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HOME COMPUTER magazine

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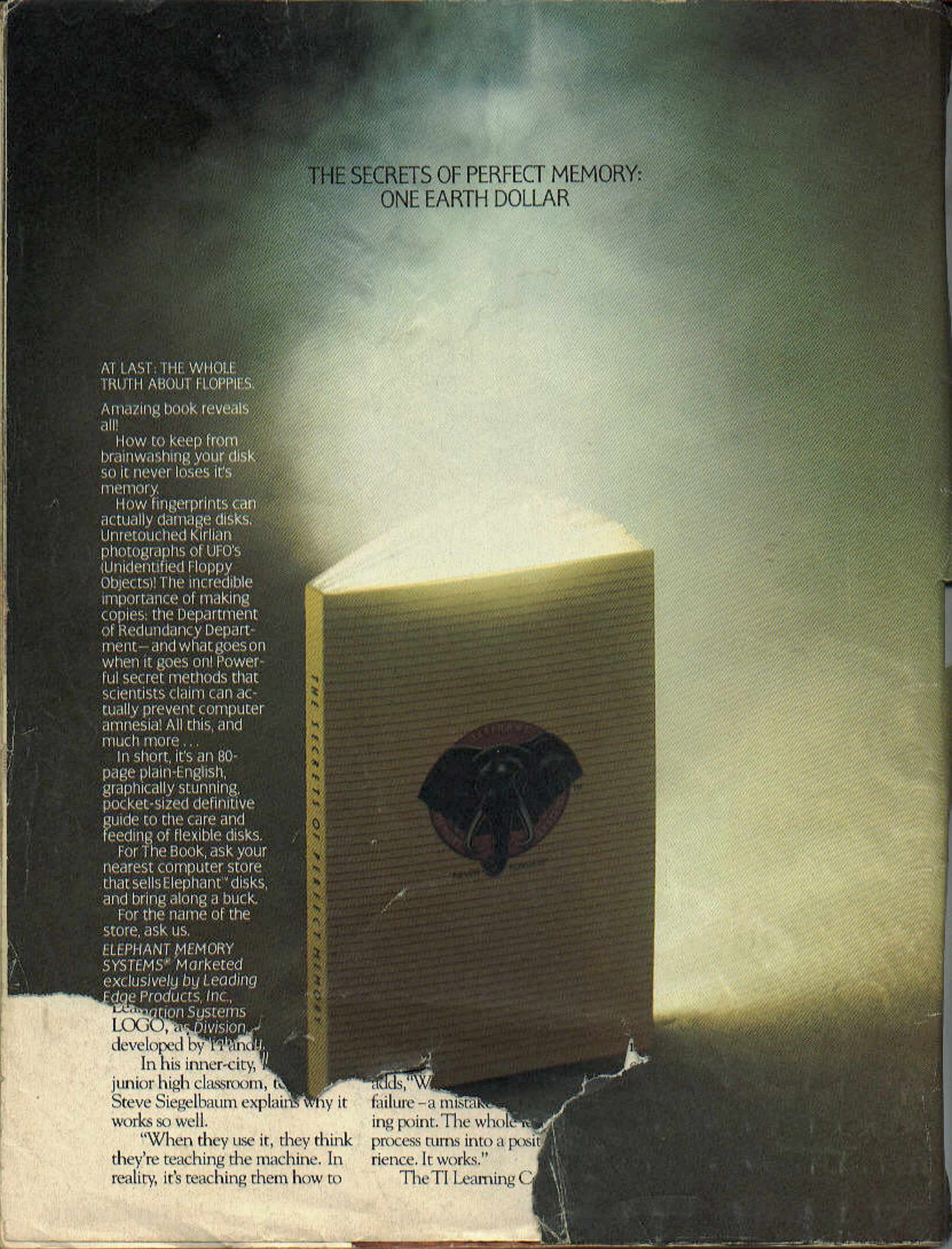
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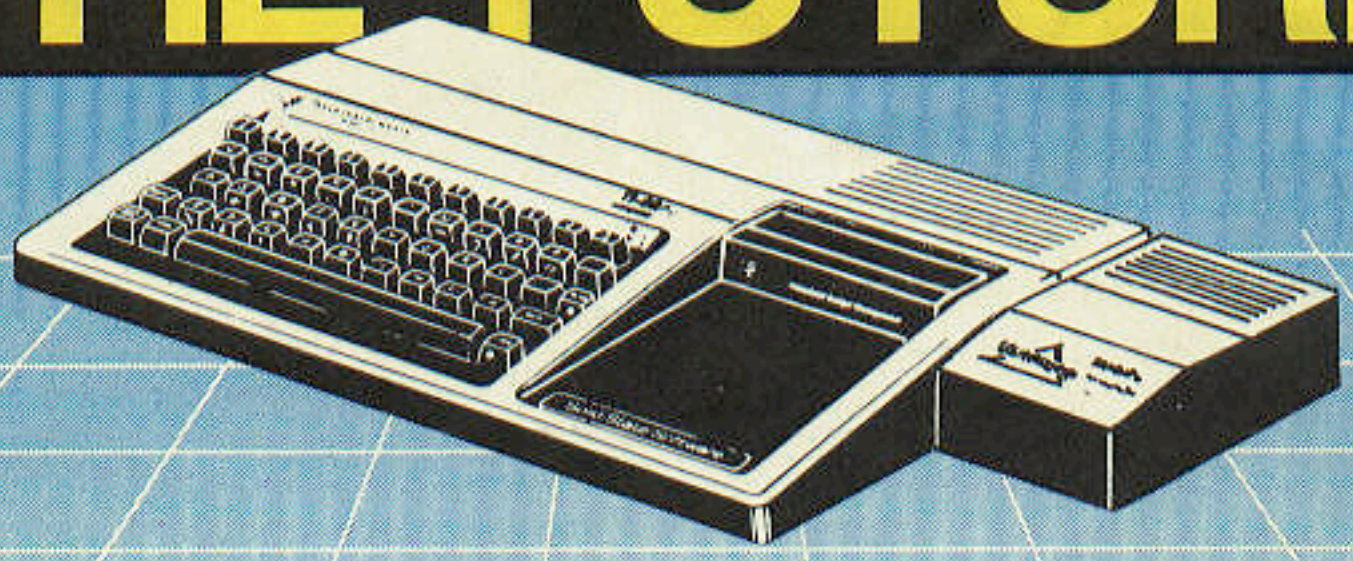

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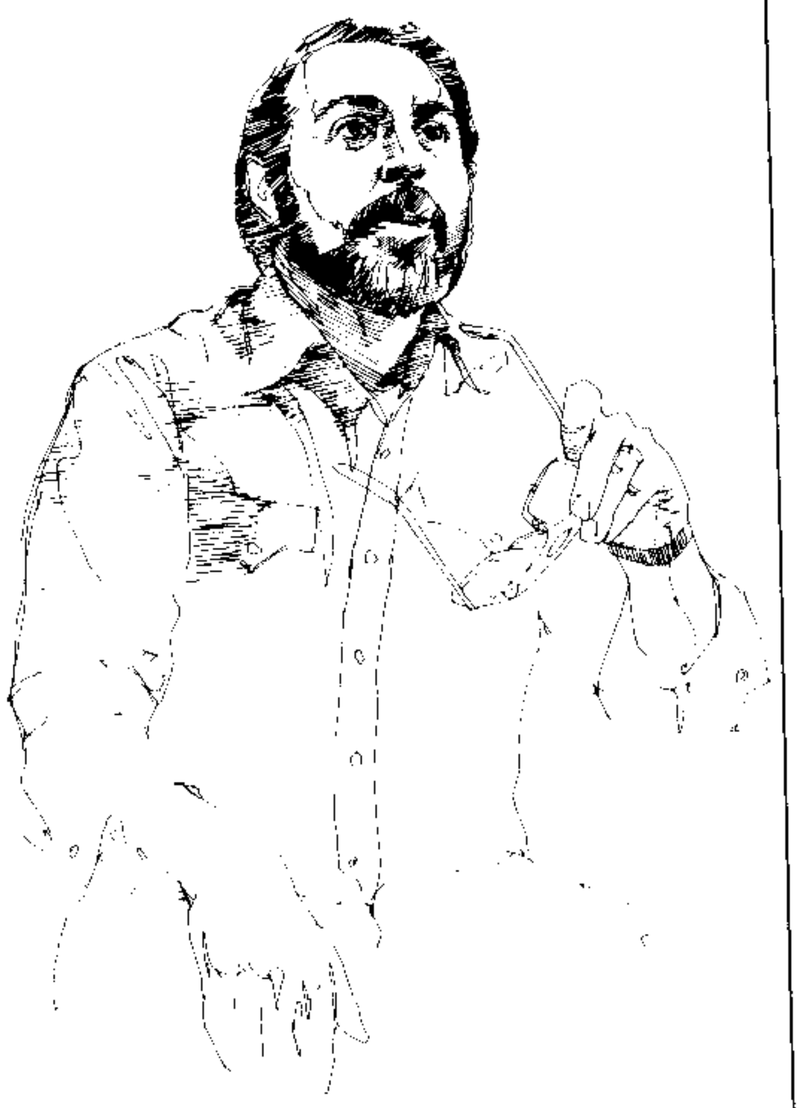
ON SCREEN

By Gary M. Kaplan
Publisher & Editor-in-Chief



"Rapid growth can sometimes be a disaster in disguise."

"The price of convenience is conformity."
—Walter Hego

This month's issue is our largest to date. Editorial and advertising content have been increasing steadily in equal proportions to give you that "fatter" magazine I promised a while back. I want to thank you, our readers, for making this possible; your response to our advertisers and your help in getting new subscribers and magazine sellers has been invaluable in bringing us this far. We still have a long way to go before you can heft a monthly 300-page issue, but that isn't as remote as some might think.

As we mature as a communications vehicle, we feel we should strive for more lofty goals in two crucial areas: customer service and innovation. Rapid growth can sometimes be a disaster in disguise—on the surface it struts proudly, exhibiting its impressive new suit of clothes; but underneath this superficial costume nothing has really improved . . .

Fortunately, our editorial, production, advertising, and circulation/fulfillment staffs take great pride in what they do, and they constantly strive to improve their individual levels of efficiency and creativity. You readers benefit from this in at least two ways: (1) Faster in-house production of the magazine now allows shipment from a more central geographic location—a change that will ensure earlier delivery for subscribers and magazine sellers alike; (2) More innovative features will keep *99'er HCM* from falling into that rut of boring, institutionalized conformity that so many computer publications have plodded into for the sake of convenience.

I also hope that you, our readers, will keep us on our toes. Whenever we do something well—or not so well—please tell us. Send us your ideas for new features and for improvements to existing ones. And by all means, keep your manuscripts and programs coming. We'll need more and more material as we continue to grow.

And we'll need new kinds of material. We're going to start featuring, for instance, works of "technological fiction." I've purposely avoided the more familiar term, "science fiction," because we've been conditioned to accept preconceived limitations in the scope of this genre. We're presently searching for unique short stories of high literary merit that are centered around computers, robotics, and associated technology.

And you accomplished programmers will want to get a head start on preparing your submissions for next month's announcement of our spectacular Home Computer Animation Contest. At this point, suffice it to say that we'll be looking for visually-attractive, non-repetitive sequences of a few minutes' duration. Animated scenes should demonstrate some random branching ingenuity to drive the projection loop.

To the "shutter bugs" among you, we'll be making cash awards for the best color photos demonstrating the educational use of the Texas Instruments Home Computer in the classroom. And if some "snap happy" members of users groups should happen to send photos of interesting (or unusual) group activities to spice up our "Group Grapevine" feature, we'll promise not to let any negative thoughts flash into our minds, frame our objectivity, filter out your creativity, or crop the best expression of your photographic masterpiece. With any luck, it might even see the light of print . . .

