

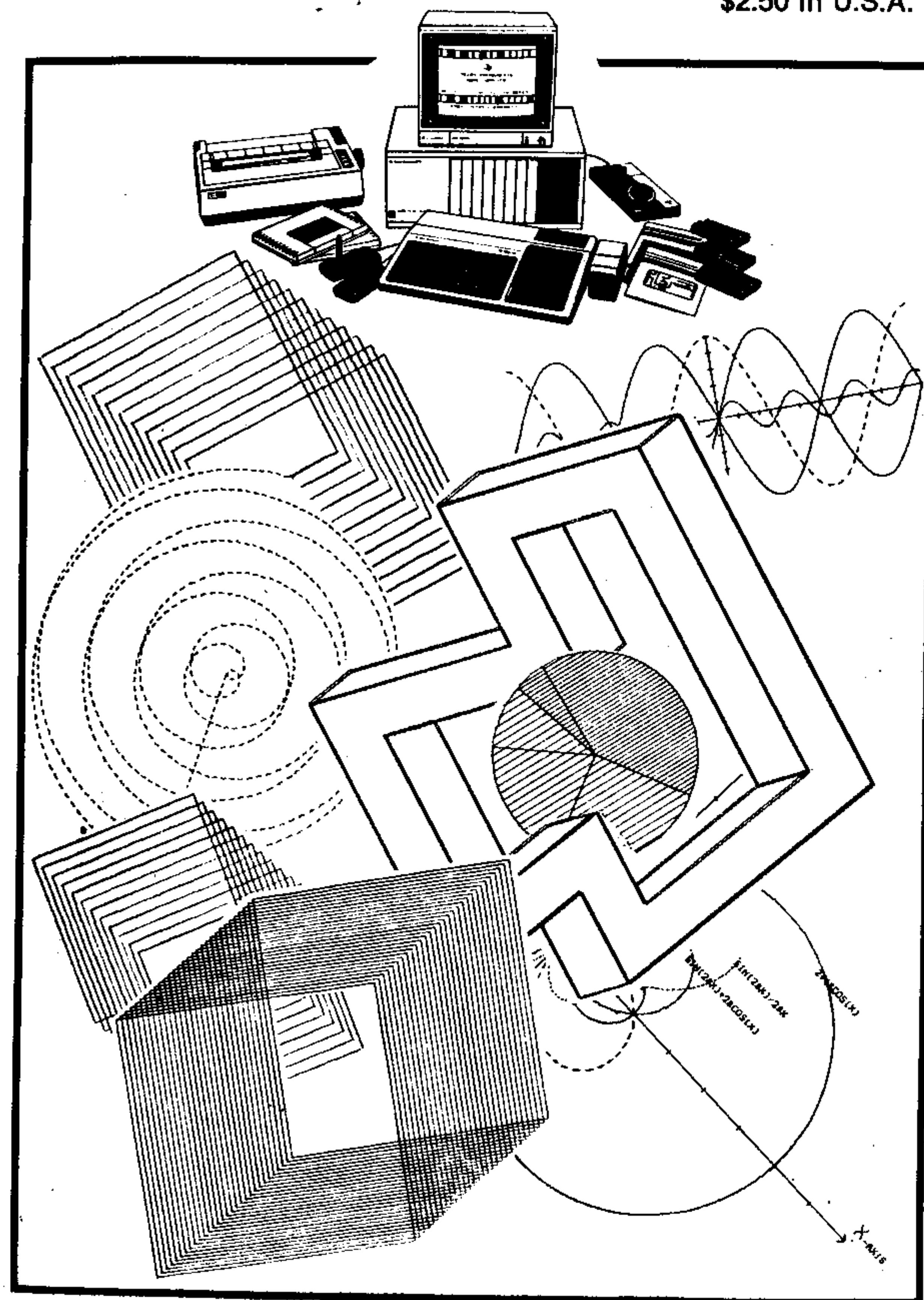
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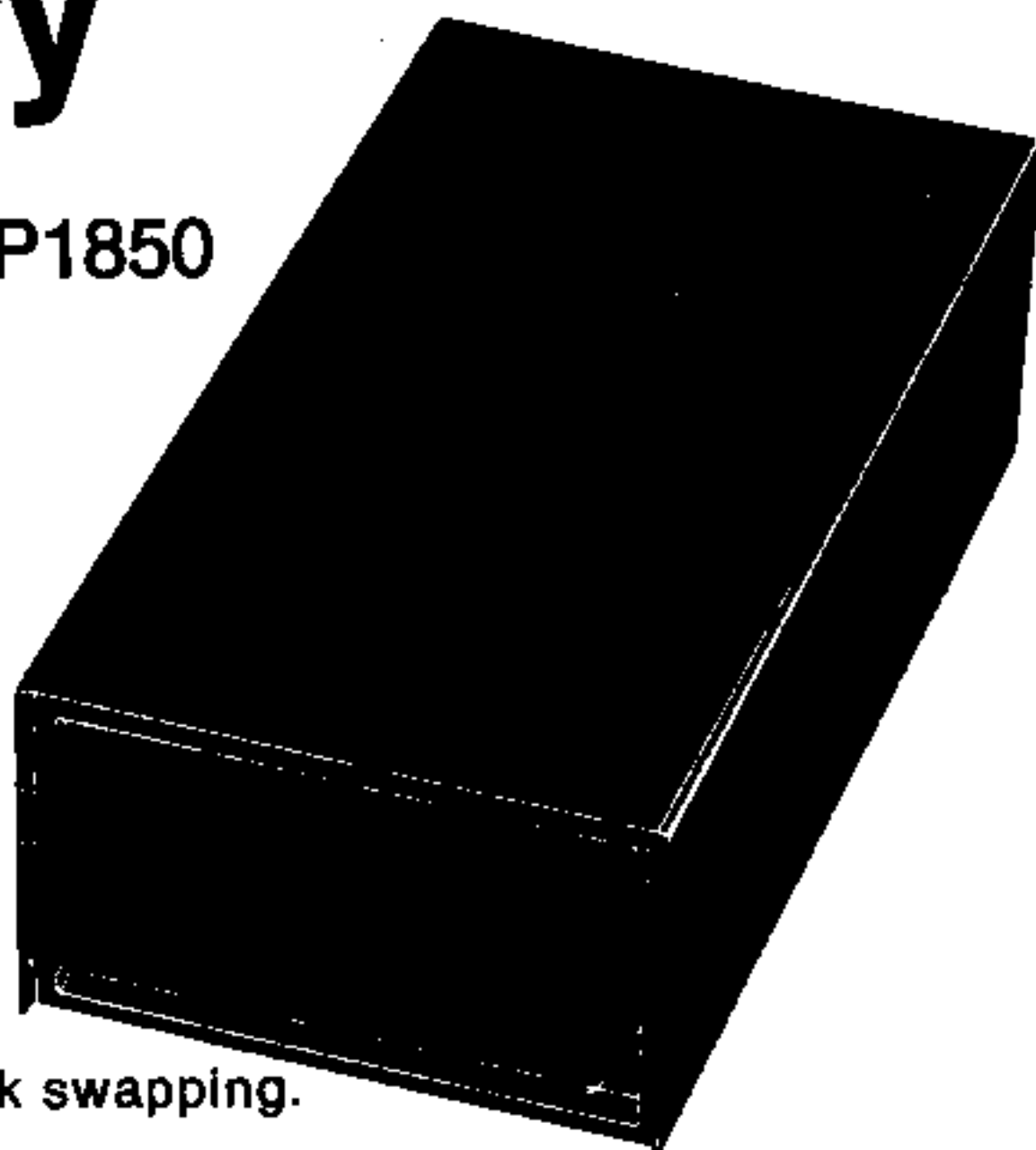
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Contributing Editors Jim Labriola
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Cartoonist Gregory Franklin

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LETTERS TO THE EDITOR

TI-99/4QI

I wish you well in your new venture! T.I.'s manual "TI-99/4A Console Technical Data" contains a mother board location diagram and several circuit schematics for a unit designated "TI-99/4QI." What is this unit? I have heard an unconfirmed story that it was offered for sale in the Pasadena area during the Great-Blow-Out-Sale of November, '83. Any truth to that? D.R.S., Grand Forks, ND

TI-99/4QI is TI code for a specific circuit component. It has never been offered for sale by TI or any of its dealers as a separate component. If, however, you wish more information on what it is, you can probably find out from Dale Osborne, Texas Instruments Consumer Products Group, Dallas, Texas.

DELIGHTED

I'm not sure where you acquired my name & address, but I'm delighted you did. It's about time someone took an interest in the hundreds of thousands of TI owners across the country & in other countries. C.R., Deptford, NJ

"GLUED"

Enjoyed immensely your complimentary issue and I'm proud to become your subscriber. I know every issue will be expectantly awaited for. You deserve our thanks for helping us keep "glued together." My sincere wishes for a successful venture. E.L.C.

HELP!

Congratulations on publishing a magazine just for us TI 99er's. I am writing because I need some help. My current system configuration is TI-99/4A console, TI Extended Basic, speech synthesizer, joysticks and one cassette recorder. I would like to add to my system the following: printer; 1 or 2 disk drives; 32K memory expansion (more memory if possible). I would like to know what other items need to be attached to the computer for these items to work properly. I won't be able to expand my computer for at least 10 months (maybe longer), because I cannot currently afford them. By then, it will

be likely that I will not be able to find a peripheral expansion box by TI (unless someone starts making one like it!!!). So, I would like to know if the "Super disk 64K memory expansion card" by DataBioTics will fit inside the "9900 Micro Expansion System" by Corcomp. If so, how many of these memory cards will fit inside of the 9900 micro expansion system. K.F., Temple, Texas

In order to expand your system and include a printer, you must have an RS232 in your expansion box. There is, however, a product (Axiom Parallax) which plugs directly into the side of the TI-99/4A, eliminating the need for the expansion system (naturally, with this method there is no additional memory).

The 9900 Micro Expansion System does not allow the option of adding any additional cards, although, to date, this has not hindered our use of the system.

