
3750 Wright Place  
Palo Alto, CA 94306  
*Products:* Software

**Brøderbund Software**

17 Paul Drive  
San Rafael, CA 94903  
*Products:* Software

**CardCo, Inc.**

313 Mathewson  
Wichita, KS 67214  
*Products:* Printer interfaces

**DesignWare**

185 Berry Street  
Building Three, Suite 158  
San Francisco, CA 94107  
*Products:* Software

**Electronic Arts**

2755 Campus Drive  
San Mateo, CA 94403  
*Products:* Software

**Koala Technologies, Inc.**

3100 Patrick Henry Drive  
Santa Clara, CA 95050  
*Products:* KoalaPad and software

**Macrotonics, Inc.**

1125 N. Golden State Blvd., Suite G  
Turlock, CA 95380  
*Products:* Atari screen printer interface

**Orange Micro**

3150 E. LaPalma, Suite G  
Anaheim, CA 92806  
*Products:* Grappler printer interfaces

**Sar-An Computer Products**

12 Scamridge Curve  
Williamsville, NY 14221  
*Products:* Magic Dump II printer interface software

**Scarborough Systems, Inc.**

25 North Broadway  
Tarrytown, NY 10591

*Products:* Software

**Silicon Valley Systems, Inc.**

1625 El Camino Real  
Belmont, CA 94002

*Products:* Software

**Syntauri Corp.**

1670 S. Amphlett Blvd., Suite 116  
San Mateo, CA 94402

*Products:* Music software and accessories

**Texprint, Inc.**

8 Blanchard Road  
Burlington, MA 08103

*Products:* Print-It printer interfaces

**The Learning Company (TLC)**

545 Middlefield  
Menlo Park, CA 94025

*Products:* Software



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## Appendix B: Software Programs

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The following programs are mentioned and described in this book. They are organized here by machine-specificity

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Program	Manufacturer
<i>Apple II, IIe, II+</i>	
Coloring Series I	Koala Technologies, Inc.
KoalaGrams Spelling I	Koala Technologies, Inc.
Reader Rabbit and the Fabulous Word Factory	The Learning Company (TLC)
PictureWriter	Scarborough Systems, Inc.
The Graphic Solution	Accent Software, Inc.
Spider Eater	Koala Technologies, Inc.
Music Construction Set	Electronic Arts
Musicland	Syntauri Corp.
Logo Design Master	Koala Technologies, Inc.
The Graphics Exhibitor	Koala Technologies, Inc.
Instant Programmer's Guide	Koala Technologies, Inc.
Pinball Construction Set	Electronic Arts
Spellicopter	DesignWare
Math Maze	DesignWare
MicroIllustrator	Koala Technologies, Inc.
Trap-A-Zoid	DesignWare
Choplifter	Brøderbund Software
Gumball	Brøderbund Software
Drol	Brøderbund Software
Lode Runner	Brøderbund Software
Lancaster	Silicon Valley Systems, Inc.
KoalaPainter	Koala Technologies, Inc.
<i>Atari</i>	
Coloring Series I	Koala Technologies, Inc.
Spider Eater	Koala Technologies, Inc.
MicroIllustrator	Koala Technologies, Inc.

Program	Manufacturer
<i>Atari (Continued)</i>	
Music Construction Set	Electronic Arts
The Graphics Exhibitor	Koala Technologies, Inc.
Instant Programmer's Guide	Koala Technologies, Inc.
KoalaPainter	Koala Technologies, Inc.
<i>Commodore 64</i>	
Coloring Series I: Geometric Designs	Koala Technologies, Inc.
KoalaGrams Spelling I	Koala Technologies, Inc.
Paint-A-Rhyme	Koala Technologies, Inc.
Dancing Bear	Koala Technologies, Inc.
Spider Eater	Koala Technologies, Inc.
MicroIllustrator	Koala Technologies, Inc.
Music Construction Set	Electronic Arts
Logo Design Master	Koala Technologies, Inc.
The Graphics Exhibitor	Koala Technologies, Inc.
Instant Programmer's Guide	Koala Technologies, Inc.
KoalaPainter	Koala Technologies, Inc.
<i>IBM PC and PC Jr.</i>	
Logo Design Master	Koala Technologies, Inc.
Instant Programmer's Guide	Koala Technologies, Inc.
KoalaPainter	Koala Technologies, Inc.
MicroIllustrator	Koala Technologies, Inc.