99'er HOME COMPUTER magazine

Hayder Amir's portrait of the TI-99/4A Home Computer may present a surprising image to those who thought that entertainment, education, and home management were the only paths along which this bold little console dared to tread. The travel stickers, which represent the 99/4A's most recent journeys through the World of Work, are evidence of what creative programming can do to transform a laid-back homebody into a decisive executive. The only problem now may be: How are we going to keep this computer "down on the homestead after it's seen Wall Street?"

CONTENTS

August, 1983 Vol. 2, No. 10

8. Bit One, Purl Two
By Pat Olsen
The 99/4A turns Designer Computer to create custom knitware.

9. Graphic Persuasion
By Fred Ellis
Bar graphs are beautiful and good for business.

14. An Ensemble of Assemblers
By Patricia Swift
A comparison of 3 assemblers for Mini Memory.

26. Cashflow
By Joel Moskowitz
Where has all the money gone?

22. Keystrokes For Thrifty Folks
By Walter Hego
A Review of Typwriter—a low cost word processor.

Computer Gaming

29

Cavern Quest: A Review
By Greg Roberts
Over the beasties and through the caverns—beware of killer spiders!

30. Starprobe '99: A Review
By Erin O Connor and Debby Amity
Can you survive the dangers hidden in this colorful labyrinth?

32. Gameware Buffet

32

Jungle Jim
By Michael McCue
Diamonds and monkeys abound in this perilous jungle game.

33

Success Formula
By Oris Bud Davis
New careers for your chance at fame, wealth, and happiness.

34. Counting Fun
By Rolynda Brantley
A preschooler's delight complete with E.T.

41. Peripheral Vision 99
By Will Schick
Look into the capabilities of a compact new printer.

58. Mean Machines and Small Potatoes
By Greg Roberts
The misadventures of Dick Dren and Grandma Leathers.

64. Multiplan Medium
By Patricia Swift
Grouping cells into rectangular bunches makes a good plan even better.

LOGO Times

69

Turtle Text
By Roger Kirchner
LOGO as a word processing language—that's write!

Portable Computing

73. Hello, Little Brother
By Robert Ackerman
The humble Hex-bus helps the TI-99/4A and the CC-40 communicate.

Plato's Progress

76

A Classic Learning System
By Sharyn Lyon
The living library of learning comes home to assess student skills.

83. Pocket Sunrise
By S.T. Holl
Key it in and catch some colorful cathode rays!

86. Public Investigator
By Robert Hess
Create questionnaires and tally the results.

4. On Screen
6. Inside 99'er
7. Letters to the Editor
27. 99'er Digest
30. Hall of Fame
68. Group Grapevine
91. Shopping Bus
98. B.A.R.C. Back
99. Index to Advertisers

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INSIDE 99'er

"Listen J.B., a TI-99/4A is a home computer and it's place is in the *home*!" Ah, not so, Mr. Senior Vice-President! Lately this cybernetic little scamp has been seen frequenting the work place. Oh yes, it's true! The hustle-bustle world of profit and loss, now has to sit up and take notice of the humble Home Computer and appreciate all it can do to spruce up the world of work.

Sprucing up your dress-for-success look may be just a matter of a quick *Bit One, Purl Two* according to our article from the Fashion Factory. Their BASIC program for a custom-tailored skirt will allow you to slip into something a bit more comfortable and stylish too.

Is your firm skirting the issues of production and profit because of the high cost of charting your progress? Worry no more—*Graphic Persuasion* is here to represent your state of affairs with stunning bar graphs. This BASIC program will help you make low-cost, colorful visual aids to impress the powers that be.

A rare meeting of powerful electronic brains is the subject of *An Ensemble of Assemblers* in which we examine three assemblers to see what they can do and how they run.

Running out of cash can happen in the best of businesses, but by using *Cashflow* and its Extended BASIC program, you can find out where your money goes and how to get the river of riches flowing in your direction again.

Does your office go with the flow, set trends, or leave well enough alone? In *Public Investigator* you'll discover how you can create a questionnaire to query your customers. This BASIC program will even compile, evaluate and print out the results for you. Talk about an ideal tally system!

While we're examining ideal forms, let's consult with the philosopher who taught us all about such things in our new feature, *PLATO's Progress*. Now that Control Data has made their learning library of educational software available to Home Computer owners, we will be communicating every new and exciting moment as it happens. This time we see how PLATO helps parents and children join forces for peak learning experiences.

Let's peek at what can happen when your computer is too big or too small for your business in *Mean Machines and Small Potatoes*. The moral of these two anecdotes will keep us from taking ourselves too seriously.

Our *Multiplan Medium* is still taking her work seriously. In this issue, our sage *Explores Rectangles* and speaks to us of ways to use rectangular groups of cells to expand *Multiplan's* usefulness.

Our LOGO turtle is more useful than ever too. In *Turtle Text*, the LOGO language becomes a versatile word processor and learns some new tricks including how to print a document that is really a procedure in disguise.

Things are not exactly what they seem in *Pocket Sunrise* either... they're better! The good Professor Holl brings us enough sunshine in his BASIC program to make Noah wish he'd taken a TI-99/4A with him on the ark.

Now that the sun is up, we'd like to awaken you to the possibility of using the Hex-bus as a communications link between the CC-40 and the TI-99/4A. In *Hello, Little Brother*, the Hex-bus helps these two machines send messages back and forth.

You can send your message in any language—or alphabet—with a compact new printer. See how it stacks up in our review, *Peripheral Vision 99*.

A business with the latest in printers needs the convenience of word processing. Our review of *Typwriter Keystrokes for Thrifty Folks*—tells about a low-cost word processor that won't spell disaster to your profit margin.

Marginal though some of your past attempts may have been, when you play our BASIC game, *Success Formula*, you will discover that you can pursue a career to make yourself rich, famous and happy before you're 41!

Of course, real life doesn't come with guaranteed second chances, so if you are looking for something that even a preschooler can count on, you won't be able to resist *Counting Fun*. A certain extraterrestrial joins up with his favorite playmates and toys for learning fun in this BASIC math game.

Toying around with snakes, fires, cannibals and acid pits may not be your idea of fun until you play our Extended BASIC game, *Jungle Jim*. If you believe in the old saying, "It's a jungle out there!", this game could be a good training ground for learning to survive any corporate chaos you may encounter.

"Corporation" and "business" need not, however, be synonymous with "confusion" and "bungles", as you will see after reading this months' special articles and regular features. Go ahead then, tuck your August issue into the secret compartment of your briefcase. Armed with these articles and programs plus the fresh applications you'll come up with, you and your trusty 99/4A can take the business world by storm. And when your co-workers ask, "What's a nice little Home Computer like that doing in a work place like this?" You'll know just what to say.

Until next month, have fun reading, learning and RUNing! 99'er

LETTERS TO THE EDITOR

Dear Sir:

I recently purchased Microsoft's excellent *Multiplan* and have found it to exceed all expectations. There is, however, a most glaring shortcoming not mentioned in your article contained in the April issue of *99'er*. Many other TI owners utilize the parallel connection between console and printer. Not only is the hardware less expensive, but the transfer rate is much faster than the 9600 baud serial rate. Yet when I first tried to print my spreadsheet results, I found to my dismay that the program is written to access only serial printers. Is there a "fix" or must I be forever limited to 'Planning sans hard copy? Please help with whatever information you can find. I am sure many other readers would be interested in you answer.

Robert F. Pinion
College Park, GA

You might have overlooked the directions for addressing printers on page 14 of the Multiplan User's Guide. *There you'll find the specifications for setting up the program with* either *serial* or *parallel printers. When you select the Print Options and enter the "setup" field, you need only to type "PIO" for Multiplan to print using the parallel port. If you don't specify this option, the* default *is "RS232.BA = 300": serial transmission at 300 baud.*

If your printer still will not print using this option, there is the possibility that it is cabled incorrectly. See the note on page 41 in Peripheral Vision 99 *in this issue.*

Dear Sir:

A company by the name of "Foundation" in Tiburon, CA advertises a 128K Memory Card for the 99/4A Peripheral Expansion System Box in *99'er HCM.*

Is this an acceptable product which functions as well as the TI-32K Memory Card but with a greater memory or are there serious problems and limitations?

Karlyn Shedlowski
Stroudsburg, PA

We are in the process of reviewing several memory expansion devices, and we'll print our findings in an upcoming issue.

Memory devices larger than TI's 32K memory expansion card will have to consist of multiple "banks" or "pages" of memory. These pages will have to be switched in and out rapidly to simulate a larger memory area. Even with a 128K board in place, the 99/4A will only "see" its first 32K of RAM because of the way it is memory-mapped. With the console's BASIC or the Extended BASIC cartridge, you'll only be able to address 32K of expansion memory. The only effective way to utilize the larger memory devices is through Assembly Language routines, either from the board's manufacturer, from another software house or of your own devising.

Dear Sir:

I've finally stopped playing and programming long enough to write. I have lots of questions, but a couple that have me stumped are (1) why won't the Speech Synthesizer say "WIN", "WAS", "NICE", "INCORRECT", "TEXAS INSTRUMENTS", "READY", "–", and "+"? Using the Extended BASIC module I've tried these words as both "word-strings" and "direct-strings." The words just get "spelled out" as letters. I had to replace "WIN" with "WHEN" in a game program.

Also (2) I can not get a return for diagonals using the joysticks. The corners are "dead."

SAMPLE

```
100 CALL CLEAR :: CALL
  SPRITE(#1,42,2,95,130)
110 CALL JOYST(1,X,Y)
120 DISPLAY AT(24,1):X;Y
130 CALL MOTION(#1,-Y,X)
140 GOTO 100
```

You can never get "–4,4","4,4","–4,–4" or "4,–4" displayed. One return is always "0".

I'm sure the majority of your readers have only the console and a cassette recorder and, maybe, Extended BASIC. A few articles on LOGO or P-Code are fine but mostly give us more BASIC articles. I expecially don't like the Portable Computing section. I don't know anyone who owns a CC-40 and haven't seen one in the stores. How many of your readers use the CC-40 and why does the fact it's battery operated entitle it to a separate section? Its version of BASIC must be similar enough that a quick check of the owner's manual would answer the user's questions about differences from the 99/4A's BASIC.

Robert W. Hall
Godfrey, IL

Your Speech Synthesizer won't say some of the words in your list, Bob, because it is limited to the resident vocabulary. The words you list which are parts of phrases in the resident vocabulary—WIN in YOU WIN, for instance—are only accessible in that phrase. And in order to have the Speech Synthesizer say the phrase completely rather than spell it out, the whole phrase must be enclosed in pound signs (#) as in the following statement:

CALL SAY("#YOU WIN#")

The TI Extended BASIC manual has a list of these words and phrases on pages 203 through 205. In the case of the numeric symbols (+ and –), it will only say these words when they immediately precede *a number.*

As far as your joystick difficulties go, our resident gamester says that they may be due to the joysticks which you're using. Some—including TI's joysticks—are not very sensitive at the diagonals, and only intermittently return the values for the diagonals at precisely the right positions. There are brands of joysticks on the market, however, which will consistently return the diagonals.

We feel that the CC-40 merits more extensive treatment not because it is battery-powered, but because it is one of the first of the new generation of miniature computers with very broad capabilities. Besides the Compact Computer itself, a broad range of peripheral devices are being developed at Texas Instruments for this system. These include a Hexbus interface for the 99/4A, a Wafertape drive, an RS232 interface, a modem and a 4-color printer/plotter. When complete, it will form a very versatile system. You might look at the article on the CC-40 in this issue for an insight into some of the potential.

Dear Sir:

I am interested in Compact Computers, have a Radio Shack PC4 and Texas Instruments CC-40.

I'd be interested to read about any information you can pass along.

I read about it in the April 1983 issue of the *99'er Magazine* but there didn't seem to be a subscription card, hence the note: Is there such a thing as the Portable Computer Magazine?

Howard J. Cassidy Jr.
Cucamonga, CA

We'll be glad to pass along more information about the Compact Computer system as it becomes available. For now, Portable Computing Magazine*(tm) exists solely as an insert of* 99'er HCM.