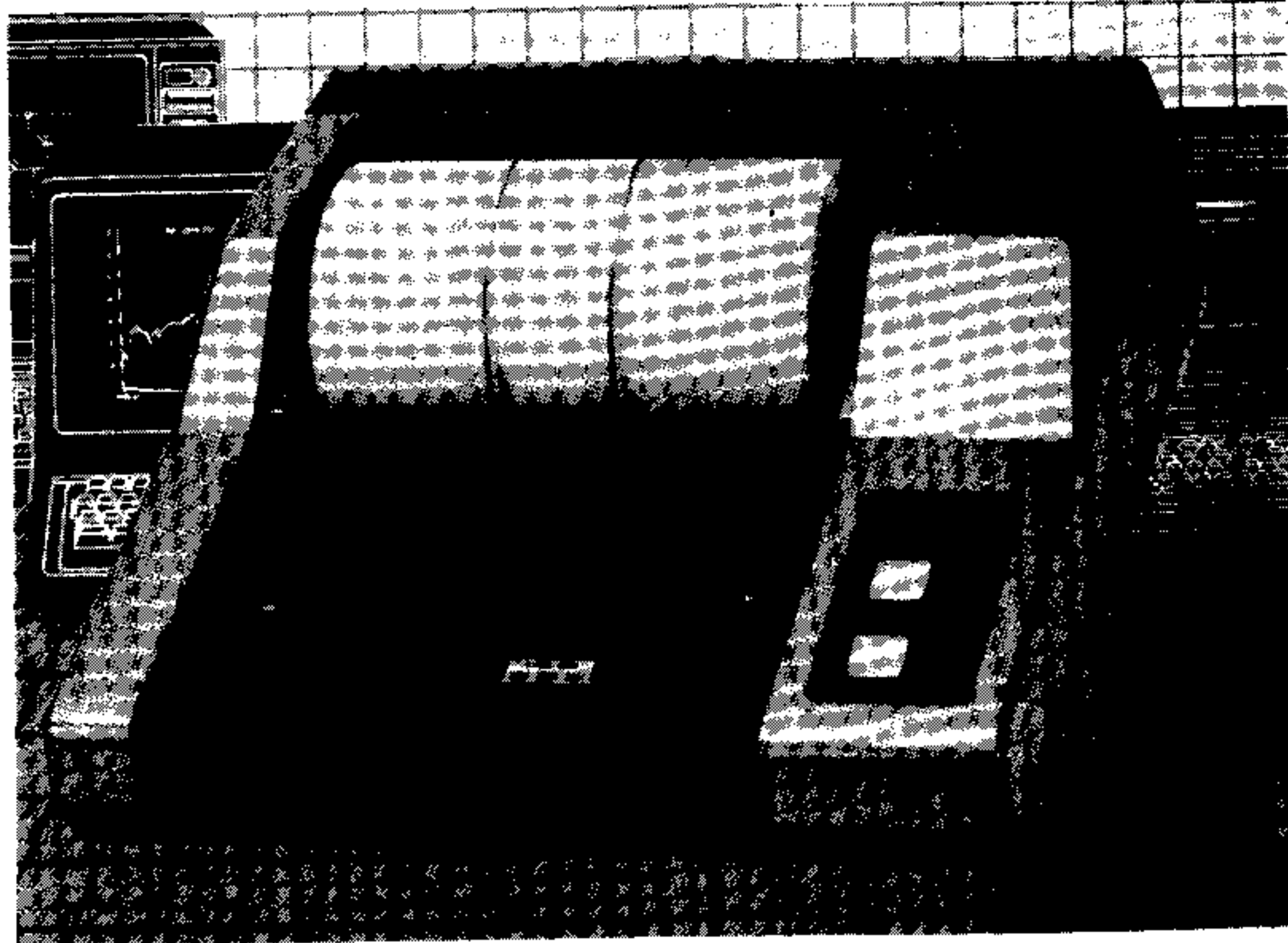
CRITICISM

I would like to take this opportunity to offer some constructive criticism of your publication. Your article titled "TID-BYTES TO WET YOUR APPETITE" and "NOTES", make mention of many new products that I would be very interested in. The problem is that we are left to our own devices to find out what the companies' addresses are, it would not be that much more work for you to include them within the article when you give the company name. It is irresponsible of your writers to assume that all your readers are familiar with these companies. It would be greatly appreciated by this reader if something could be done about this in future issues.

R.A.D., South Gate, CA

The addresses of the companies you mentioned were not available to us at the time of publication. However, we have made note of your suggestion and will try to include addresses whenever possible in future articles.

Continued on Page 13



PLOTTING ON THE TI-99/4A

Using the Radio Shack CGP-115 Plotter

by Maurice E.T. Swinnen & Thomas Coppens

Since I have had my TI-99/4A, I have been on a constant look-out for a good way to plot equations or make technical drawings on it. The TI-99/4A, as is, is not equipped to accomplish this task.

Although there are several good programs on the market (i.e., DRAW 'N PLOT and CHART-MAKER by QUALITY 99 SOFTWARE) which enable the user to put drawings on the screen and later "dump" them to the printer, plotting equations is out of the question. And you can forget plotting in four different colors.

Just recently my friend, the Rev. Keith Koch, an avid TI-99/4A enthusiast, drew my attention to a

plotter—the CGP-115—that was on sale at Radio Shack for only \$119.95 (Reg. \$199.95).

The price was right, it could plot in four colors, and it had an RS-232 interface. If only it could work with the TI-99/4A, it would be an ideal solution.

Since the sales people at Radio Shack were not familiar with the TI-99/4A, they were unable to help with any information on connecting it to the CGP-115.

My friend and club member Allen Minton, without my knowledge, had also been obsessed with the same idea of plotting on the 99/4A. He had also purchased the same small plotter on sale at Radio

Shack. He had, however, gone one step further and found a way to connect it to the RS-232 box!

There were only three wires to consider, and one of his systematic combinations worked (there were only six permutations)! From then on, everything went smoothly.

Allen showed me some fantastic drawings he had done in four colors, with programs that were only a few lines long. In no time we had several converts, egging each other on to produce better and more complicated drawings. Good old competition took over.

After having used several plotters professionally, I found that a good plotter should have the following vital commands:

1. Move the pen, without drawing, from point x_1, y_1 to point x_2, y_2 ,
2. Draw a line from point x_1, y_1 to point x_2, y_2 ,
3. Move the pen, without drawing, from an origin, by an amount of x and y units, and
4. Draw a line, starting at an origin, of a length x, y units.

These four commands are known as "move absolute," "draw absolute," "move relative" and "draw relative," respectively. These commands are essential. Any additional ones are very welcome, though, as they make your life easier, requiring you to do a lot less programming.

If these commands are built in the ROM of the plotter, you will save the time of having to enter many CALL VCHARs and HCHARs. Now you can simply enter

:"PRINT #1:"M230,75": "D125,25"

and so on. And the pen will first move 230 units in the positive x -direction, simultaneously 75 units in the positive y -direction, then draw from there a slant line 125

units to the right and, at the same time, 25 units down.

The TRS-80 CGP-115 not only has *these* four basic commands, but it also has many more.

The "I" command will establish the origin, wherever you happen to be. The "H" command will make the pen "home" to the I-spot every time.

The "C" command lets you choose between four pen colors: black, blue, green and red, while the "L" command allows you to select any of 16 line types, from a solid line to fifteen types of dotted lines.

The "P" command permits you to write text while in graphics mode, and the "S" command allows you to select the size of those characters, in 64 different steps from a small $\frac{1}{16}$ of an inch high character to a giant 4 inch one.

The "Q" command lets you say in which of four directions you

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want that text printed: right side up, upside down, from the left up or from the right down.

The "A" command puts you back from graphics mode into text mode, moves your pen to the left margin and redefines the origin to that spot—all in one swoop.

In text mode, this plotter becomes a superb printer for listing your programs (ever seen your programs listed in red?) and is capable of either 40 or 80 characters per line on four-inch wide paper. Although the 80 characters-per-line mode uses 2mm high letters and numbers, they are still very legible.

This text mode also has several CHR\$ controls:

CHR\$(8)	back space
CHR\$(11)	reverse line feed
CHR\$(18)	select graphics mode
CHR\$(17)	select text mode
CHR\$(29)	allows rotation of the pen holder

In addition to the above software switches, the machine has four hardware switches:

1. Selection between parallel and serial interface. *If you are using the RS-232 interface on your computer, needless to say, put that switch in "serial" mode.*
2. Selection between 40 and 80 characters per line.
3. Choice of either "carriage return only" or "carriage return AND line feed." *In practice it turns out that all we need is a carriage return only, as the second choice will add an extra blank line for each line of text.*
4. "Special characters or 7-bit ASCII." *7-Bit ASCII is what you need, unless you live in Japan and want to write all of your text in Kanji characters.*

The paper width of this little machine is about 4 inches. It is made

in Japan, so all measurements are given in millimeters. Paper width is exactly 96mm. Each "move" or "draw" unit is 0.2mm or one-fifth of a millimeter long. Therefore, the paper is 480 units wide.

I found it much easier to think in 0.2mm units than in actual millimeters or, heaven forbid, the translation to the equivalent in inches or even fractions thereof. Thus, a command of

"M240,0"

moves your pen horizontally to the middle of your paper, and a command of

"D200,-200,-200,-200,200,200,200,200"

draws a box slanted at 45 degrees. Connection to the RS-232 box or card is simple. The plotter has a four-pin female DIN connector on the back. Radio Shack sells a matching male connector to use as your connecting cable (Radio Shack catalog no. 26-3014—about \$19.95). The other end of that cable has a male DB-25 connector that will match the female connector on your RS-232 card or box. The table below shows which pins to connect.

Male DIN Plug	Male DB-25 Plug
Pin #1	No connection
Pin #2	Pin #20
Pin #3	Pins #1 and 7
Pin #4	Pin #3

The Baud rate of this plotter is fixed at 600 Baud, so the "opening" statement should be either

OPEN #1:"RS232.BA = 600"

or

OPEN #1:"RS232/2.BA = 600"

depending on which of the two output ports on the RS-232 interface you use. Listing your programs is done, logically, with

LIST"RS232.BA = 600"

or

LIST"RS232/2.BA = 600"

Programs for this plotter can be written in either TI-Basic or in Extended Basic. Assembly language can be used, I assume, but I see no speed advantage here, as the plotter is a mechanical device, needing a definite execution time for each command—orders longer than commands in Assembly language.

In this article, we will show you several programs and their results, some written in TI-Basic, others in Extended Basic. The only advantage to the latter is its ability to combine several statements on one line. Unless, as in the final program of this article, you get real fancy and start using commands such as DISPLAY AT, to enhance the input screen; and INIT, forcing you to use even the 32K expansion memory. But how else would you POKE values into your program and use these advanced techniques known as "dynamic program modification"?