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## Glossary

- BASIC** A computer language (Beginner's All-purpose Symbolic Instruction Code) that was designed for noncomputer professionals to use. BASIC was quite popular in the late 1970s, but several more powerful end-user languages are now available.
- cartridge** A plastic box containing a computer program that has been stored on a ROM (Read Only Memory) circuit. Most personal computer software is provided either on cartridges or on diskettes.
- cursor** A movable indicator on the display screen that shows where action is to be taken. The cursor position can indicate the insertion point for text or the starting or ending point for a line, or it can mark the choice of a menu item to be selected. The cursor moves in direct response to signals received from the computer input device.
- custom keyboard** A keyboard in which the function of each key is controlled by the user's program. Each key can represent anything from a single letter to a complete set of commands to the computer. Custom keyboards can make computer programs very easy to use.
- digitizing tablet** Any of several types of tablet-based computer input devices designed to generate very accurate measurements of position on the tablet surface. Accuracies in the range of 1/200 of an inch are not uncommon for these devices; they are priced according to degree of accuracy.
- diskette** A magnetic recording medium about the size of a 45 RPM phonograph record that is used to store programs and data used with computers. Most personal computer programs are provided on diskettes.

- dot matrix** An array of dots that form the pattern of a letter or part of a picture. The computer display screen is a very large dot matrix; each character on the screen is a smaller dot matrix.
- ink jet printer** A computer printer that produces images on plain paper by spraying very fine ink droplets under computer control. Ink jet printers are available that generate excellent color images.
- input device** A computer attachment that transfers information from the user to the computer. Common input devices include keyboards, joysticks, touch tablets, and the like.
- jaggies** Jagged lines produced on the computer display screen when it tries to display diagonal lines. Jaggies result because the computer display can place dots only at fixed screen locations.
- joystick** An input device that measures the position of a handle manipulated by the user. Joysticks are commonly used to control fast-paced games. Simple joysticks produce very crude directional information (up-down, left-right, and diagonal positions). More sophisticated joysticks give very accurate position information.
- light pen** An input device that consists of a pen-shaped object that is moved on the computer display screen. As long as the display screen is bright enough to be sensed by the pen, the computer can be programmed to sense the pen's coordinates.
- Logo** A computer language for end-users that is based on the artificial intelligence research language, LISP. Logo can be used to produce stunning graphics and for all other types of programming.
- menu** A set of choices presented to the user on the display screen that can be selected by moving the cursor to the desired choice and pressing an appropriate button on the device that controls the cursor.
- microprocessor** A collection of many thousands of transistors on a chip of silicon the size of a fingernail that contains the major computational function of the computer system. The development of the microprocessor made the personal computer possible.

- mouse** An input device used primarily for cursor control in text-based applications. The mouse resembles a small, rounded plastic block that contains one or more switches and a cable that goes to the computer system. The user moves the display cursor by sliding the mouse on a tabletop or on a special pad. Drawing pictures with a mouse is possible—after all, cavemen drew with rocks.
- needle printer** A dot matrix printer that produces images on plain paper by striking an inked ribbon with a series of magnetically controlled wire pins to produce characters or parts of graphic images.
- output device** Any computer peripheral whose main function is to convey information to the outside world. Common output devices include printers, display screens, loudspeakers, and the like.
- overlay** A sheet of plastic that lies over a touch tablet. The overlay can contain special markings that divide the tablet into different areas denoting different functions. Overlays have to be used in conjunction with special programs that let the computer know the significance of the various overlay markings.
- paddle controller** An input device that is operated by twisting a knob. Paddle controllers are used as steering wheels for computer simulations of driving a car, and they were originally used to control the position of a paddle on the display screen for computer-based table tennis games.
- parallel interface** An electronic circuit that conveys information to or from a computer by receiving or transmitting several (typically, eight) digital signals at once.
- peripheral** Any computer device that is external to the computer itself. Common computer peripherals include displays, printers, touch tablets, and the like.
- PILOT** A computer language (Programmed Instruction, Learning Or Teaching) that is primarily used for the creation of programmed instructional materials by teachers; it can also be used by children and adults to create sophisticated programs. The rudiments of PILOT can be learned in an hour, and some versions of the language have excellent graphics capabilities.