Continued on p. 68

Entering 99'er Programs

New readers should be aware that within the magazine's pages are found actual computer programs that *you* can put into your Home Computer and enjoy.

Make sure you have any special system components required by the program (e.g., the Speech Synthesizer, Extended BASIC cartridge, etc.). Then, using the console keyboard, you can type the printed magazine listing (character for character, and line by line) into the computer's memory.

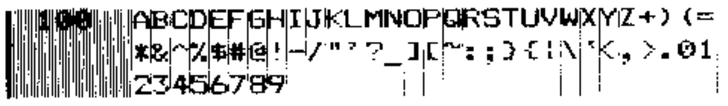
Before entering the program, connect a cassette recorder to the computer. Make sure you have two blank cassette tapes. For each 10-20 lines you type in, use SAVE CS1 to save that program segment onto one of the tapes. Alternate between the two tapes each time you save the program. Be sure to rewind to the beginning of each tape before saving, so that you always record over and replace the shorter segment of program lines with the longer segment. By following this procedure, you'll always retain most of your work even if the lights go out or someone turns off the computer.

Double check your typing against the program listing for errors, and *then* have someone else check it. The most common errors are typing the letter "O" instead of the number "0" (zero)—they are *not* interchangeable to the computer. This is also true for the letters "I" and "L" and number "1" (one). See "Key-In Reference"

Every time you make a correction to your program, SAVE CS1 and switch the tapes. Once all the errors are corrected, you will have a good copy of the program on the last tape. Before turning off the computer, put the other cassette tape in your recorder and once again SAVE CS1. Now, if one tape gets damaged, you won't have to enter the program listing via the keyboard all over again. Have fun and happy computing.

Programming Conventions

KEY-IN REFERENCE

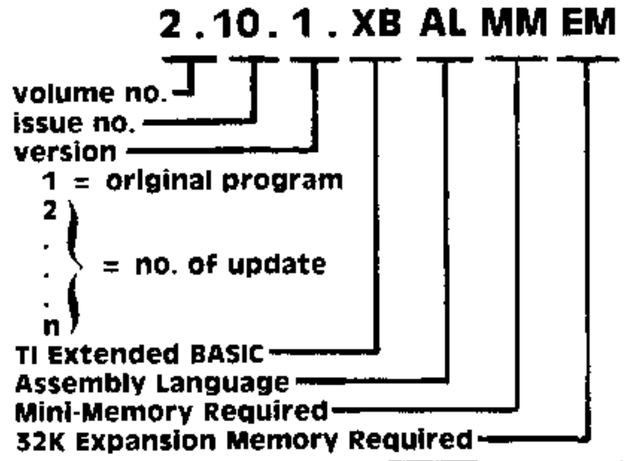


99'er =End of Program or Article

compu-prestidigitation

(kŏm·pū·prĕs·teh·dĭ·jeh·tā·shŭn) —*n.* **1.** The magical quality of unexpected comprehension that results from presenting technical information about computers in a lively, entertaining, visually attractive and easy-to-understand format. **2.** The magical tricks that make a computer sing, dance, and do all sorts of wonderfully useful things.

99'ER VERSION



BIT ONE PURL TWO

PROGRAMMING PATTERNS FOR A PERFECT FIT

By Pat Olsen

3511 Rucker
Everett, WA 98201

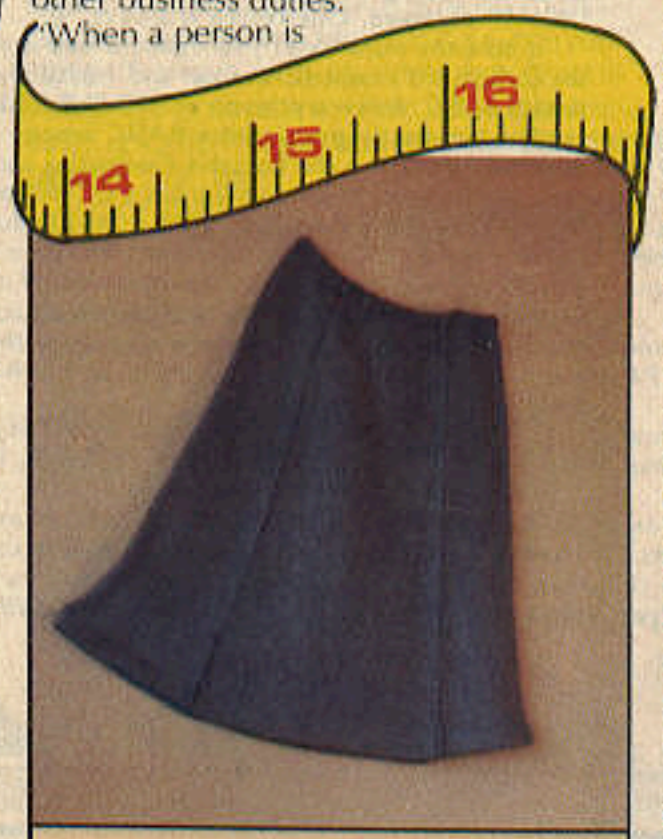
Hardware, software, and knitwear—they may seem like strange bedfellows. But combining the TI-99/4A with a marketable idea has produced many such unusual collaborations. Nowhere is this more evident than at The Fashion Factory in Everett, Washington, where one of the brightest new fashion ideas has come from the creative efforts of fashion designer Billie Buell and programmer-analyst Marty Keil—and, of course, the TI-99/4A. With each contributing technical information from her own field, the two businesswomen have developed a highly salable home computer knitting program. Hand or machine knitters need only enter their measurements and a knitting gauge, and the program produces a pattern to fit any size from 6 months through size 56.

Fashion designer Buell first entered the machine knitting market "Years ago when I had six kids at home, and couldn't knit fast enough with two needles to keep them all in sweaters and hats." Little did she know that there would be a day when she would be able to produce the patterns for six perfectly fitted sweaters, half a dozen hats, and maybe a coat or two in the same time it used to take her to run down to the store for a ball of yarn.

Buell has spent many years practicing the art of producing the perfect fit in clothing. She has taken the basic design shapes and grouped them in a logical way to come up with formulas that will work for all figure types.

The need for an accurate program arose when Buell opened her knitting-machine shop last year. In addition to knitting custom orders for her clientele, Billie had to chart patterns for them. Each pattern took at least an hour—often longer—to chart, and this left her little time for her other business duties.

"When a person is pressed for time, and there are phones ringing, people to help, and customers talking to you, it's hard to be sure that the pattern you have just charted will actually fit," says Buell. "Charting takes plenty of concentration and a liberal dose of peace and quiet to be positive that you will be able to knit a garment that fits."



"That's where microcomputers are put to good advantage," says Marty Keil. "Machines never become upset when people are looking over their shoulders while they are printing out patterns. Once we perfect the basic calculations, we know that our patterns will fit perfectly."

When Keil met up with Buell, she had just formed her own company to help small businesses take advantage of microcomputers. Buell already had a pretty good idea that the key to making up an easy home computer program to chart patterns lay in translating her ideas into BASIC language. "Billie had a good idea of what her TI-99/4A might be able to do," says Keil, "but no way to actually produce the program. We spent several days just exchanging information so that we each could begin to understand exactly how our respective machines would work."

Computer Meets Knitter

Although Keil had never seen a knitting machine and had no conception of how to design an accurate fashion pattern, she was able to work well with Buell's knowledge and ideas, turning them into programs that could be easily understood by any home knitter. Both agreed that the TI-99/4A was the best computer to use because of its ease of operation and ability to adapt applications for reprogramming into other home computers.

According to Buell, the body's contours coincide with geometrical configurations: "There are only so many different geometrical shapes that can be combined for a figure. These shapes can be defined in terms of parallelograms, rectangles, triangles, angles of any given degree, and curves which can join any of these angles." After the basic shapes that go into the design have been defined, the process that remains is one Buell compares to a child balancing building blocks. A shape builds upon the one that went before it, and all are connected with the soft lines which we call the "figure." In the process of designing a garment any of these shapes can be interchanged to establish the basic look of the end piece. For instance, a dolman-shaped sleeve would require a different set of geometric shapes than a simple fitted shell.

Buell's fabric is a machine knit, supple and adaptable to the human shape. To determine how many stitches or rows will

Continued on p. 11

GRAPHIC PERSUASION

Visual Aids to Make Your Point.

By Fred Ellis
P. O. Box 777
Edinburg, TX 78539

Numbers are abstractions that are sometimes hard to grasp; to understand and compare them quickly, it's often worthwhile to turn them into concrete representations—bar graphs, for instance. The program accompanying this article does exactly that: It turns abstract numbers into multicolored bar graphs. The program can easily be customized for different applications. Figures 1 and 2 are examples of graphs plotted by this program.

Properties of a Good Graph

The objective in making a graph is to communicate, and there are some definite and specific elements a good graph should contain. These include accurate scaling, clear numbering, and adequate labeling.

If the graph is to be projected from a 35mm slide, a good rule-of-thumb is that the slide should be readable when held at arm's length. If slides are made by photographing the CRT screen, this rule is met automatically by the size of the 99/4A's resident font. Another requirement is that the graph's axes be labeled, and the labeling should give the following information: (1) the name of what is represented, (2) numerical values, and (3) units.

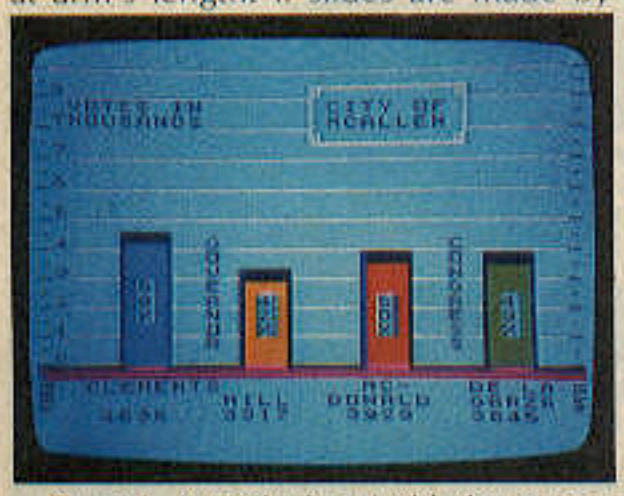


Figure 1. A graph plotted with the program *Bargrapher*. Bars were spaced to leave lots of room for labels.

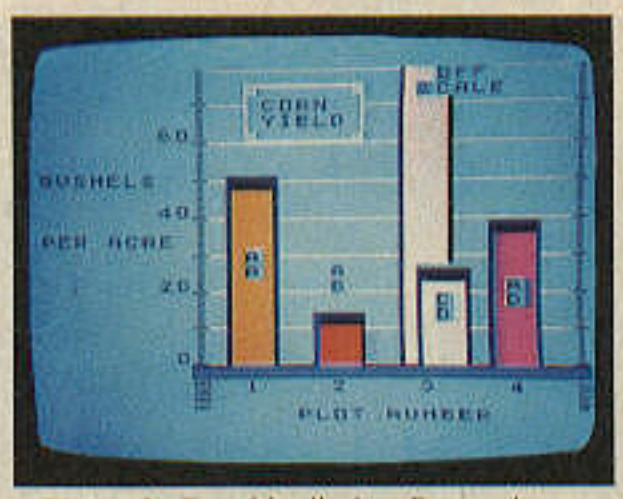


Figure 2. For this display *Bargrapher* was customized to put the vertical axis on column 10. Also shown is the response of the program to an off-scale datum.

Scaling the axes is a compromise. The taller the bars, the easier it is to read the graph, but you must leave enough space to accommodate the largest values in the data set. A good value to start with for this program can be found from the formula:

$$\text{SCALE} = \frac{\text{MAXVAL}}{20} \text{ units per character}$$

where MAXVAL is maximum value in the data set rounded up to the nearest multiple of 2, 5 10, or power-of-ten. For scaling and numbering, I recommend that multiples of 3 be avoided. In fact, I try to use consecutive integers, multiples of 2, multiples of 5, multiples of 10, or powers-of-ten.