A few lines back, I switched from the pronoun "I" to the pronoun "we." I did this deliberately. The text of this article comes mainly from the pen (should we say more realistically "from the typewriter"?) of Maurice Swinnen. But once I start mentioning programs, I should include Thomas Coppens. He is one of the converts I talked about earlier. (And what a convert he turned out to be!)

Thomas teaches math at a high school in Antwerp, Belgium. I, on the other hand, came to the States, eons ago, and worked for the U.S. government. But we kept in touch, and I always fed Thomas the latest on the calculator or computer front.

Thomas, in turn, wrote magnificent programs for all kinds of machines. Many of his TI-99/4A programs, after translation into English of the prompting text and

Continued on Page 10

MINI-MAG 99 NOW ACCEPTING ARTICLES AND PROGRAMS

MINI-MAG 99 is looking for articles and/or programs that would be of interest to TI-99/4A Computer Owners and Users.

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TI-WRITER

Labels & Mailing Lists

By Leslyn Tepper

In the last issue, we set up a variable file for use with a form letter. Without having to re-enter all of the data again, it is possible to use the same variable file to create two additional files:

A labels file

A mailing list file

The TI-WRITER manual tells you how to set up a label and/or mailing list file; however, their method requires the user to make up new files with the information in its proper position on the page. It does not allow the use of the "variable" file to insert the information.

What happens if you try to use your variable file to run labels or a mailing list? Wherever the variable numbers appear, the computer picks up and prints the same name and address over and over until the end of the first page, then, going on to the next page, it picks up the following set of data for a full page, and so on.

If you want to run off several labels on each person in your list for some future use, this is fine. However, if you wish to run off one label for each person and a mailing list placing several different persons on one page, this technique leaves a lot to be desired!

The following is an example of a variable file that you may want to convert to a label or mailing list file:

```
1 John Smith
2 7324 Main Street
3 Anytown, CA 91364
4 (818) 333-7272
*
1 Mary Jones
2 2243 Central Avenue
3 Othertown, CA 90049
4 (213) 795-1212
*
etc.
```

Note: Since you will probably want to keep this variable file as it is, be sure not to save the new file under the same name.

I usually assign names to my files that indicate what type of files they are. For instance, if this were a sales file, I might name my three files

```
DSK2.SALESVAR (variable file)
DSK2.SALES LAB (label file)
DSK2.SALES LIST (mailing list file)
```

What you name your files is not as important as "cueing" yourself as to what each file contains. This really saves you time, and provides a consistent method of locating any files you are storing.

THE MAILING LIST

First, call up your variable file (LF in the text editor, and enter the name of your file). When it comes to the screen, enter command mode (Function 9) and replace string (RS). At this point, enter the following:

```
/*/.SP 2/(CR)
```

After entering this information, the cursor will stop on the first occurrence of an asterisk (*) and wait for your response (Yes, No, All Stop). Choose "All," by entering an "A" from the keyboard. All of the asterisks in your file will be replaced with a format command that allows a double space between each data set.

The next step is to eliminate all of the numbers in front of the data. This must be done manually, but will still take a lot less time than re-entering all of the data, especially if it is a very long file.

Go to the beginning of each line and delete the number and the space following it (Function 1).

When you have completed this step, you have a mailing list. Save this file under the mailing list name you wish to give it. When the "save" is complete, you will still have the file on the screen and can continue to alter it for use as a label file.

Later, after you have printed your mailing list, you may wish to set up the list with a specific number of names and addresses on each page.

To accomplish this, you go back into the file and enter "New Page" commands (Control 9) at each point you wish the new page to begin.

Note: These commands should replace a double space format command (.SP 2(CR)).

THE LABEL FILE

Since you have already set up the mailing list file, you have very little to do to obtain a label list.

Decide how much space you need between each label by looking at the information that will be printed on each one.

For instance, with our example above, we will have a three-line label: Name, Street Address and City/State/Zip.

If you were including a company name on each label, you would have a four-line label.

Note: You must use a one-across computer label for this method, since your data is placed in a single-label format.

A three-line label needs the command .SP 3(CR) between each data set, while the four-line label only requires .SP 2(CR).

Therefore, if you are using a four-line label, you need only to delete the information that you do not want on the label (i.e., telephone number, etc.) and then save the file under the name you have chosen for the label file.

If, however, you have a three-line label, you also need to change the .SP 2(CR) to .SP 3(CR) by entering command level (Function 9) and Replace String (RS):

```
/.SP 2/.SP 3/(CR)
```

Basically, the greatest advantage of using TI-WRITER for your mailing and label files is the fact that you are only limited by the size of your paper or label.

The main disadvantage is the inability to sort in any way (zip, alphabetically, etc.). □

PLOTTING

Continued from Page 7

slight enhancements to accommodate current American usage and taste, found their way into club libraries all over this country.

A rather simple program which tests all of the line types in the four possible colors is easy to write. It also demonstrates the fact that variables can be used in FOR-NEXT loops, as well as to store the numerical parts in the plot commands. Using Extended Basic, enter:

```
100 CALL CLEAR :: OPEN #1:
  "RS232/2.BA=600" ::
  PRINT #1:CHR$(18)
110 FOR I=0 TO 15 :: PRINT #1:
  "C";INT(I/4):"L";I:"J120,
  60,120,-60,120,60,120,-60":
  "R0,-20,-480,0," :: NEXT I
120 PRINT #1:"A" :: CLOSE #1 ::
  END
```

Line 100 clears the screen, OPENS the plotter and puts the plotter in graphics mode. Line 110 sets a 16-step loop. In that loop it tells the plotter to first use a pen color of I/4, which gives for I=0 to 3 the digit "0" or black color, for I=4 to 7 the digit "1" or blue color, for I=8 to 11 the digit "2" or green color and for I=12 to 15 the digit "3" or red color. Then it tells the plotter to draw, using a line type equal to I, each of the 16 lines with a different line type, starting with 0, a solid line, and ending with 15, a coarsely dotted line. Next it tells the plotter to draw a wavy line 16 times. The J means "draw relative." Line 120, finally, commands the plotter to stop all that nonsense, command "A", CLOSE the plotter and end the program.

When we first had the plotter, we tried out all kinds of doodles—simple two dimensional drawings that looked cute. But we got tired of it very soon. Simulating three dimensions became the next challenge.

Figure 1 shows our first attempt. By offsetting the figure by a small amount, as demonstrated in Line 170, we did the trick. Then, to enhance the three-dimensional effect even more, we introduced color, as done in Figure 2. Both programs are written in TI-Basic.

(NOTE: The figures are shown in black for the purpose of publication in Mini-Mag 99; however, most of the programs are written to utilize the 4-color capabilities of the CGP-115 plotter.)

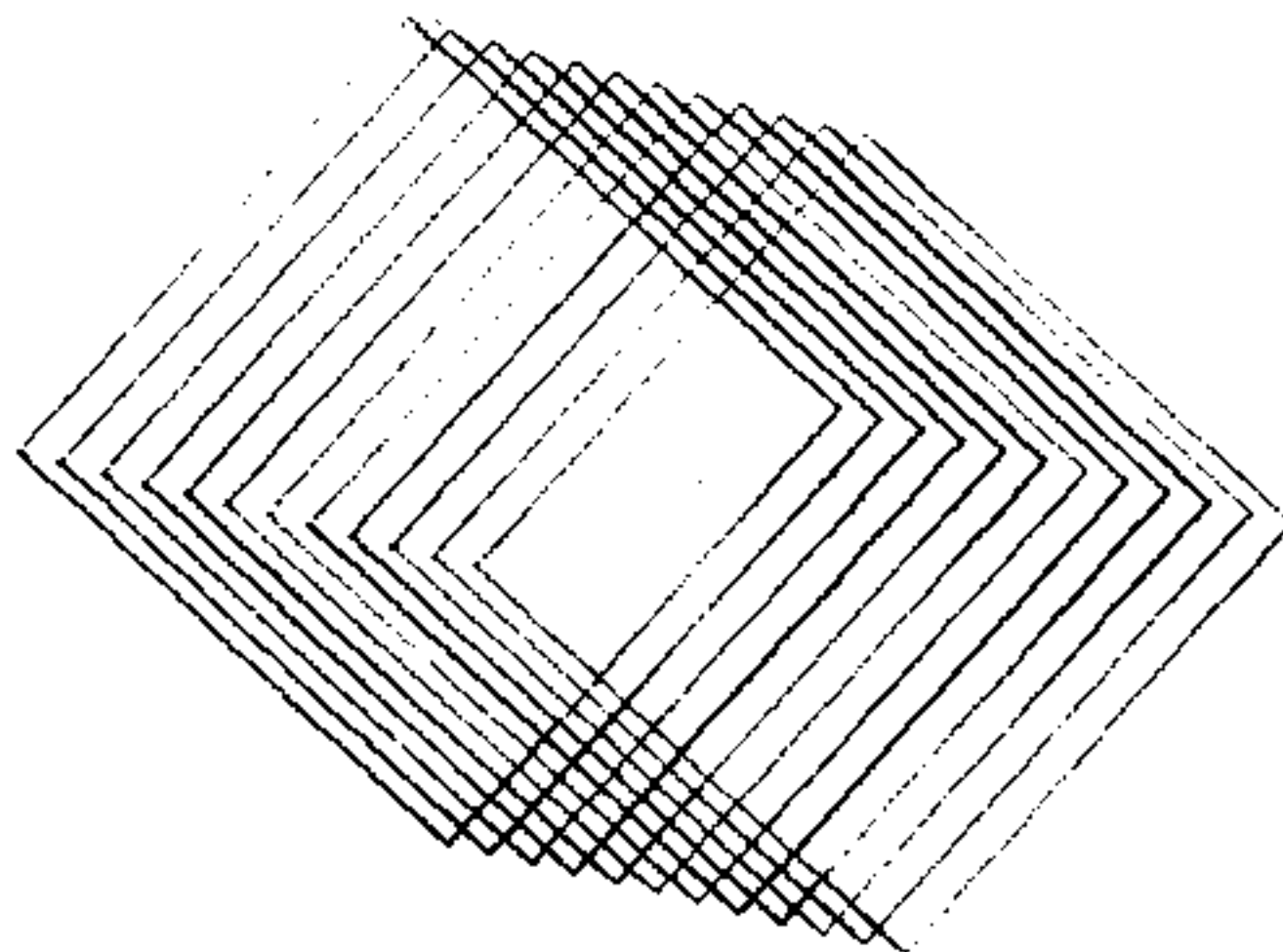


Figure 1, Three-dimensional, Slanted Box, in one color only. Program written in TI Basic.

```
100 REM SLANTED BOX
110 REM TI-BASIC MAURICE SW
  INNEN FEB 4 1984
120 CALL CLEAR
130 OPEN #1:"RS232/2.BA=600"
140 PRINT #1:CHR$(18)
150 PRINT #1:"M10,-200"
160 FOR X=1 TO 12
170 PRINT #1:"R10,-3"
180 PRINT #1:"J100,100,100,-
  100,-100,-100,-100,100"
190 NEXT X
200 PRINT #1:"M0,-450"
210 PRINT #1:"A"
220 CLOSE #1
230 END
```