- pointing device** An input device whose primary function is to control the position of the cursor on the screen. Common pointing devices include touch tablets, light pens, mice, and joysticks.
- random access memory (RAM)** The portion of the computer memory that can be used to store temporary information, such as the program and data currently being used by the computer. The information stored in RAM is lost when the computer is turned off. RAM is like a blackboard that can be erased and written upon as many times as desired.
- read only memory (ROM)** The portion of computer memory that is used to store information permanently. ROM is often used to store the basic operations of the computer, and it is used in program cartridges. The information stored in ROM is like a book in that it can be read again and again, but it isn't alterable.
- resolution** The measure of the number of discrete dots that can be placed on a computer display screen. All personal computer display screens show images created from an array of discrete dots. Typical display resolutions range from 160 dots across and 96 down to 512 across and 320 down. Some computer systems support several different screen resolutions. Because each displayed dot requires room in the random access memory (RAM), high-resolution screens that display many colors simultaneously are not commonly found on personal computers.
- screen printer** Any of a class of printers that print images on paper directly from video signals, such as those generated by television cameras, video cassette recorders, and personal computers. A screen printer can be thought of as a television printer. It is limited to printing images exactly as they are shown on the display screen.
- serial interface** An electronic circuit that conveys information to or from a computer by receiving or transmitting data as a serial chain of 1s and 0s. By sending the data in a linear string rather than in chunks of eight pieces at a time, serial interfaces are usually slower than parallel interfaces. However, they are commonly used for communication purposes, and they can be used to send information over telephone lines to remote locations. The

most common serial interface in use today has a special name—RS-232.

- stylus** A rod or penlike object that is moved on the surface of a touch tablet to indicate position information.
- thermal printer** A dot matrix printer that uses a miniature array of electronically controlled heater elements to selectively heat regions of a temperature-sensitive paper. The special paper used with these printers turns a dark color when it is heated over a prescribed temperature. Thermal printers are low-cost and quiet but tend not to produce as high-quality images as either ink jet or needle printers.
- touch tablet** An input device for cursor control that senses the pressure of a finger or a stylus on the tablet surface and transmits the position of the finger or stylus to the computer. Touch tablets can be used as drawing tools, as pointing devices, and, through the use of overlays, as custom keyboards.
- track ball** A cursor control device that is operated by rolling a ball around in a captive socket. The distance and direction in which the ball is rolled are converted into positional information for the computer. Track balls are finding a great deal of use in fast-action arcade games.
- video monitor** A televisionlike device that displays video signals directly from a computer or other video source. Televisions receive broadcast signals that are then transformed to video signals before being displayed. This transformation process usually results in degraded image quality. Video monitors generally produce sharper images than television sets.



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**Other titles by this author:**

Discovering Apple Logo: An Invitation to the Art and Pattern of Nature

Picture This! An Introduction to Computer Graphics for Kids of All Ages

Picture This Too!

Computer Art and Animation: A User's Guide to Atari Logo

Computer Art and Animation: A User's Guide to Radio Shack Color Logo

Computer Art and Animation: A User's Guide to TI-99/4A Color Logo

Computer Art and Animation: A User's Guide to Commodore 64 Logo



# The KoalaPad Book

David D. Thornburg

**From the inventor of the bestselling KoalaPad...  
ideas and activities to draw on your imagination  
with the revolutionary touch tablet!**

The KoalaPad touch tablet, and its library of graphics software, is an affordable tool that, for the first time, allows Atari, IBM PC and PCjr, Commodore 64, and Apple computer users to glide a finger over a smooth tablet surface to:

- construct color pictures of your own design on the display screen
- learn to compose and play music, from nursery rhymes to Baroque fugues
- create word and spelling games, puzzles, and adventure stories with customized game boards
- write computer programs in BASIC, Logo, and PILOT programming languages
- explore new ideas for programs and applications on your computer system!

THE KOALAPAD BOOK has it all — directions from how to hook up the tablet to your computer system to videotaping your projects — and a thorough look at the software programs available, like Reader Rabbit and Pinball Construction Set. Whether in the classroom or at home, adults and children alike will be amazed at the touch of simple elegance the KoalaPad can add to your computer system.

**David D. Thornburg** is president of Innovision, a consulting firm, and the author of numerous books on computer graphics and the Logo language. Thornburg is the inventor of the technology behind the KoalaPad and other educational computer products from Koala Technologies.

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