Tick marks should be harmonious. For example, if the height of one screen character represents 10 units, making tick marks by turning on every other row of pixels creates tick marks that increment by 2½. Such markings are hard for the viewer to work with. How does one visually subdivide using 2½? In this case the best you can do with an 8-pixel-high screen character is to turn on the first and fifth rows to create increments of five. Actually, you may not even want tick marks that close together.

Each bar or bar group should be identified. It may be desirable to add associated numerical information such as percents. Last but not least, every graph should have a title. Graphs should be designed to please students, not professors; readers, not authors; viewers, not artists.

How to Use the Program

When using the *Bargrapher* program, you will find that you can change and reposition all the labels. In particular, the title with its box, can be placed anywhere on the screen. You can also change the color, position and number of bars (up to four), and incorporate various axis-labeling and tick-marking schemes into the program.

There are also two automatic features in the program. One of these is off-scale protection. If a datum is high enough to result in a bar whose top would be off-scale, the bar will be plotted "folded." The off-scale part will be plotted up from the baseline, and displaced to the right from the full-scale bar stem. The graph in Figure 2 includes an off-scale bar. A second automatic feature is the positioning of the percent label above the bar for short bars, which can be seen in Figure 2.

The program statements most likely to be changed are between lines 280 and 780. This part of the program is set off by the barbed wire (—•—•—•—) in lines 270 and 780. Non-cosmetic changes must be made within the later sequential parts of the program. Table I shows how to make various changes in the program.

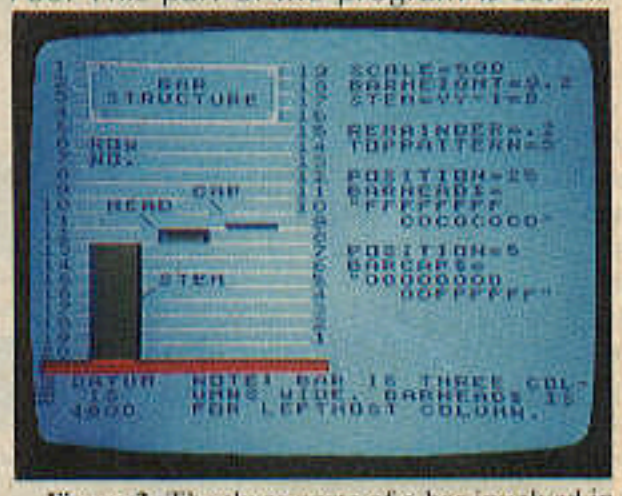


Figure 3. The three parts of a bar involved in the outlining routine. With this example, three pixel rows will be turned on in the bar cap, and in the bar head the top four pixel rows will be black.

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Purl Two . . . from p. 8

be used for each shape, the yarn is knitted to form a piece of fabric which is called a *swatch*. This swatch is measured to find the number of stitches or rows in one inch, and the results of this are called a *gauge*. Final calculations are found by multiplying body measurements by the stitch or row gauge. The resulting calculations are then multiplied to give the correct number of stitches to cast on for a given garment, as well as the number of rows to knit before increasing or decreasing the angle for the various types of shapings.

Although the process is a fairly simple one, it has taken years of study to understand how the pieces must fit together to form the whole. Buell felt that there were not many home knitters who would care to take the same time to research and understand body design. But Marty Keil was challenged by Buell's idea of using the TI-99/4A home computer and BASIC to shape garments. Keil was accomplished in the use of a mini-computer and COBOL, and happily she found that the TI-99/4A was a simple computer to work with. Given the precision of the geometric figures and the ease of the computer, the programs practically began to write themselves.

"One of the reasons that the programs were so easy to understand is that when a garment is knit, it begins at the bottom hemline and builds itself into some sort of geometric shape," says Keil. "It was a fairly simple matter to take the formulas, which were already in Billie's brain, and computerize them."

Also, according to Keil, the precise and mathematical art of charting lent itself perfectly to the flow-charting process. Keil emphatically stated that this is the most important part of the program and will provide the structure that is necessary to writing an easy program design.

"The formulas were intriguing," Keil said, "because all of the rectangles, triangles and parallelograms worked together to give a perfect fit to the human body. Small areas here and there added just enough fullness to produce a fit that wasn't precisely the molding of the form."

Keil went on to explain that the program uses so many subroutines because all garments use the same formulas, no matter what the shape. Once these subroutines were developed, one program could write the next with very little variation.

"It was a real learning process for me," said Keil. "Working with BASIC, learning terms used by machine knitters, and maintaining flexibility to allow the user to still be able to design within the program framework was a real challenge."

Pattern Enterprise

Although all of the programs Keil has designed were written on the TI-99/4A, they can be and are being rewritten to work with any other home computer. That way a home knitter not familiar with the shapes needed to understand charting will have no problem feeding in either a cartridge or a disk to the home computer. The work and expertise are already there. The knitter merely adds in the correct measurements plus the gauges taken from a sample swatch of knit fabric. Within the minutes it takes to process the input figures, the computer produces a complete and perfect-fitting personal pattern that will knit easily into a custom-made garment. Buell and Keil have produced a series of programs that cut the time of charting from hours to minutes and are, above all, accurate.

More and more knitters have begun to take advantage of knitting programs which they can take home and use whenever they are ready to knit. Customers like the fact that they can by-pass years of training in both charting and computer programming and use programs to customize their own fashions. When Buell and Keil became aware that their programs could be adapted to other computers and marketed anywhere in the country, they began advertising in national knitting magazines. They now fill orders all over the United States.

For knitters who don't own or have access to a computer, Buell and Keil also started a computer pattern club. Knitters can pay for a membership on a yearly basis and obtain the same patterns for a nominal fee by just sending in their measurements and knitting gauge. The pattern service has begun to flourish as

Continued on p. c

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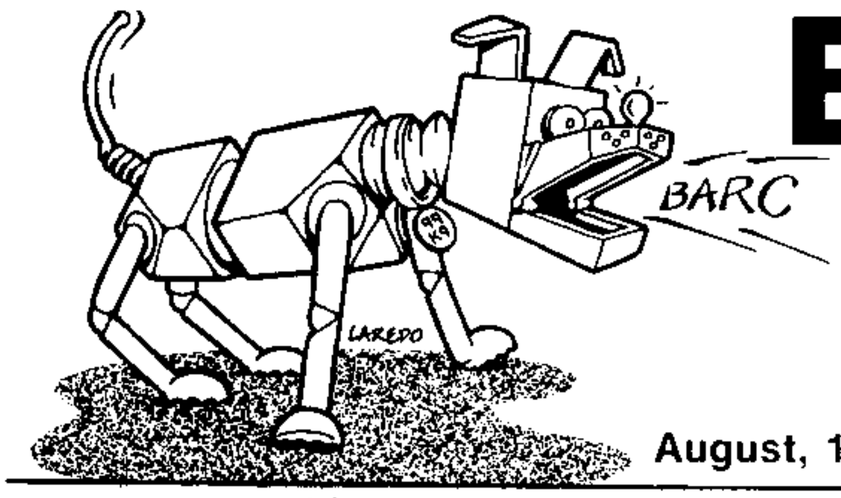

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	Page	Article	Author
☐	8	Bit One, Purl Two	Olsen
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☐	19	Cash Flow	Moskowitz
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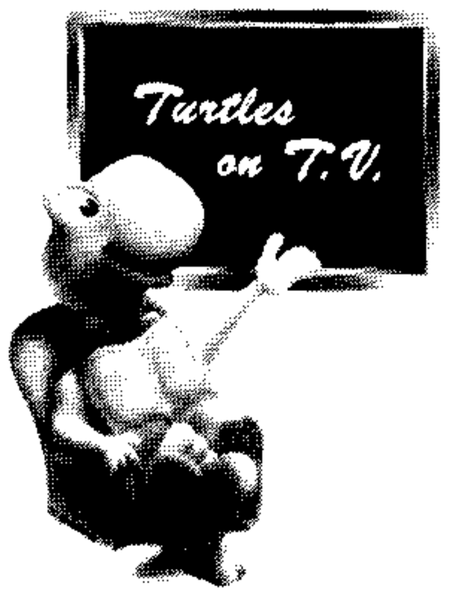

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Persuasion . . . from p. 9

Other changes would require considerable programming—for instance, trying to have more than four bars of different colors. As it stands now, the program uses all of the user-defined character sets. (I just wish there were more character sets available.) Also, if the bars are to be individually labeled, four bars are about the most you can fit on the screen without running out of space for labels.

Description of the Program

For title and labels and their respective positions on the screen, there is a rather long subroutine near the beginning of the program, starting at lines 290 and ending at 650. Statements for data, bar color, and vertical axis markings are next and bring us to line 790.

Most of the special screen characters used in the program are defined with data statements and a CALL CHAR loop. These data statements are at lines 790 and 840, and the defining loop uses the following lines up to line 890. If you try to define these characters by typing in individual CALL CHAR statements, you are going to get an acute attack of *ennui*. All the color sets are defined next. The statements that actually do most of the mechanics of drawing the grid lines, tick marks, etc., and labeling the graph are lines 1000 to 1260. At this point in the program the screen is ready for the bars.

The interesting part of the program is the loop which plots the bars. There are two special functions of this loop. First, the loop dynamically plots bar heights to one-pixel resolution. The characters used at the top of each bar are defined during program execution by the code between lines 1370 and 1800 using the long strings in lines 1280, 1290, and 1300. Hexadecimal strings which define the bar-top characters are taken from these strings using SEG$ statements, with position determined by the data. For instance, such selection and definitions are made by lines 1390, 1400, 1560, 1570, and 1580. (the article, *Dynamic Manipulation of Screen Character Graphics* in *99'er HCM*, Vol. 1, No.6, described this technique.)

The second special function of the loop is to put black outlines around the bars. Without the outline the edges of the bars appear smeared, fuzzy, and blurred.

Following the bar-drawing loop, the vertical axis is labeled, and the title and its box are added. Note that the title box will "paint over" anything else on the screen; thus you will have to move it if it covers up the top of a bar. Next, lines 2370 and 2380 hold the display on the screen using the CALL KEY subprogram. After the END statement there are subroutines for printing vertical and horizontal labels. The last subroutine draws the bar stems. In the case of an off-scale bar, program execution will pass through this routine twice, the second time to draw the off-scale part of the bar.

Rather than data statements the program could use files or arrays. Thus lines 190, 1350, 1360, and 2390 are reserved for possible use with files on cassette or floppy disk.

Outlining

As mentioned earlier, a black outline is used around the bars so their edges will not appear blurred. Part of this blurring can be blamed on the computer and its CRT monitor; I assume that this is due to such things as the CRT screen matrix, bandwidth, circuit ringing, overshoot, stray coupling, etc. Be that as it may, the blurring is real, although the effects are not equal in all directions: The horizontal smearing is worse than the vertical, and it smears to the right. The situation is worse with red. Light red especially will bleed far into colors to the right. But there is very little smearing with black, probably because black is achieved in a CRT by completely shutting off the electron beam.

But the other part of the trouble is in *front* of the CRT. The human eye does not do a good job when certain color pairs lie next to one another. For example, a red area adjacent to a yellow area will appear fuzzy *even* with good monitor resolution. Drawing a narrow black line between these areas will make the boundary appear sharp.

Continued on p. 55

An Ensemble of Assemblers

A Comparison of Three Mini Memory-Compatible Assemblers

By Patricia Swift
Technical Editor

Assembly languages are traditionally highly symbolic, with mnemonic operation codes representing fairly simple instructions. An *assembler* is a program that changes Assembly Language statements into the machine code which can be executed directly by the computer. No matter what kind of assembler you use, you need a place to put the machine code it generates. This machine code must be in RAM (random access memory) that is directly addressable by the microprocessor if the computer is to run it. There is only a small amount of this addressable RAM in the console itself. The Mini Memory Command Cartridge contains 4K of RAM, and the expansion memory gives you another 32K. For users without expansion memory, the Mini Memory is the least expensive way to add enough RAM to do some significant Assembly Language programming.