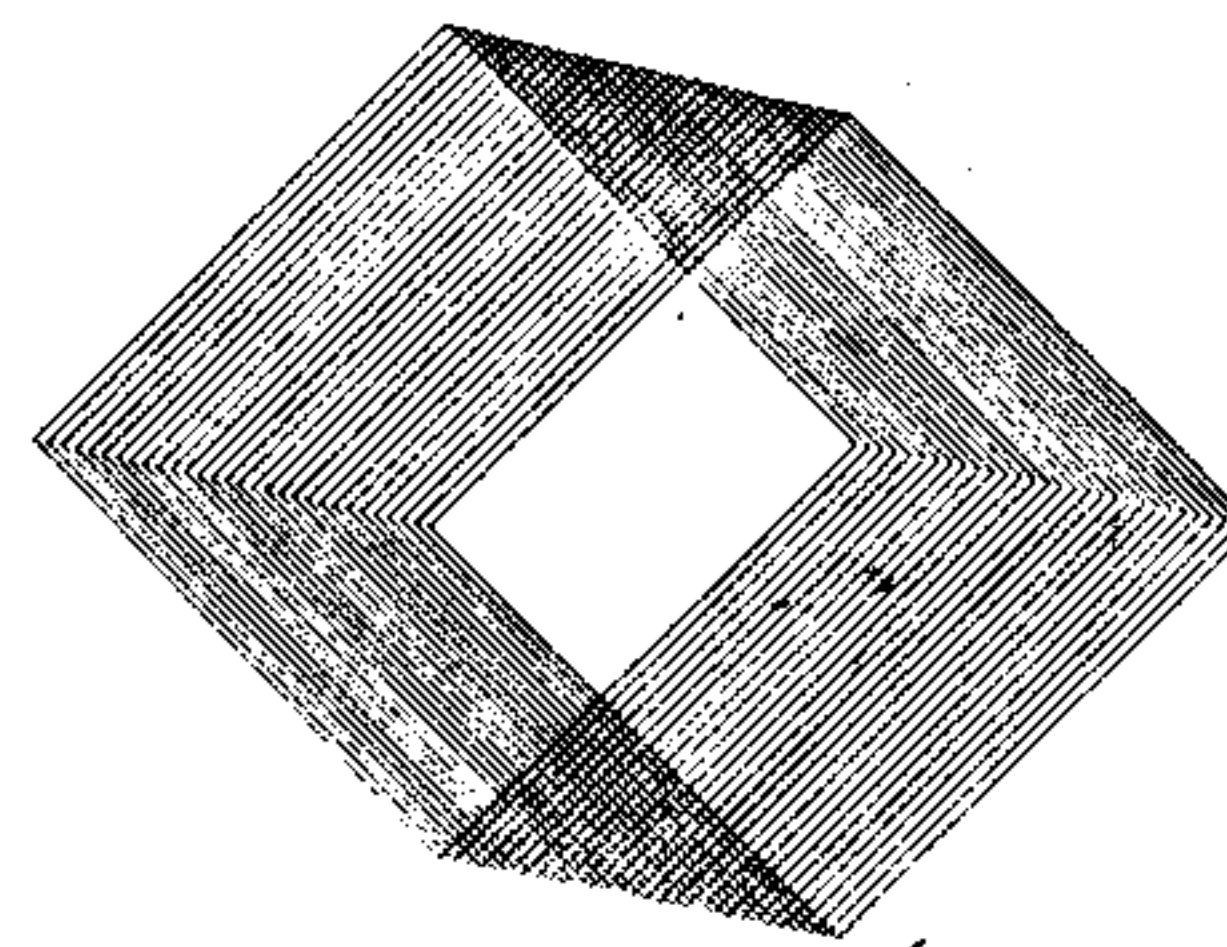


Figure 2, Slanted Box in four colors. Program written in TI Basic.

```
100 REM SLANTED BOX(2)
110 REM TI-BASIC MAURICE SW
  INNEN FEB 4 1984
120 CALL CLEAR
130 OPEN #1:"RS232/2.BA=600"
140 PRINT #1:CHR$(18)
150 PRINT #1:"M10,-200"
160 FOR X=1 TO 30
170 PRINT #1:"C";INT(X/4)
180 PRINT #1:"R5,-1"
190 PRINT #1:"J150,150,150,-
  150,-150,-150,-150,150"
200 NEXT X
210 PRINT #1:"M0,-450"
220 PRINT #1:"A"
230 CLOSE #1
240 END
```

Emboldened by our first success, we attacked several Escher drawings. For those of you who are not familiar with that unique art form, suffice it to say that Maurits Cornelis Escher was a Dutch artist, born around the turn of the century. He started out as an architect, but soon he was enthralled by repeating and often impossible patterns. He developed this art of the impossible to a high degree.

We have always been fans of Escher. Recently, we saw a new

work on, of all places, a Swedish postage stamp honoring Escher.

Figure 3 shows our rendition of that inimitable drawing. The program is written in TI Extended Basic and uses a different technique than our short programs.

Here, all the numerical parts of DRAW statements are contained in DATA statements and read into an array.

Note that with the exception of the one MOVE statement on Line 130, to establish the origin, there are no MOVE statements at all—only DRAW statements. This means that the pen has to draw twice over several lines. This technique has the definite advantage of simplicity in programming.

Once you have the rough sketch of what you intend to draw ready, it really is a cinch to code it. To enhance the drawing, we offset our pen by a small amount (see Line 140: R2,-2) and drew the entire design a second time. The effect is fascinating.

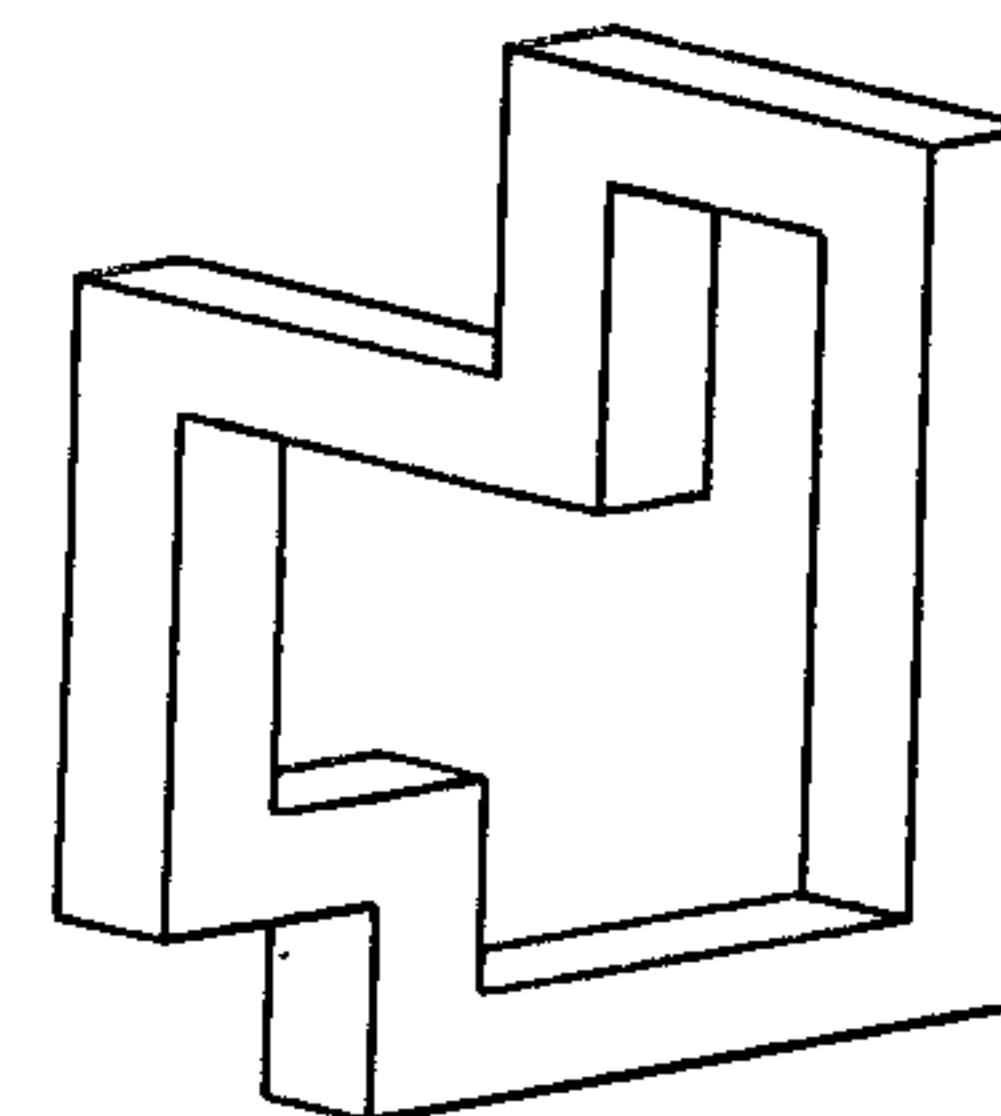


Figure 3, Escher Drawing, written in TI Extended Basic. Note how the plotter has traced the drawing twice, for added effect.

```

100 REM ESCHER DRAWING B,XBASIC,
    MAURICE SWINNEN,23 FEB 84
110 DIM X(50),Y(50)
120 FOR N=1 TO 50 :: READ X(N),Y
    (N):: NEXT N
130 CALL CLEAR :: OPEN #1:"RS232
    /2.BA=600" :: PRINT #1:CHR$(
    18):"C0":"M5,-500":"I"
140 FOR Q=1 TO 2 :: FOR N=1 TO 5
    0 :: PRINT #1:"D";X(N);",";Y
    (N):: NEXT N :: PRINT #1:"H"
    : "R2,-2":"I" :: NEXT Q
150 PRINT #1:"M10,-200":"A" :: C
    LOSE #1 :: END
160 DATA 0,290,200,250,200,270,5
    0,300,0,290,200,250,200,400
170 DATA 400,360,450,370,250,410
    ,200,400,400,360,400,10,350,
    20
180 DATA 200,-10,200,-30,400,10,
    350,20,350,320,250,340,250,1
    90
190 DATA 300,200,300,330,250,340
    ,250,190,50,230,50,-10,0,0
200 DATA 50,-10,150,10,150,-90,1
    00,-80,100,0,150,10,150,-90
210 DATA 450,-30,450,370,450,-30
    ,150,-90,150,10,50,-10,50,23
    0
220 DATA 100,220,100,50,200,70,1
    50,80,100,70,100,50,200,70,2
    00,-30

```

changed manually each time on the plotter by pressing the COLOR SELECT button.