All three of the assemblers reviewed in this article use the Mini Memory. (They also build machine code in the expansion memory if you have it.) While disk drives and printers may be supported, I used only one cassette recorder in comparing the packages.

Texas Instruments' Line-by-Line Assembler comes with the Mini Memory at no additional cost. The MAX Assembler from M.K. Eckhaus is available for $25. The Dow Assembler by John T. Dow costs $25. All three are shipped on cassette tape, let you use Assembly Language based on 9900 Assembly Language, and all three can build machine code in the Mini Memory's RAM. But the similarities end there. In other ways, the three could hardly be more different.

The documentation for all three of these assemblers was adequate. Since none of them describes the assembler statements in detail, all three wisely recommend that you also purchase TI's Editor/Assembler manuals. Novices should be aware that none of these manuals, not even the Editor/Assembler manual, teaches you how to program in Assembly Language; they cover the mechanics of the languages, not how to think in assembler.

How They Work

These assemblers take in Assembly Language statements from the keyboard and put machine code into the Mini Memory. In order to do this the assembler must keep track of any symbolic names and labels you use. This is done in a *symbol table* where labels and their addresses are kept. Once the assembler has finished its work by creating a machine-code module, the assembler and its symbol table are no longer needed in RAM. You can use EASY BUG (which comes with the Mini Memory) to save the machine code from the Mini Memory to cassette tape no matter which assembler you use.

It's not enough to merely put the machine code into the Mini Memory *somewhere*. The program name should be placed in the REF/DEF table so it can be referenced later. This table starts at >7FFF and grows toward >7000; its size is determined by the number of entry points you need. The two-byte address at >701E, called the *Last Free Address in Mini Memory* (or LFAM for short) tells the system where the top of the REF/DEF table is. If an entry is added to the REF/DEF table, the LFAM must usually be adjusted to reflect this.

The Mini Memory contains RAM addresses >7000 through >7FFF. The first part of this memory (addresses >7000 through >7117) is reserved for system use. Assuming a minimum of one entry in the REF/DEF table to define your program's entry point, you are left with Mini Memory locations >7118 through >7FF7, or 3808 bytes available for your use. The three assemblers vary greatly in how many of those 3808 bytes can be used for the finished machine code program.

The machine-code modules created by all of these assemblers can be moved using the *Mini Memory Relocator* program (published in the May, 1983 issue of *99'er HCM*). This relocator allows you to overcome some of the size restrictons of these assemblers. After splitting the program into two or more logical chunks, you process each module through the assembler and save it with EASY BUG. Then use the *Mini Memory Relocator* to relocate the modules from wherever they were loaded originally to other locations in the Mini Memory. This technique allows you to construct programs which use all 3808 bytes in the Mini Memory, but you can see that it is not the most convenient process.

As your Assembly Language proficiency increases, the question of how large your programs can be will become important. To give you an idea of the sizes you'll be working with, the simple sprites programs which appeared in the April, 1983 issue of *99'er HCM* occupied about 260 bytes of machine code.

If your Assembly Language programs run perfectly the first time and never need to be changed, then the question of what happens to your source program will never come up. In real life, things are never that simple. You can be sure that you will need to change your program at some point. The three assemblers cope with this need in different ways, as noted in each section.

Another important consideration is speed—how long does it take you to arrive at debugged machine code? This is the most important question of all. The answer will vary for different individuals. If you compose your source program at the keyboard, then a momentary hesitation between entries of source lines will probably not slow you down at all. If you carefully write out your programs first, then you will want the entry into the computer to be as fast as possible. Programming style and proficiency are also factors: Do you program in smallish modules and test them singly, or do you enter

the whole program at once? Is most of your time spent debugging rather than composing the program initially? Do you already know 9900 Assembly Language? If you do, be careful not to make hasty assumptions, because each version of Assembly Language closely resembles 9900 Assembly Language. This similarity can also be confusing if you're using TI's Editor/Assembler Manual.

Line-by-Line Assembler

Texas Instruments
Consumer Relations
P.O. Box 53
Lubbock, TX 79408
Cassette, $99.95 (includes Mini Memory cartridge)

TI's assembler is an *instant assembler*. This means that each source statement is translated into machine code and stored in the Mini Memory as soon as you enter it. You can actually see the code which is generated, and the translation is extremely fast. If you refer to a label which has not yet been defined, the assembler generates a reference (you see an R). When you (hopefully) define the label later, the assembler fills in the address(es) right before your eyes. All this action may be confusing at first, but it will quickly become an education in machine code as well as a valuable self-checking device. You can display the symbol table at any time to see what labels have and have not been defined. As soon as you finish entering your program, the machine code will be in Mini Memory ready to be executed. You must put the program's entry point into the REF/DEF table and adjust the LFAM pointer explicity; this can be done via the Line-by-Line Assembler.

The form in which you enter each statement is very simple. If the statement has a label (two characters maximum) you enter it, and follow with a space. If the statement has no label, you just type a space first. Next comes the op code followed by a space, and the operands, separated by a comma. The ENTER key signals that the statement is finished. If the statement has a syntax error, the assembler tells you right away. You are not obliged to spend time lining up your source columns.

The Assembly Language supported by the Line-by-Line Assembler is very close to 9900 Assembly Language. The instruction RT is not implemented (use B *R11 instead), and only seven assembler directives can be used: AORG, BSS, DATA, END, EQU, SYM, and TEXT. Comments are not allowed, and labels may be only two characters long. Otherwise, the Line-by-Line Assembler's statements are just like those described in the Editor/Assembler manual. Figure 1A shows a portion of the sprites program as it would be entered into the Line-by-Line Assembler.

TI's assembler resides in the Mini Memory itself, and so does the symbol table. This increases its speed, but it also greatly reduces the space available for your program. For all intents and purposes, the Line-by-Line Assembler uses address >7118 through >7CD7. The symbol table starts at >7CD8 and grows toward >7FFF. (Its actual size depends on the number of labels you use in your program.) The default starting point for your machine code program is >7D00, which leaves you room for nine labels. To use the Line-by-Line Assembler, you should have its two entry points (OLD and NEW) in the REF/DEF table, as well as one for the program you're building. This means that addresses >7FE8 through >7FFF are occupied by the REF/DEF table. Therefore you have 744 bytes for your machine code program (>7D00 through >7FE7) in this environment. If you use no symbolic names at all, you can start your program at >7CE0 and thus squeeze in 776 bytes of machine code, but it's hard not to use any symbols or labels. If you want to use more than nine labels, then you must start your program at a higher address than > 7D00 (easily done via the AORG directive), but this shortens the room available for your program.

The sample program *Lines* which comes with the Mini Memory illustrates an important point about program size. When you first load the cassette tape into the Mini Memory, both the Line-by-Line Assembler and *Lines* are present in Mini Memory. The program logic and initialized data areas for

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Lines all fit between >7D00 and >7FE7. After you run the program *Lines*, the Line-by-Line Assembler is no longer present. This is because *Lines* uses some workspace between address >7118 and >7D00, thus obliterating portions of the assembler. This illustrates two points: 1) The assembler does not need to be present during the execution of the program it created, and 2) you can effectively use other areas of RAM for workspace at RUNtime, as long as you don't need to initialize the workspace beforehand. This way you can use the Line-by-Line Assembler to create programs which are really much larger than 744 bytes.

While you are using the Line-by-Line Assembler, it maintains a small screen buffer. You can scroll up and down to view the last nine screens if you want to check your work. But if you want to change a previous statement, you may have problems. Different Assembly Language statements generate different lengths of machine code. If you want to replace an SRL statement with a JGT statement, that's easy because both are the same size. You can scroll the screen up to find the address of the SRL statement, type an AORG command to get to the right spot in memory, and then type in the new JGT statement there. The assembler will generate the code for the JGT right over the old SRL. Then AORG yourself back to where you were before and continue entering the program. But if you want to replace the SRL statement with a longer MOVB instruction, you usually have to go back to the SRL statement and re-enter the program from there on down, starting with the new MOVB statement. If you catch your mistake right away, this isn't much work.

Aside from the screen buffer, the Line-by-Line Assembler keeps no copy of your source program. Longer programs will exceed the screen buffer, so towards the end of your program you will not be able to go back and view the beginning. If you happen to have a printer and/or disk drive, the Line-by-Line Assembler cannot use them. This means that you should keep a handwritten copy of your entire source program, at least until it is completely debugged.

The MAX Assembler
M.K. Eckhaus
P.O. Box 1079
Elgin, IL 60120
Cassette, $25.00

The MAX Assembler by M. K. Eckhaus uses a completely different approach. The MAX Assembler is actually a group of BASIC programs which run in the 16K of console memory. Only the output of the MAX Assembler (the machine code) is put in the Mini Memory.

The MAX Assembler consists of three BASIC programs and one data file. To use it, you first load the program ASM1 from tape using BASIC's OLD command. The first statement number in ASM1 is 4000, which leaves room at the front for you to add your Assembly Language source statements. You add your source statements using BASIC's editor. When they look just right, you RUN the program ASM1 to check the syntax. ASM1 reads the op code file which comes with the MAX Assembler and outputs an intermediate work tape. If ASM1 finds syntax errors, they are shown after it has finished parsing your whole program. If you have errors, you can edit your source program with BASIC's editor and run ASM1 again until it finds no errors. At this point you can SAVE ASM1 to a different tape with your source statements for later use. Next you load the program ASM2 from tape, again using BASIC's OLD command. When you RUN ASM2, the program will ask you to mount your work tape from ASM1; it uses this to build machine code in the Mini Memory. You will be asked to rewind this work tape once during ASM2 because it makes two passes. If you have a printer and want an assembler listing of your program, you must tell ASM2 about this and then RUN ASM3 afterwards, again using a (different) intermediate work tape for output from ASM2 and input to ASM3. If ASM2 finds any errors, it writes them to a work tape for viewing by ASM3.

The syntax of the source statements for this assembler varies significantly from 9900 Assembly Language. Since the source

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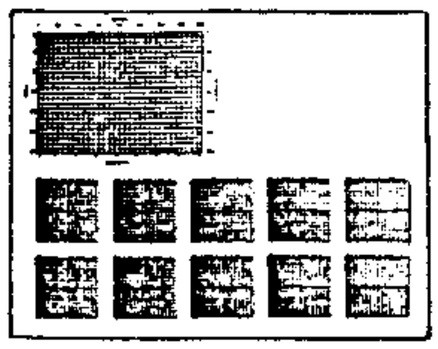

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statements are part of the BASIC program ASM1, each statement must have a sequence number lower than 4000. Then you must have the word DATA with spaces both before and after it, because the statement will be input to ASM1 via a BASIC READ statement. After this comes the label (up to 6 characters), if any, followed by a space; you can use up to 108 such labels. If the statement has no label, you must enter # and a space. Next comes the op code. All 9900 op codes are supported, as are the assembler directives AORG, EQU, BSS, BES, BYTE, DATA, TEXT, DEF, REF, EVEN, and END. After this you put the operands, separated by periods. It may be hard for old programmers to remember to use periods, but commas are not allowed because they are meaningful to BASIC's READ command. The MAX Assembler has its own format for operands which, in the manual's words, "differs somewhat from TI operand syntax." At least superficially, the main difference seems to be that labels are preceded by the @ symbol. You must also precede all register operands with R (optional in 9900 Assembly Language). Finally, your statement may contain a comment preceded by at least one space. Figure 1B shows a portion of the MAX Assembler source statements for the sprite program. This assembler also has the names of the VDP utility commands built in, so you can just refer to such things as VMBW (VDP Multiple Byte Write) without having to define them.