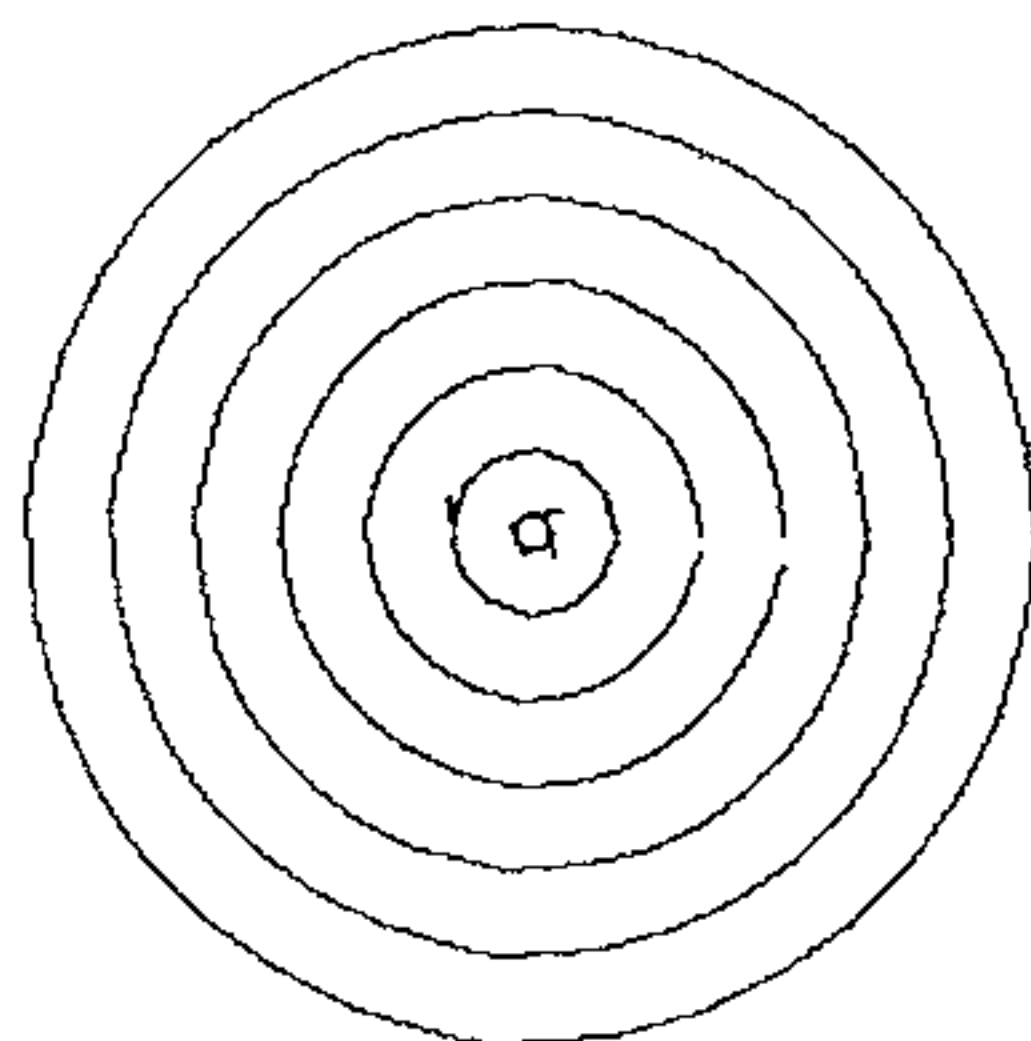


Figure 4, Circles, written in TI Extended Basic. If a line is added to define "PI," such as "115 PI=3.14159," this program could also run in TI Basic.

```

100 REM CIRCLE,XBASIC,ALLEN
    MINTON,1/30/84
110 OPEN #1:"RS232/2.BA=600"
120 PRINT #1:CHR$(18):"M240,
    -240":"I"
130 INPUT "RADIUS = ":R
140 PRINT #1:"M";R;",";0"
150 DT=2*PI/36
160 FOR T=0 TO 2*PI STEP DT
170 DX=R*COS(T)
180 DY=R*SIN(T)
190 PRINT #1:"D";DX;",";DY
200 NEXT T
210 PRINT #1:"H"
220 GOTO 130

```

Straight lines soon lose their charm, too. The first challenge we tackled was a circle. A technique can be used that is used effectively in Logo: advance one, go one to the left. But in actual paper plotting, this turns out to be rather slow.

Allen Minton came to the rescue with an efficient algorithm, as you can see in Figure 4.

Note that on the TI-99/4A, angles are measured in radians rather than in degrees. The program asks you to choose a radius, which you must give in drawing units of 0.2mm each.

The outer circle is 120 such units, and the inner ones are each of 100, 80, 60, and so on. The color was

Another beautiful curve is the spiral. A friend of mine, who works professionally as a civil engineer, was once given the task of surveying the entire railroad system in the Eastern United States.

The main reason for this survey was the avoidance of future train accidents due to faulty layout of the curves. From him, I learned that railroad curves are always parts of a

spiral, and we spent many evenings together looking up all kinds of obscure references to spirals.

Figure 5 shows a double spiral, one wound into the other. Line 270 determines the "tightness." "R-.5", for example, will result in a more closely wound spiral, while "R-2" will loosen the spiral.

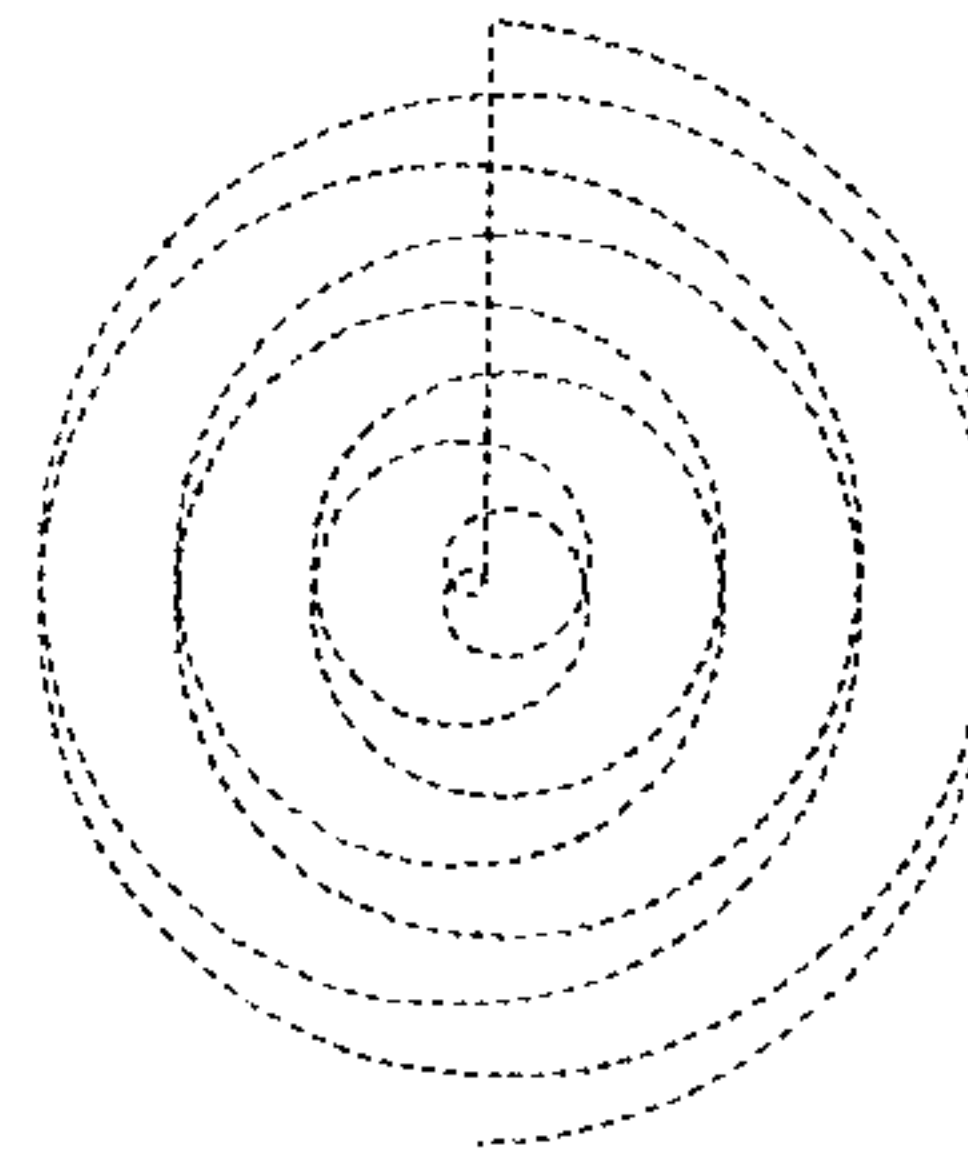


Figure 5, Double Spiral, written in TI Basic.

```

100 REM DOUBLE SPIRAL
110 REM TI-BASIC MAURICE SWI
    NNEN FEB 4 1984
120 CALL CLEAR
130 OPEN #1:"RS232/2.BA=600"
140 R=200
150 PRINT #1:CHR$(18)
160 PRINT #1:"L4"
170 PRINT #1:"C0"
180 PRINT #1:"M240,-240"
190 PRINT #1:"I"
200 PI=3.14159
210 P2=2*PI
220 FOR I=0 TO 800 STEP 2
230 S=I/100*P2
240 X=INT(SIN(S)*R)
250 Y=INT(COS(S)*R)
260 PRINT #1:"D";X;",";Y
270 R=R-1
280 NEXT I
290 PRINT #1:"M0,-240"
300 PRINT #1:"A"
310 CLOSE #1
320 END

```

Next month, we will discuss pie charts, function plotting, Polar function plotting and planning on the screen to save time and paper on your plotter. □

LETTERS

Continued from Page 3

TI-WRITER

Congratulations on, and Thank you for, your new publication. I enjoyed your first edition so much that I have already sent in my subscription order. We 99'ers appreciate the continued support of vendors and publishers like yourself. It is reassuring to know that we haven't been cast adrift in a vast and empty sea.