The actual entry of the source statements is fairly fast, and the BASIC editor allows easy updating and scrolling throughout the source program. The MAX assembler is not interactive, so you don't see syntax errors right away; ASM1 lists up to 49 errors on the screen at the end. The statement numbers of the error messages can be cryptic—they refer to the actual sequence number of the statement in the source program, not to the BASIC number of the statement. The author suggests that you use BASIC line numbers starting with 10 and going up by 10, and use RES 10 after adding any source statements in between. This works fine; all you have to do is append a 0 to the line number in the error message to get the BASIC statement number.

Since the MAX Assembler resides in console RAM, you can theoretically use all 3808 free bytes in the Mini Memory for your machine code program. However, a single source program cannot usually make such a lengthy machine program. BASIC will most likely run out of memory (MEMORY FULL message) if you try to enter that many source statements at the beginning of ASM1. The manual that comes with the MAX assembler gives a rough estimate of 130 source statements per segment, and explains how to use the special CONT directive to hook together separately-created segments. It's hard to say what this source maximum is because it depends entirely upon the source statements being used. If you segment your program, each segment must be processed separately through ASM1 and ASM2 (and ASM3, if you want an assembler listing). You can have the MAX Assembler hook them together via the CONT directive, or you can make use of the REF and DEF commands which cause entries to be made in the Mini Memory's REF/DEF table. In this way, separate subroutines could be defined in one segment and called from another. The MAX Assembler's AORG allows you to locate the subroutines in different sections of the Mini Memory, but it's up to you to be sure they don't overlap. You can also use the DEF command to put the entry point of your program into the REF/DEF table for execution later. (When I used the DEF directive, I found that the MAX Assembler made a pefect REF/DEF table entry but did not adjust the LFAM properly; I did the latter with EASY BUG.)

When it's time to change your program, you load the latest version of ASM1 with the program from tape. Make the changes with the BASIC editor, RESequence the program to start with statement 10, and run ASM1 again. You will also have to run at least ASM2 to reload the program into Mini Memory.

If you have a disk controller attached, you will have to turn if off to run ASM2. If you have a second cassette, you can

Continued on p. 28

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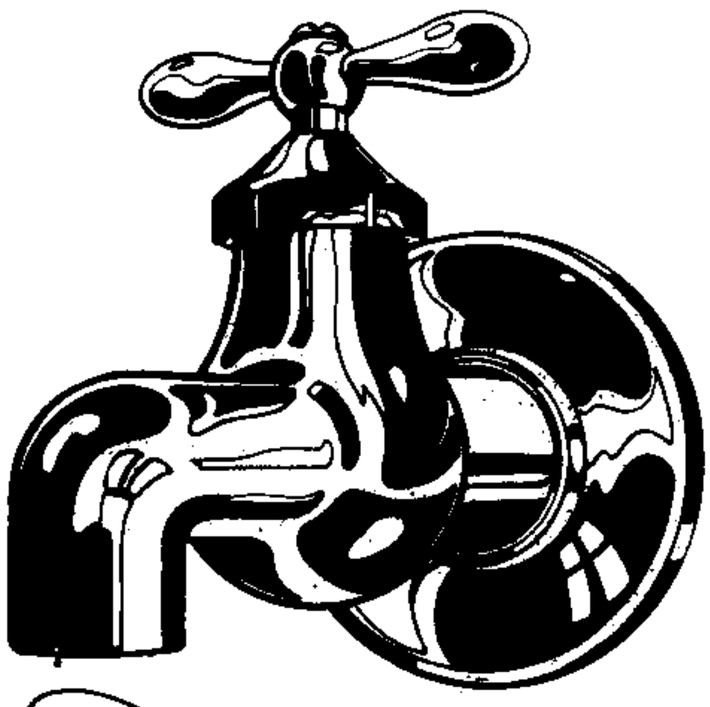


By Joel S. Moskowitz, J. D.

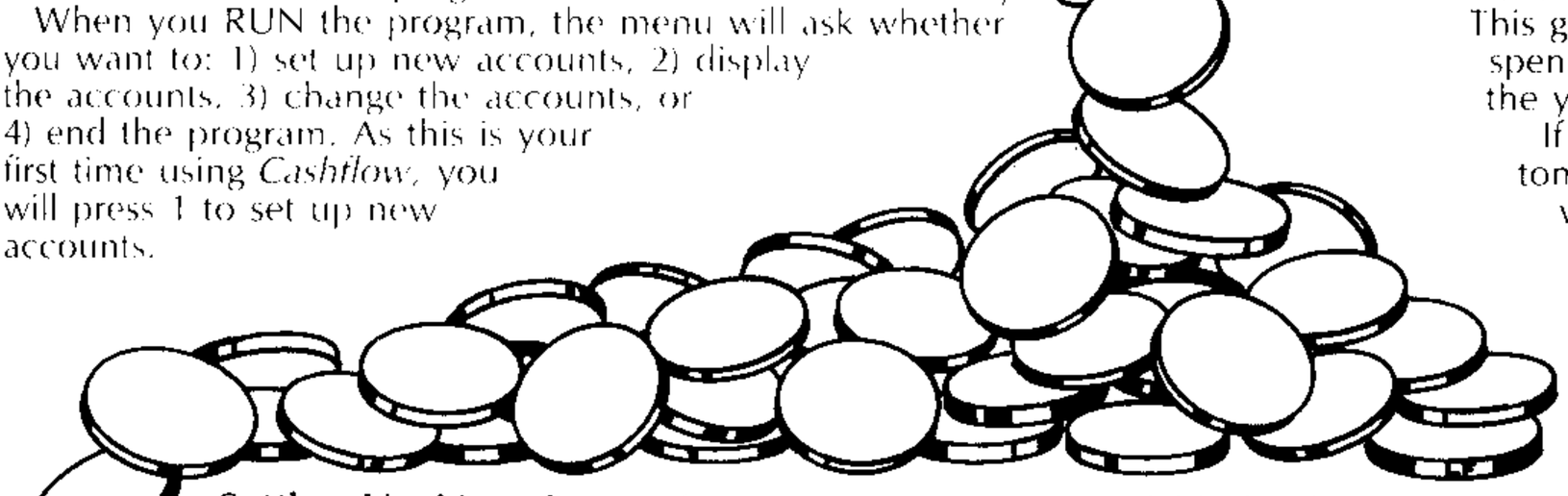
2410 El Pavo Way
Rancho Cordova, CA 95670

What usually wrecks our family's monthly budget is not some unexpected emergency or a sudden desire to fly to the Bahamas for lunch. We are driven to the poorhouse by expenses which regularly show up a few times each year: Car insurance payments which are due in March, June, September and December but leave us alone the other eight months; property taxes due in December and four months later in April; a life insurance premium payable in June; a vacation we are planning to take next August; college tuition due in September. We see these expenses coming. We are like the captain of a ship who sees an iceberg heading right toward the ship, but who never plans an evasive maneuver.

When several of these expenses cluster in one month, we are scrambling for money to live on the day after payday. In months when these bills leave us alone, we are "rich." We suffer from a financial disease known as "cash flow" problem. The solution to this monetary manic-depression is to level out the peaks and valleys by paying one amount each month that anticipates, saves up for and pays these bills.

This is where the power of your TI 99/4A and the speed of random access files come to your rescue. To run this Extended Basic program, you will need a Disk Controller Card (or peripheral) and one disk drive. Although the program could be modified to utilize sequential files from a cassette or DATA statements within it, the program would run *much* more slowly.

When you RUN the program, the menu will ask whether you want to: 1) set up new accounts, 2) display the accounts, 3) change the accounts, or 4) end the program. As this is your first time using *Cashflow*, you will press 1 to set up new accounts.



Setting Up New Accounts

In this subroutine, you will be prompted to supply information about your expenses. First, you will be asked the name of the item. Any name or names, up to 14 spaces, is acceptable. Next, you will be asked how many times per year a payment is due on this item. If, for example, the item is fire insurance, and you receive an annual bill each July, you will enter 1. If you are on a payment plan which allows you to pay for your insurance in four installments, you will enter 4.

For each of the payments you indicate, you will be asked to supply two facts: the month the payment is due, and how much is due in that month. If money is due for fire insurance in July, we will input 7 (as July is the 7th month) and the amount of the bill. You will then be asked if you want to save an equal amount each month toward that item. If you do, then the required calculations will be made automatically, and you can go on to the next item.

This feature can be a real timesaver if you have multiple payments of unequal amounts over unequal intervals. One family I know sends a daughter to a private school. They must pay $300 in June, $1,200 in September and $1,500 in February. The program automatically spreads out each payment over the year, and then for each month calculates how much should be saved toward these payments.

However, you might not want the payments to be equal. One neighbor wants to save $2,000 each year to put in an Individual Retirement Account (IRA) each December. But his budget is too tight to allow equal monthly payments of $167. After August, however, Social Security stops withholding $300 from each month's paycheck, and he has money left over. He therefore decided to save $300 toward his IRA each month from September to December, and to spread the rest of the money he needs to save over the entire year. As a result, he saved $67 a month toward his IRA from January to August and $367 a month for the remaining four months. This gave him an extra $100 a month spending money for eight months of the year.

If you want to devise such a custom plan, indicate that you do not want the level payments option. The program will then display the months of the year in sequence and ask how much you wish to have saved toward that bill by each month. In our example, $67 will be available for the IRA in January. When another $67 is added in February, the total amount accumulated will be $134. Note that you should enter the total amount accumulated for this item over the months to date ($134), and not just the current month's payment.

While this custom option is useful if you have periodic surges in income which you want to level out, for the most part we should let our TI do the work and opt for level payments.

When you finish entering the data for the first item, the process will start again with the second item. When you have run out of items, just press [ENTER]. You will then be asked the number of the current month and how much you have already saved toward your expenses as of this month.

After you have entered this data, the computer signals that it is working as it totals the figures and prints them to your disk in a file it has set up named "CASHDATA." You will note that it takes quite a while to print this data, as opposed to the very rapid access you will have when you use it. This allocation of time will be discussed in the programming tips later.

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THE 99/4A PROGRAM EXCHANGE
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If you have made a mistake entering any items, don't worry. The data will be very easy to alter later. But before we consider how to change the data we have entered, we will look at how we use it in the Display subroutine.

Display Accounts

When you select this subroutine from the menu, the left side of your screen displays a list of all the expense items you have entered. You are then asked to input the number of the month you wish to examine (or to input 0 if you want to return to the menu). To see your situation in January, for example, enter 1. The name of the month will appear at the top of the screen. Next to each item, you will see the total amount you want to have set aside as of January to pay bills on that item. If any bill is actually payable in January, the amount of the expected bill will be displayed on the right side of the screen as a negative number in parentheses. The amount will be paid out of the total saved.

At the bottom of the screen your situation is summarized. First, the total amount you are supposed to have accumulated for all items is displayed. If you have not saved anything toward your expenses in prior months and if no bills are payable out of this total in January, this is the amount you would have to pay into your account to stay on track.

Usually, however, you will have saved something toward this total as of the end of the previous month. The amount of these savings is displayed next. Under that, the total amount of all expenses due in January is set forth. On the last line is the amount of the payment which you have to make in January to get ready for the next month.

For example, suppose the bottom four lines of the screen look like this:

```
TOTAL        2500
- SAVINGS    1800
- EXPENSES    400
PAYMENT       300
```

This tells you that the total amount you need to have accumulated before paying any expenses is $2500. You have been saving toward this amount over the previous months, however, and after your last payment you have accumulated $1800. Moreover, $400 in bills due this month will be taken out of this total. The actions you will take this month are to 1) pay the $400 in expenses and 2) pay $300 into the savings account toward next month's needs. Between your expenses and your payment to savings, your total outlay is $700, which represents your "level payment."

Occasionally, the PAYMENT figure is a negative number, as in the following example:

```
TOTAL        2500
- SAVINGS    1800
- EXPENSES    900
PAYMENT      -200
```

In this case, the two actions you will take are to 1) pay the $900 in bills as itemized and 2) *withdraw* $200 from your savings to help you pay the bills. Again, your net "level payment" is $700.

Changing the Accounts

There are various reasons why you might want to alter your accounts: Your auto insurance rates just went up; your child just graduated from college, and you no longer have to save for his tuition; you have decided to go to Europe next August, and you need to save $3000 for the trip. Whatever the change, when you select Change Accounts from the menu, you will see your expense items as well as PRESENT MONTH/SAVINGS displayed on the screen. The needed data will then be read from the disk.

You will have the options to 1) alter items, 2) enter new items, 3) delete items or 4) indicate that your changes are completed.

Deleting an item is easy. Just select this option and enter the number of the item you want to delete. If you indicate that you want to add items, the program will take you back to the prompts you originally used to input your data. If the screen indicates FILES FILLED you will be able to add new items only if you first delete items to make room and then print this shorter list to the disk.

If you indicate that you want to alter an item, the screen will display all of the data pertaining to that item, including its name, the month and the amount of each payment, and the amount accumulated towards these payments for each month. You can alter any of these items. Unless you merely want to change the name of the item or are altering a "custom" account, the easiest

way to alter an item is to delete it from the list and add it again as a new item.

When you signal that your changes are completed, the new totals will be computed and the new data will be printed to the disk, ready to display.

Practical Pointers

While *Cashflow* will make your financial life much more tranquil, it is a whole new orientation to paying your bills, and you should ease into it slowly if you want it to work. The most practical method, and the one which I used, is to ease into *Cashflow* over the period of a year. Each month, after a bill is paid, add it to your program so that you can begin to save for its reappearance the following year. If too many payments are due in the same month to make this practical, add only some of the items to your list and save the rest for next year.

One other major benefit of *Cashflow* should not escape your notice. You will be earning *interest* on all that money you set aside. The actual amount in your account will therefore be greater than the required savings displayed in the program. While the program could easily have taken account of this interest to reduce your payments a bit, the purpose of ignoring interest is to give you a margin of safety when some of the bills are higher than you expected. If inflation and taxes don't gobble up your surplus, then throw a party to reward yourself for your discipline, or reward your TI-99/4A with some new software.

If, however, things are so tight that you cannot afford a margin of safety, you can discount the interest in advance in favor of lower payments by using my program *Savings* in the April, 1983 *99'er HCM*. Use the "level payments" subroutine to figure out the amount of monthly payment that will, when added to your interest, equal the amount of your bill at the end of a year. You can then multiply this figure by 12 and feed the result into the level payments option of this program.

Programming Pointers

The major advantage of random access files over sequential files is speed of input. Rather than having to read all of the data in the file, you can proceed directly to the record containing the informatin you want.

In reading data on a disk, the computer consumes more time in locating the data and relatively less time in reading it. It is as though you lived in a summer cabin and had to haul your water from a well 50 yards away. Most of your time would be spent in transit to and from the well. If you carried two buckets, instead of one, you could haul the water you needed in a much shorter time. In setting up your files, you will want to put as much data on each record as is practical and arrange the data in the order in which you will use it.

In the file in this program, the names of all of the expense items are contained in Record 0. When you select the Display subroutine, only one record will have to be read to input all of these names, and they will therefore be rapidly displayed on the screen. If these names were located on different records, the operation of the program would be much slower.

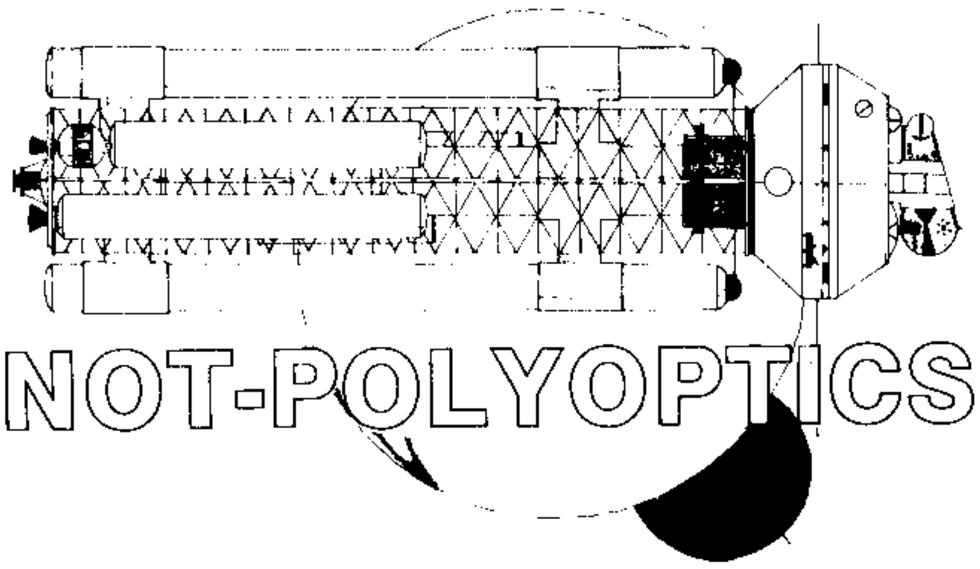
On the same principle, all of the display data pertaining to each month, with the exception of itemized expenses, are contained on the same record.

That explains why the names of the expense items are 14 letters and spaces long, rather then 15. The program utilizes a maximum of 16 items. Only 15 strings fit on a record of maximum length if those strings are 15 letters and spaces long. But if the strings are 14 letters and spaces long, 17 of them can fit on a record. This leaves room at the beginning of the record for a notation as to how many items there are.

While speed in display requires that the data be arranged by month, speed in changing the data requires that it be arranged by item. The data is therefore arranged on the file in both ways. When you indicate that you want to alter data, not all of the file is read in, only the minimum data about the expense items. Displaying some of the data in two forms of organization increases disk space and printing time, but you are compensated by speed of use.

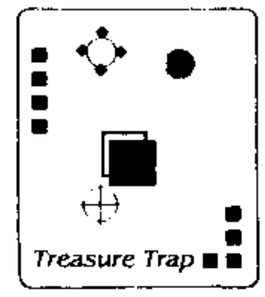
The only thing faster than reading records efficiently is not having to read them at all. Therefore, when you display the figures for a given month, the value of a variable (U(M)) changes from 0 to 1. If you later want to display that month again, the data will be read from the disk only if the value of U(M) is 0.

Continued on p. 26



Five New Games for the 99/4(A)

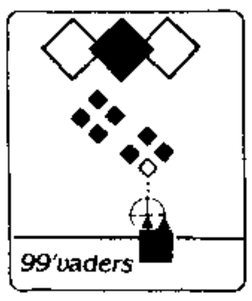
In TI Console Basic -



Treasure Trap An exciting new concept in graphic adventure. Break into the Builders' Planetoid and explore myriad rooms on your quest for High Tech treasure. A different adventure each time you play!

99'uaders All the finger-slamming adrenalin of the arcade favorite at half the cost. Fight back wave after wave of galactic kamikaze aliens from the last outpost on Earth.

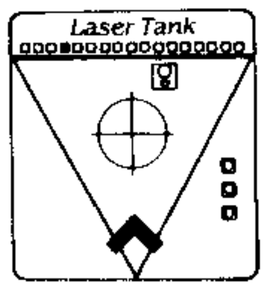
In TI Extended Basic -



Laser Tank On a battlefield of the future maneuver your Coherent Infra-red Equipped Vehicle (CIREV) into position for the lightning quick laser duels with similarly equipped enemy tanks. Chase and engage in the battle zone.

Waldoball Androids are pitted against Robots in this soccer game of tomorrow. Combines the action of team sport with the machine cool of pinball.

Arcade Monopoly Play this all time favorite with full graphic representation on your screen. Choose between regular and arcade versions. The arcade game adds quick movement, rolling obstacles, and the ability to blitz opponents' properties with super projectiles.



And don't forget the games that made NOT-POLYOPTICS: Great strategic games such as Khe Sanh, Sengoku Jidai, Ant Wars, Shipsl, and Hordes. Great action games like Tickworld, Maze of Ariel, and Cars & Carcasses 2. Great board games like Addvance and Crosses. And of course the best selling Winging It flight simulator and Starship Pegasus game of CETI.

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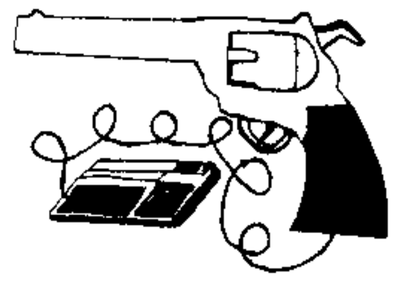
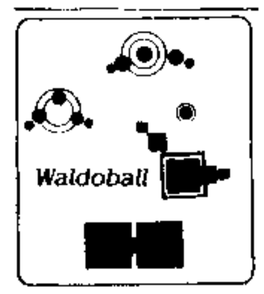
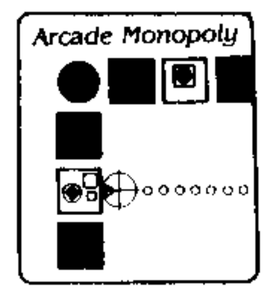


The Texas Light Shooter A photoreceptor gun that plugs into the joystick port of your 99/4(A) to allow you to shoot at targets on the screen. Included with the Light Shooter are complete instructions and a shooting spree game on cassette. Our supply will be limited initially so hurry ordering this item.





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KEY STROKES FOR THRIFTY FOLKS

A Review of *Typwriter*
By Walter Hego
Contributing Editor

Name:	**Typwriter**
Program Type:	**Word Processor**
Language:	**Extended BASIC**
Distributor:	**Extended Software Company** **11987 Cedarcreek Drive** **Cincinnati, OH 45240**
Price:	**$32.00 cassette** **$35.00 diskette**

System Requirements:
Extended BASIC
cassette recorder

	Poor	Fair	Good	Excellent
Documentation:				
Human Engineering:				
Usefulness:				

The price of word processing is dropping so rapidly, it's hard to keep up with it. Printers are turning up at prices that appeared impossible just a short while ago; this puts word processing hardware within reach of a good many Home Computer owners for whom it was once just a pipe dream. These people will now be looking around for inexpensive word processing software to complete their systems.

Typwriter, a software package from Extended Software, may be precisely what they're looking for. This program allows you to enter text into the computer, then save, recall, edit or print that text. It also provides a number of simple commands which can be inserted directly into the text to control the format of the final, printed product.

Usefulness

Typwriter comes on either cassette or diskette and is written in Extended BASIC. Although the minimal system limits you to about 600 words of text input at a time (120 lines of text, each line about 5 words long), you can perform an extremely simple conversion which approximately doubles the available text buffer space if you have a memory expansion peripheral card.

Typwriter does not necessarily limit you to short, 600-word documents. Its formating commands let you form longer texts by chaining short documents together. When the command @A appears at the end of a text file followed by another file name, *Typwriter* finds that file and prints it immediately following the file it has just printed. Thus, if you have limited memory space available, you can SAVE documents in sections.

If you need to generate repeated copies of a given document, you can use the @A command followed by a space and the letter R (@A R) to print as many repetitions of the document as necessary. The PROMPT command (@P) lets you generate "customized" boilerplate documents. If the printer will accept software control codes, the @S command can direct the printer to implement those options. Several other formating commands allow simple formating of text as it is being printed.

Entering and editing the text you want to print is straightforward—with one exception. *Typwriter*'s text lines are short, and there is no warning before you hit the margin. When I was using it to write this review, I often found myself typing over characters at the end of a line. Although the manual contends that "you can get used to typing lines of about 20 characters and pressing the ENTER key without looking at the screen," that is a procedure I have yet to master. It is especially irritating when a long word, like "straightforward," falls at the end of a line. Is there room—or isn't there?

Those of you who program in BASIC will find *Typwriter*'s editing functions very familiar. Even if you're not a BASIC programmer, it shouldn't take you long to become familiar with all the commands. When you start out, however, you need to know that you can enter and exit the Edit mode only if the cursor is in or at the left margin.