In addition to my praise, I now pose a question concerning my TI PH2500 printer and the TI-Writer software, specifically, how does one change type styles within the body of a form letter? Is there a key which can be built in at the time of formatting to tell the printer (via the formatter) to switch to condensed, enlarged or standard printing starting at a designated place in the text and continuing to another specified point in the text? The printer documentation is unclear on this and having the flexibility to alter type styles within a letter would be most beneficial.

L.M.C., Plainville, MA

Yes, it is possible to specify type changes from within the editor via the use of format commands. However, you can only make your printer condense and/or enlarge print if the printer, itself, has that capability. I am, at this point, unfamiliar with the printer you have, but it should tell you in the printer's manual if it does provide this function.

If so, then the use of the "transliterate command" will provide you with the means. With this command, you assign the ASCII code of a key you may not use too often (i.e., a plus sign—ASCII 43) and "transliterate" it to represent the function you wish to achieve (on my printer, expanded print is ASCII 14). Therefore, my format command would be

.TL 43:14(CR)

and means that every time I push the plus sign on the keyboard, I am changing to expanded print until the next line occurs in my copy (the "turn off" point will also vary with different printers).

It takes a little experimentation to see how your printer "listens" to your formatter. We will be sharing more about this in future TI-WRITER articles. You may also refer to MICROpendium, Volume 2 Number 1, February 1985, Page 12-15, "Taking Control of TI-Writer," by Ron Castleton for a few hints.

Continued on Page 24

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SPECIFY DISK OR CASSETTE VERSION

IN, OUT & IN BETWEEN

by Jim Labriola

When two people are trying to communicate and one of them is blind and deaf, they must find a suitable medium for understanding one another. The same is true with computers—each must have a medium that connects the outside world with its internal processes (input/output devices).

The keyboard, an input device, is the primary piece of hardware that is used by the individual to enter data and to program the computer.

To keep in touch directly with the internal process of the computer, a cathode ray tube, with or without sound, is used to monitor the flow of data.

A most crucial part of any computer is the central processing unit (CPU). The TMS 9900 is a 16-bit microprocessor. It coordinates 2 bytes of information at a time.

The CPU directs data to and from memory by addressing specific parts of memory. The CPU contains the arithmetic logic unit (ALU) in which a group of function circuitry is located.

This group contains the accumulator temporary register and flip flop circuitry. The ALU can combine, add, subtract or carry out comparison word operations.

Instructions and pertinent data is stored in memory.

The first type of memory is called the Read Only Memory (ROM). A ROM memory is permanent information that is placed in the computer at the time of manufacturing.

Random Access Memory (RAM) is where data is temporarily stored. This is also called volital memory because a power failure can cause loss of information.

Random Access means that the CPU can address certain parts of the RAM memory to place or retrieve data or instructions. The keyboard and CRT monitor are tied into the computer by means of input/output ports (I/O ports).

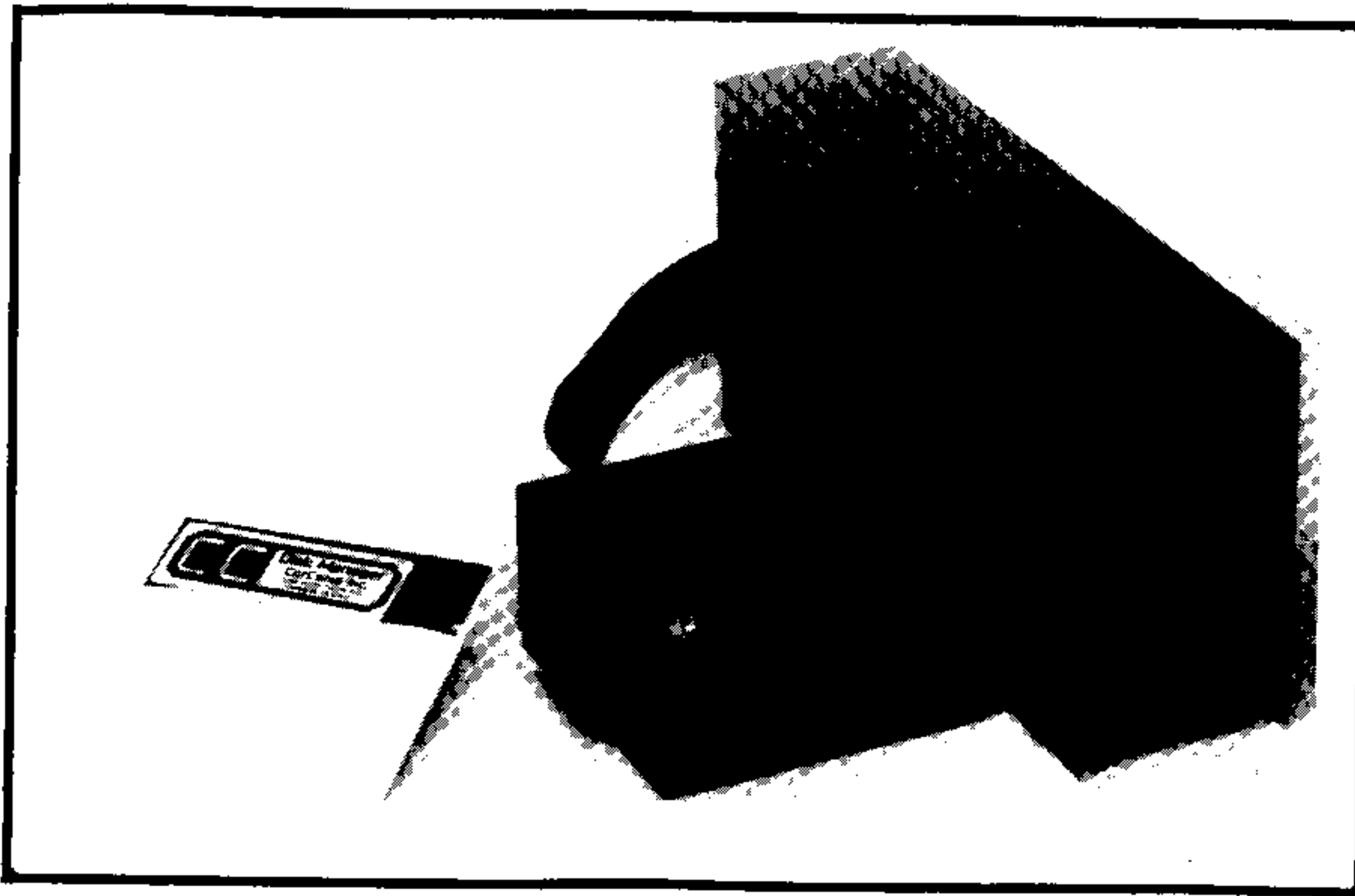
In general, I/O ports are gateways through which external hardware transmits data and instructions to and from the computer.

In the TI-99, the communication register unit (CRU) is used as a secondary means of addressing components in conjunction with the address bus of the computer. It primarily addresses the I/O ports.

Data and address buses are the internal connections in which the different components of the computer are tied together. Address buses are used by the CPU to access memory and other control components. In turn, data buses are used to send data from place to place in the computer as directed by the CPU.

All functions in the TI-99 computer are coordinated on the basis of time. This is accomplished by the use of the TMS 9904 clock and the timing and control logic unit. The clock operates the computer at a speed of forty-eight million clock pulses a second. The timing and control logic unit gives each component the proper amount of time in which to work.

The TI-99, by itself, has a limited amount of memory and basic routine functions. By implementing additional external components (i.e., 32K memory expansion, disk drives, etc), the capabilities of the TI-99 are greatly expanded. □



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It is a full system which includes 32K memory, RS232 and the 9900 DD/DS Disk Controller.

The small black box measures 5" x 5" x 3" and replaces the TI Peripheral Expansion Box (17" x 12" x 7").

Although the system cannot be expanded (i.e., no additional features may be added like Pascal, more memory, CP/M, or 80 column, etc.), it offers the capability of controlling up to 4 disk drives without even the sound of a fan.

Each Double-Sided, Double-Density drive can store 360K Bytes of information. With two DS/DD drives, the on-line storage is 720K, and with four DS/DD drives, it is increased to 1.4 Megabytes.

Included with the system is the CorComp 2.3 Disk Manager. The user has a lot of control with the system since he is allowed to *Configure* the disk manager uniquely to his system. He can select his own text and screen colors, set up each of the different drive types attached to the controller for number of sides, density and number of tracks; set the printer type for catalog and disk test print outs, and then save the configuration on the disk and use it as default data when the disk manager is loaded.

The CC-Disk Controller also adds eight new commands and programming statements to Basic and Extended Basic.

The technical reference manual is organized, and to date we have had no problem finding any information that we needed. The Disk Controller Reference Manual that we received with the system is a photocopy of

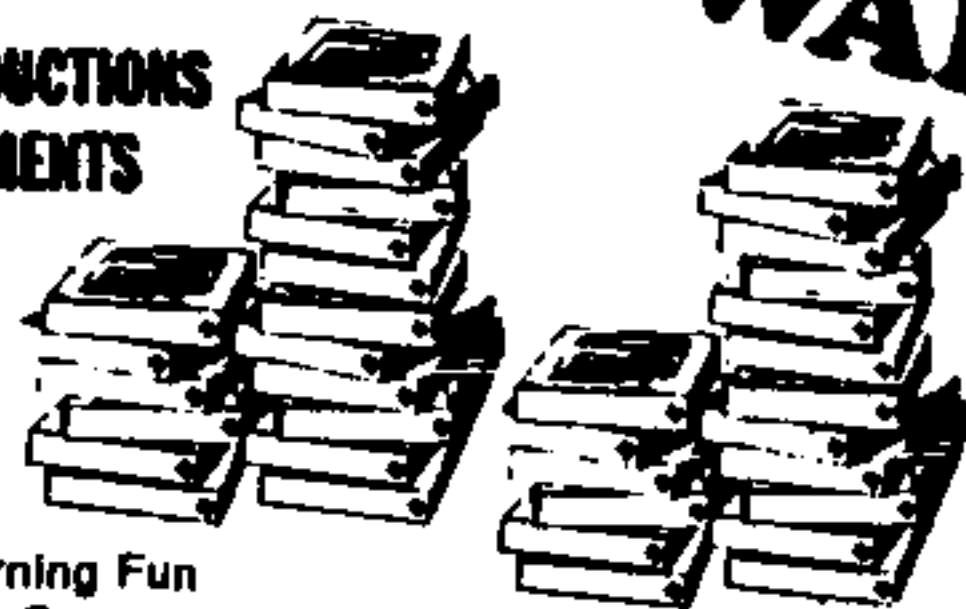
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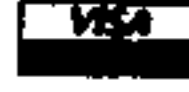
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99 PUZZLE OF THE MONTH

```

R A B H S U A F O W W G M L M B C P V A
G K J R I X H R X J A L I L H O F F T X
B V Z B W Y C L T T L B L E U P W B Q X
P D U X T R O R R V E A U R S G K X D K
G P Q P E G O J Z L L D S S S T W A X O
M I V E O T O L I N N E O Y O E B R V D
F V D J I M N F O A W F N A H G H H Z Y
P O F N N J B I M A X T U S Q A O Z X O
C U O S Z U S M R A H D N N X S H S Z P
X M T G S N O E D E E U R D C F S K O H
A I C P A C Q T S E T Y B G H T E D X N
B W M P R U A I F R U T R D N Y I M O T
R L X X I O Z F O D G O I G B F I O B D
S E J T B E G T B L M S H O F I H L N E
W L H E T S S T X S K I A Y G T K J R H
K R U T Z L S R A E W R N V M V W H C U
L S H I U X C I T M D H R U O T Q H E E
T S B M U K V T C R G J K B V F A A C A
Q W E V X E E I P W X W K I U R U C W W
Z P S A L U F Z G F I C D D P O C P W J
  
```

DIRECTIONS

There are 20 words hidden in the above puzzle. You may find them horizontally, vertically or diagonally, and they may be either frontward or backward.

The word list is at the right. Check each one off as you locate it in the puzzle. Good luck!

BITS
BYTES
CODE
COMMAND
COURSEWARE
DISKETTE
EMULATOR
EXPANSION
FUNCTION
GOSUB

GROM
HCHAR
KEYBOARD
LOGO
MONITOR
PROGRAM
QUIT
SUBFILE
SYNTHESIZER
XBASIC

TID-BYTES TO WET YOUR APPETITE

GPL GRAPHIC PLAN DESIGN AID

GPL Software announced the planned release of their first product for the TI-99/4A Home Computer, the "GPL GRAPHIC PLAN DESIGN AID."

It requires only cassette and TI Extended Basic and allows the creation of a plan, chart or design on the screen using a character set of *the user's own choice*. The GPL Graphic Plan Design Aid features:

MENU DRIVEN major functions
NO DISK, EXTRA MEMORY OR JOYSTICKS required (Diskette version requires 32K Memory Expansion).

USER-DEFINED CHARACTER SETS of up to 26 characters and 4 colors in addition to black. This allows precisely detailed symbols to be custom designed for any applications.

PRINTED REPLICAS of the the plan may be produced in normal or double-size scale on the popular Star Gemini graphic printer, or alphanumeric substitutes may be defined and printed on a character printer.

SAVE PLANS, starter-plans and conversion symbols on external media.

PRE-DEFINED CHARACTER SETS are provided with the system:

- Vegetable Garden Design
- Landscape Design
- Shapes for Drawing
- Graph Plotting
- GPL Script



Release of the GPL Graphic Plan Design Aid is scheduled for Spring of 1985. GPL Software, 5699 Kanan Road, Agoura Hills, CA 91301

RECORD ALBUM COLLECTION

Thomas J. Strang has released a new program called, "Record Album Collection," for TI Extended Basic. This program requires TI-99/4A, 32K memory expansion, disk drive, Extended Basic, and an optional printer.

The information fields in each record include: album title, album side, 7 songs and classification of music.

The program will maintain one or more disk files, with a maximum of 350 records per file. Program will allow the file to be maintained on a current basis, with adequate display and printer routines to satisfy information needs, whether or not the user has a printer.

The menu screen includes: inquiry, update, file setup and printer options.

All record albums are stored by side and indexed by artist. Program on disk and user instructions, from Thomas J. Strang, 1049 Grand Central Avenue, Glendale, CA 91201 \$29.95.

LOTTO PICKER

RIDGE SERVICES, 170 Broadway, Suite 201, New York, NY 10038, has just announced its newest software release for the

Texas Instruments Home Computer (TI-99/4A), "LOTTO PICKER."

The program generates a series of random plays for all Lotto-type games, duplicating the same process used by Lottery Commissions, in order to eliminate bias from the selections. Lotto Picker has the 16 most popular lotto games in North America pre-programmed into it. Of course, users can easily substitute a game not in Lotto Picker's memory. Keyboard or printer output controls allows Lotto Picker to be customized to any system. Written in Console Basic so that every TI-99/4A owner may enjoy and profit from this program, on cassette or diskette for \$25.00.

GENERAL-INTEREST UTILITIES

Asgard Software, P.O.B. 10306, Rockville, MD 20874, has begun to concentrate its efforts on producing general-interest utility software for the TI-99/4A.

The first four products in this area are the Schedule Manager, Stamp Manager, Music Synthesizer and Balloon War.

Schedule Manager is a business/home program that features a calendar, a four-month appointment book, and a twenty-five page notebook.

All sections are integrated for easy transfer between options. It has pull-down menus and windows (a la *Mac*), and a HELP function with explanations of over 35 features of the program.

User friendly, the program requires Extended Basic, a 32K memory expansion, at least one disk drive and controller. The printer is optional. \$29.95

Stamp Manager is for the philatelist and saves the user long hours of tedium in maintaining a complete catalog of a stamp collec-

tion. Sorting capabilities and printing by Scott Number, quantity, value or date purchased. User control over all the entries, including selective editing, deletion or updating of new or old files. Pull-down menus and error information (in English). Comes with a 10-page manual. Extended Basic, 32K, disk drive and controller. \$16.95

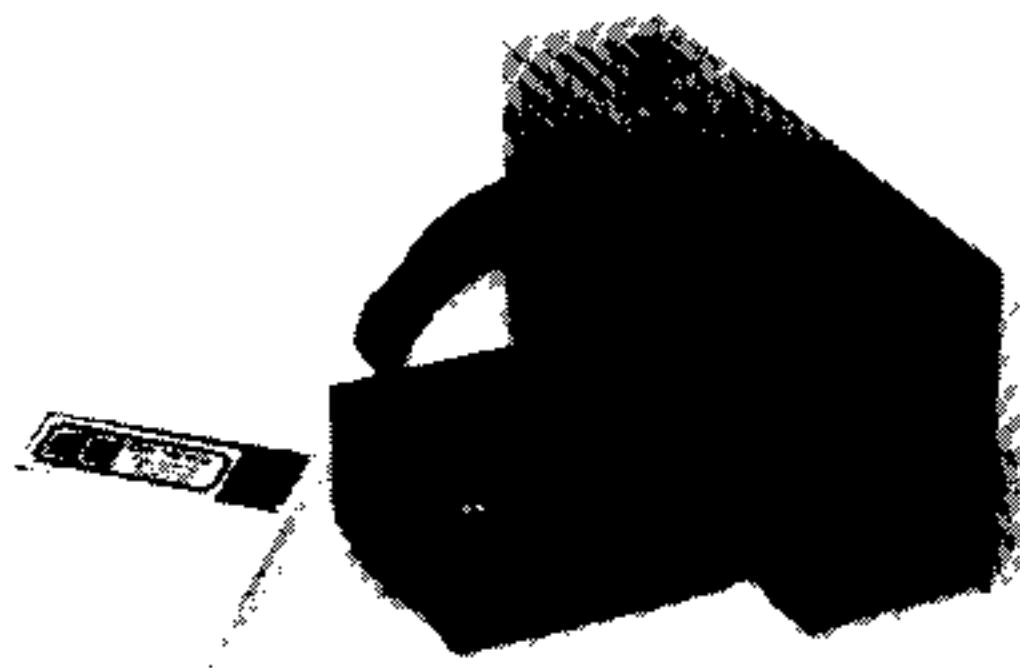
Music Synthesizer is designed with the music novice in mind, and features easy-to-follow menus, and a simple note-placing scheme that even a child can master. Requires Extended Basic, 32K memory expansion, a disk drive and controller. \$16.95

Balloon War is a strategy/arcade game. The user is in command of a balloon which must be flown across 30 screens to a base deep in the desert, while avoiding or destroying enemy tanks, soldiers and artillery that are determined to destroy the balloon. The balloon also uses up crucial fuel, sandbags, and bombs and has a leak. Requires Extended Basic, a disk drive and controller. \$11.95

If you know of any plans for new products, send details to:

S.O.S. Publishers
Product News
21777 Ventura #203
Woodland Hills, CA 91364

.....
If you find a path with no obstacles, it probably
doesn't lead anywhere.
.....



typewritten pages, a little cumbersome, but we are sure that Cor-Comp is in the process of having this manual typeset and published in a more suitable format. The information, however, is very clear, with examples of screen menus and results of user choices.

Overall, Mini-Mag considers the 9900 MICRO EXPANSION SYSTEM to be an innovative, compact and practical approach to expanding the 99/4A.

CAREFULLY CHOSEN

It is *poor taste* to cast derision on an unnamed magazine via a letter to the editor. I am sure it was carefully chosen.

That magazine was the firm foundation upon which most users learned about the TI. Its size and quality make up for the paucity of issues in this transition year.

You would do well to realize that you are riding on its shirt tails in a very real sense. You would also do well to realize that you are going to be stronger supporting each other, rather than competing.

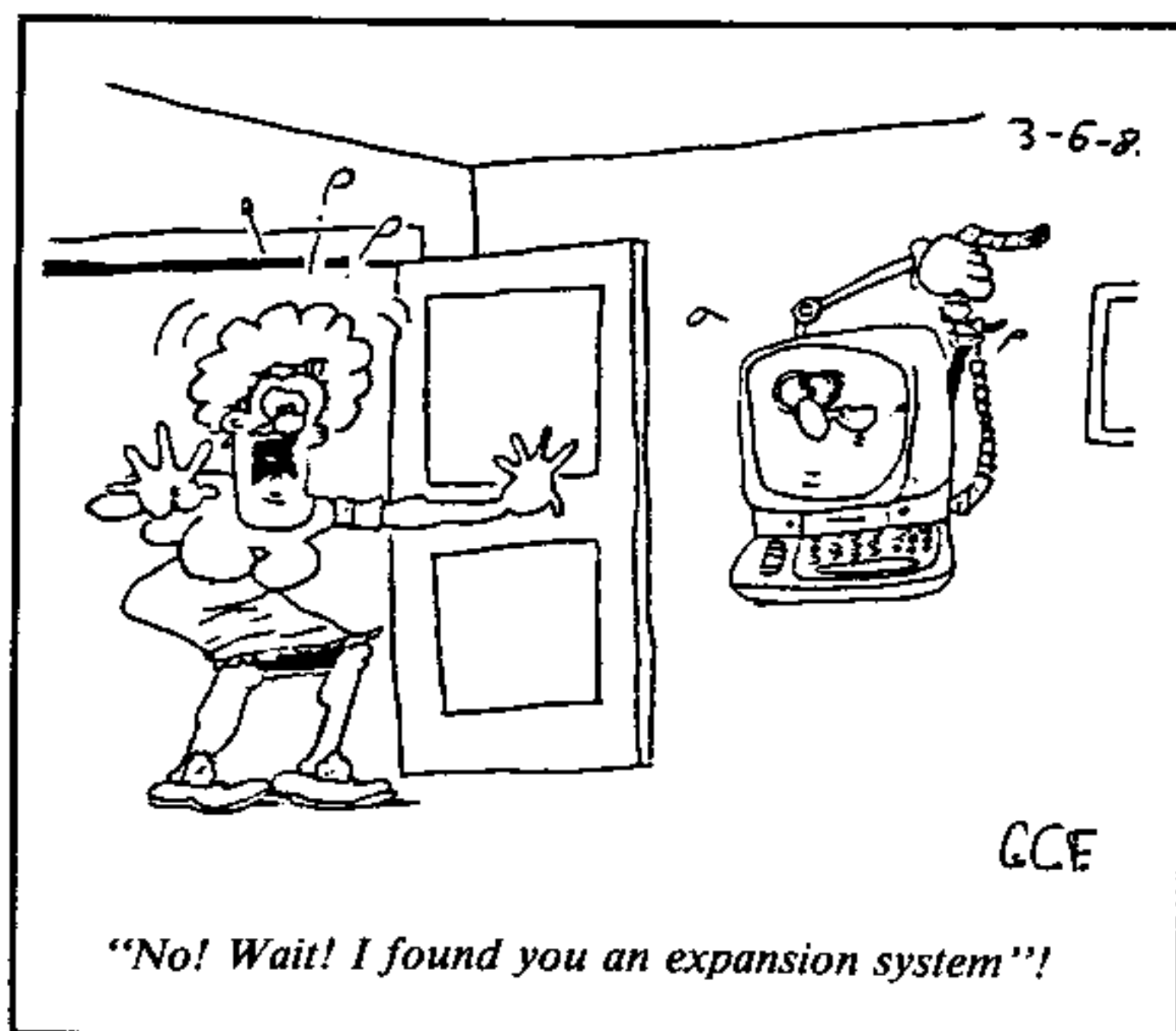
My personal policy is to support *all* that support the T.I., hence my subscription to you. Let the *cooperation* of the many users groups be a lesson to you.

FRANK

Frankly, Frank, one of the reasons that we began to publish Mini-Mag 99 is our love for the above mentioned magazine, which we so dearly miss. I'm sorry that it appeared to you that we chose the letter for any other reason than the fact that we were pleased with the enthusiasm of its author.

In addition, we recommend all TI users to subscribe to any and all publications that can offer even the smallest bit of information to expand their knowledge in the use of their computer. This includes, HCM and MICROpendium. As for us, we subscribe to HCM and pick up a MICROpendium each month from a local dealer.

Continued on Page 27



**Don't Miss
One Issue
Of
Mini-Mag 99
Subscribe Today**

NOTES

MODIFY EARLY MODULES

Kent Maxwell found a way to be able to print the Weight Control & Nutrition Module and the Tax Investment Record Keeping Module to a parallel printer. (*Editor's Note: TI produced these modules prior to the availability of an RS232 card with a PIO output, so the menus did not provide for same.*)

The procedure is as follows:

1. When setting up your files, tell the computer that you will not be using a printer, then create your data files accordingly.
2. When reviewing the files, put in any fictitious printer call up (i.e., RS232/8) and the computer will indicate *DEVICE NOT FOUND*. At this time, enter in PIO, and the computer will allow access to a parallel printer.

The procedure may vary slightly between the various early modules, but the key is to avoid a printer identification in the data unit, process, then put it in later when recalling and reviewing the previously entered data.

Kent Maxwell is an avid TI enthusiast who is employed with the VA Hospital in Sepulveda, California on the security force, and is also a member of Tex-Comp's technical consulting group.

ADVENTURES

In response to the overwhelming success of its Adventure Series offer of all 12 adventures, plus a new bonus adventure, Tex-Comp has announced the formation of a separate division to support the thousands of 99/4A owners who are into "adventuring."

In addition to the Adventure Series, Tex-Comp is also marketing an Adventure Editor which permits the user to write original adventures on cassette or disk for use with the TI Adventure Module.

This program, which runs on Editor/Assembler (disk) or Mini Memory (cassette), also permits the editing of the original Adventure Series plus transfer of cassette to disk or vice versa.

The new Tex-Comp Adventure User Group will serve as a clearing house to distribute the original Adventures being submitted by users who wrote them with the new Adventure Editor.

Tex-Comp also markets the entire Infocom Adventure line for the 99/4A, including the widely acclaimed Zork series.

NEW USERS' GROUP IN NY

According to Alvino Williams, Jr., president of the Brooklyn 99'ers, TI-99/4A owners in search of excellent public domain software for the 99 should look into the "Brooklyn 99'ers." This group will consist of public domain software, monthly newsletter, and meetings. The yearly fee is \$5.00. For more information, you can contact the Brooklyn 99'ers at 375 Blake Ave., Apt #8H, Brooklyn, NY 11212

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Foundation Computing 128K Memory Expansion Card

Equipment to emulate

By JOHN KOLOEN

Foundation Computing's 128K memory expansion card is a product that has remained unique in the TI marketplace. The card has been out for more than a year, and still there are no imitators.

Since introducing the card, Foundation has made a significant improvement to it by marketing Disk File Emulator firmware that allows users to access the extra memory in a straight-forward manner. Prior to the availability of the Disk File Emulator several months ago, the card was of greatest use to those who used it in programming and could write programs to access the cards 128K of Random Access Memory. The Disk File Emulator chip option changed all that, making three 32K memory banks easily accessible to even casual users.

Purchasers may order the 128K card without the emulator firmware, but I do not know why anyone would want to. For an extra \$35 or so the company will ship the card with firmware implanted, and I recommend the firmware option to any would-be purchasers. It is the brains of the outfit, so to speak.

Performance: With the exception of the activity light in the front the card (which is green), once it is installed in the PEB a user is not likely to notice any difference between the Foundation card and the standard TI issue. The card itself is as sturdy as a TI card and fits the PEB like a glove.

The card actually consists of four memory banks. The lower one functions in the same manner as the standard 32K of RAM found in the TI card, and the other three banks have 32, 32 and 24 kilobytes of RAM, respectively. 8K of the last bank is used for the disk emulator software.

The upper three memory banks provide the user with potential not available in any 32K card. Although it is possible to address these banks

Review

Report Card

Performance: A
Ease of Use: A

through such cartridges as TI-Writer and Microsoft Multiplan.

Basically, the emulator allows the user to access the upper three memory banks in much the same way as one would access a disk drive. Only the names are changed. Instead of entering DSK1 to represent disk

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* Add 3% shipping, California residents add 8.5% sales tax.

NOTES

Continued from Page 25

TEXAS INSTRUMENTS HOSTS AWARD BANQUET

Each January, the world famous Lawry's Prime Rib Restaurant in Beverly Hills, California hosts the competing Rose Bowl football team to a prime rib dinner where incredible amounts of food are consumed.

In February, Lawry's was also the scene of the annual Texas Instruments Award Banquet.

For the second year in a row, Tex-Comp received the coveted TI Million Dollar Award as the leading TI-99/4A retailer.

In presenting the award, consisting of a large oak and bronze plaque displaying the TI logo, Keith Lewis, Western regional sales manager for TI's consumer product group, commented that it was incredible that Tex-Comp could increase its 99/4A product line sales by \$1,000,000 each year following the withdrawal of TI from the home computer market place.

Another TI official attending the banquet indicated that Tex-Comp's success was a result of its total dedication to supporting the continuing 99/4A market by offering users the best products available at the best price.

Another speaker, Robert Kerkis, an officer and business analyst for Union Bank, attested to Tex-Comp's successful marketing of the TI-99/4A product line, and commented that Tex-Comp, with its financial strength, buying power and strong banking ties with Union Bank, a member of the Worldwide Charter Group, is able to move quickly to take advantage of special offers, closeouts, and promotions so as to be able to offer even greater values to its customers.

Almost anyone who is anyone in the Southern California 99/4A scene was present at the gala event, including user group representatives.

In accepting this award which TI presents to its leading computer dealers, Jerry Price of Tex-Comp expressed Tex-Comp's appreciation for the support and cooperation it has received from its suppliers, customers and many of the leading user groups and assured everyone present that Tex-Comp would continue to meet the needs of the TI home computer user.

LETTERS

Continued from Page 24

DataBioTics

Is DataBioTics real? I was going to buy a PC, or a Compaq, or a KayPro this weekend, but decided to hold off. If DataBioTics is real, with their expansion plans for the RAM, and with the hard disk system, I can wait! Your article makes it sound like we could expand into virtually the most complete Micro system in the industry.

Yes, DataBioTics is real. We have seen the prototypes of the products in question. One DataBioTics distributor, Tex-Comp, will be announcing the availability of these products in a future issue of Mini-Mag 99, and they have promised us copies for review.

Even if you are on the right track, you'll get run over if you just sit there.

**This Issue
of Mini-Mag 99
has been
enclosed
in your
shipment**

**Compliments
of
TEX-COMP**