Documentation

Typwriter's documentation is quite clear. It covers all the instructions and gives examples when appropriate. The instructions for changing the underlying BASIC code to take advantage of memory expansion devices should be sufficiently clear for even the most timid and computerphobic nonprogrammer. The manual, which is concise and follows the main menu screen, makes it easy to find the information you need and to relate the text to program use. The section on getting started gives novice users a guide to follow, some general hints, and the reassurance that punching the wrong keys as they learn won't cause the computer to go up in smoke.

The manual requires some editing in places—the spelling errors are particularly disconcerting in a word processing manual. In addition, the sections on the DROP and JUSTIFICATION commands are a little mystifying. But some experimentation will make their use clear.

Human Engineering

Typwriter provides easy access to all the features of the system. Most users will quickly become familiar with all twelve formating and nine editing commands and probably won't need to refer to the manual for help. At every step the menus give clear prompts to direct the user. *Typwriter*, in its disk-based form, takes advantage of one of the nicest features of Extended BASIC: It loads itself automatically. When the text you've entered reaches the storage capacity of your system, however, you get a cryptic error message:

```
CODE = 57
JUST ENCOUNTERED AN ERROR.
```

The screen will direct you to the Extended BASIC manual, where you will read another puzzling message. Rather than merely giving you an error message when you hit the limit of text, the program would be much more helpful if it prevented you from entering any more text, and gave you a message that memory was full and you should now SAVE your text.

Not all users can readily take advantage of many of the program's features. Those who have cassette-based systems may be able to use some of the boilerplate features in the formating commands, but this will require careful planning, and a lot more jockeying around of cassettes.

And there are a number of things you wouldn't want to try with *Typwriter*. This program's short line length would make it very difficult to set up tables, for instance. Any word processing jobs which require heavy editing, movement of blocks of text, and extensive insertions would also best be done with other software. This is not to say you *couldn't* do it—you can shave with a Bowie knife, after all, but. . .

So if you're looking for low-cost software for a relatively small volume of word processing—software which does what it says it will—*Typwriter* may be for you.

SOFTWARE FOR THE 99/4(A)

EXTENDED

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MASTER DISK FILE uses a large portion of the 90K bytes available on a single sided disk as virtual memory to create and store a perpetual file of disks, programs and applicable data. Data can be added, removed or up-dated. The file may then be accessed for viewing on the screen or for printing several types of lists on a printer.

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Supports single or multiple drives.

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List on screen or a printer in alphabetical order by program name or disk name.

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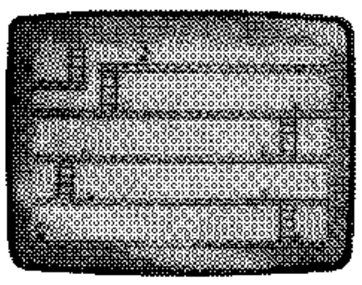
May be used without a printer (on screen); file is portable and can be taken to a friend's for printing.

Supports any printer: serial or parallel.

Diskette (only) $15.00

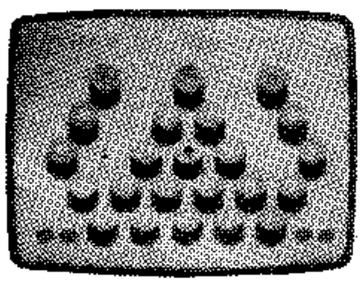
GAMES PAK/III



KONG

Help KONG fight his way to the top of the warehouse, avoiding rolling barrels and trap-doors. Save Roxanne from the bomb set in motion toward her by the villainous Igor. Six different screens. Joysticks.

Cassette or Diskette $15.00



BOUNCER

BOUNCER bounds from one trampoline to another, scoring points for clearing off the squares. He must avoid the arrows which will burst him. Six different screens. Uniquely coordinated sprites, graphics and sounds make BOUNCER so like a real arcade game, you will wonder why we didn't provide a slot for the quarters. Joysticks required.

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Any Input/Output storage of text — disk, cassette, cassette input/disk output, or vice versa.

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Complete *Software Control* of Printer (depending upon its capabilities) — for enhanced print, underlining, formatting, 28 to 254 characters per print line, etc.

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An encrypted message is displayed and guesses change all corresponding letters to the guess. Includes a help feature. Comes with 50 messages which can be changed.

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Move alphabetic squares (A to O) into the single empty slot in an effort to arrange them into order. The computer keeps track of the number of moves taken to solve the puzzle and scores of previous games are displayed for comparison. Multiple squares may be moved when appropriate.

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Complete *File Sort*: 250 records in *100 Seconds.*

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Cassette version differs from disk version.

Cassette $32.00 Diskette $35.00

NOTE: Should you decide to up-grade to the TI-WRITER module, TYPWRITER and NAME-IT data can be converted for use by that module. NAME-IT alone, will generate 250 TI-WRITER form letter records.

TI-WRITER is copyrighted software of Texas Instr.

GAMES PAK/I

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- Have you recently purchased a piece of hardware or software that hasn't quite come up to your expectations, or has, on the other hand, impressed you with its performance? We're looking for comprehensive product and book reviews from different perspectives.
- Are you an educator or parent with something to contribute to computer-assisted instruction (CAI)? We're always looking for new ideas and fresh approaches to educational problems.
- Have you created any unusual computer games or simulations? Let our readers experience your excitement and pleasure.
- Perhaps you've modified your microcomputer or have interfaced it with some unique or useful hardware. Send us your how-to-do-it story.

These are just some ideas. Perhaps you have others. Don't worry if you're not a professional writer. Our editorial staff stands ready to help polish up your manuscripts. And we'll be more than happy to send you a copy of our author guidelines.

Please send your double-spaced typed manuscripts, plus disks or cassettes (recorded on both sides) if the article includes program material, to:

99'er Home Computer Magazine/Editorial Dept.
1500 Valley River Drive, Suite 250
Eugene, OR 97401

Cashflow
Explanation of the Program

Line Nos.

100-140 Program header.

150-190 Program setup. Lines 160-180 contain all the variable and subprogram names used in the program. This increases the speed of Extended BASIC's pre-scan function, which is turned off in line 190. See the Extended BASIC manual or supplement for details.

210-270 Prints title screen.

280 Opens CASHDATA file in UPDATE mode (the default value).

290-330 Prints menu.

340-650 Alters accounts.

660-670 Subroutine calls to enter new items.

680-720 Deletes items.

730-740 Subroutine calls to complete changes.

750-960 Displays accounts.

970-1200 Accepts input data for accounts.

1210-1300 Totals accounts.

1310-1460 Prints data to CASHDATA file.

1470-1550 Inputs records from CASHDATA for alterations.

1560-1570 Displays "Working . . ." message.

1580-1610 Displays payments/savings messages.

Cashflow . . . from p. 21

```
100 !**************
110 !* CASH FLOW *
120 !**************
130 REM BY JOEL S. MOSKOWITZ
140 !  99'ER VERSION 2.10.1XB
150 DIM AK(16,12),EX(12),I$(16),IT
(16,12),MO(16,4),MO$(16,4),NP(
12),X(16,12),X$(16,4),M$(16),P
(12),SA(13),T(12),U(16)
160 CALL CLEAR :: GOTO 190 :: A ::
 A$ :: B :: C :: DEL :: I :: K
 :: M :: PM :: PT :: R :: S ::
 SAV
170 CALL SCREEN :: CALL SOUND :: C
ALL COLOR :: CALL CHAR :: CALL
 HCHAR :: CALL VCHAR :: CALL K
EY
180 DATA JANUARY,FEBRUARY,MARCH,AP
RIL,MAY,JUNE,JULY,AUGUST,SEPTE
MBER,OCTOBER,NOVEMBER,DECEMBER
190 DEF RD(X)=INT(X+.5):: !@F~
200 IMAGE #####
210 ! TITLE SCREEN
220 CALL SCREEN(11):: CALL COLOR(1
4,2,13)
230 CALL CHAR(95,"0000FF"):: CALL
CHAR(134,"80703E1F07000000010E
7CFBE0000000FFB0B9BABA89B0FFFF
0111A9A91101FF")
240 DISPLAY AT(9,11):"CASH FLOW":T
AB(5);"----------":
 : : : :
250 FOR A=1 TO 24 STEP 23 :: FOR B
=3 TO 30 STEP 5 :: CALL HCHAR(
A,B,134):: CALL HCHAR(A,B+1,13
6):: CALL HCHAR(A,B+2,137)
260 CALL HCHAR(A,B+3,135):: NEXT B
 :: NEXT A :: CALL VCHAR(2,3,3
6,21):: CALL VCHAR(2,31,36,21)
270 FOR M=1 TO 12 :: READ M$(M)::
NEXT M
280 OPEN #1:"DSK1.CASHDATA",INTERN
AL,RELATIVE,FIXED 255
290 ! MENU
300 CALL CLEAR :: CALL SCREEN(8)
310 DISPLAY AT(7,2):"CHOOSE:": :"
  1. SET UP NEW ACCOUNTS": :"
  2. CHANGE ACCOUNTS": :"   3.
 DISPLAY ACCOUNTS": :"   4. EN
D PROGRAM"
320 CALL KEY(0,K,S):: IF S=0 OR K<
49 OR K>52 THEN 320
330 CALL CLEAR :: ON K-48 GOTO 350
,370,760,1610
340 ! SET UP NEW ACCOUNTS
350 A=0 :: GOSUB 980 :: GOSUB 1160
 :: GOSUB 1570 :: GOSUB 1220 ::
 GOTO 300
360 ! CHANGE ACCOUNTS
370 CALL CLEAR :: GOSUB 1480 :: GO
SUB 1580 :: GOSUB 1600 :: DISP
LAY AT(22,9):"READING DATA..."
 :: GOSUB 1500
380 DISPLAY AT(21,1)BEEP:"PRESS: 1
. TO ALTER ITEMS":TAB(8);"2. T
O ENTER NEW ITEMS":TAB(8);"3.
TO DELETE ITEMS":TAB(8);"4. CH
ANGES COMPLETED"
390 CALL KEY(0,K,S):: IF S=0 OR K<
49 OR K>52 THEN 390 ELSE ON K-
48 GOTO 410,670,690,740
400 !     ALTER ITEMS
410 DISPLAY AT(21,1):"ENTER THE NU
MBER OF THE ITEM":"YOU WANT TO
 CHANGE. IF YOUR":"CHANGES ARE
 COMPLETE,":"PRESS '0': 1"
420 ACCEPT AT(24,12)SIZE(-2)VALIDA
TE(DIGIT)BEEP:I :: IF I=0 THEN
 GOSUB 660 :: GOTO 380 ELSE IF
 I<1 OR I>A+1 THEN 420
430 IF I<>A+1 THEN 470 ELSE DISPLA
Y AT(5,1)ERASE ALL:"PRESENT MO
NTH: ";PM: :"AMOUNT SAVED:   ";
"$";STR$(SAV)
440 DISPLAY AT(22,1)BEEP:"PRESS: 1
. TO ALTER":TAB(8);"2. TO CONT
INUE"
450 CALL KEY(0,K,S):: IF S=0 OR K<
49 OR K>50 THEN 450 ELSE IF K=
49 THEN GOSUB 1160
```

Continued on p. 51

Excerpts from the 99'er Digest of news & happenings in the Home Computer world

TI LASSOS DISK-BASED SOFTWARE ON "HIGHER FUNCTIONALITY" COMPUTERS

With the signing of Broderbund and Spinnaker to TI's much-publicized software licensing program---whereby TI translates the coding then manufactures/markets the ROM cartridges itself--the Texas giant has initiated a new acquisitions policy aimed at bringing over the best software, previously available only in disk implementation on "higher functionality" computers such as the Apple II. This move will secure for TI certain popular titles that can't be implemented on less-sophisticated cartridge computers.

BUSINESS SOFTWARE DEVELOPERS TO SLASH PRICES FOR HC MARKET

Developers of business/professional software for the $2500 PC market are expected to slash prices on their $300-$700 productivity packages as they finally enter the upper-end of the under-$1000 home computer market. To get retail prices down low enough, the purveyors of the word processing, spreadsheet, and database wares will most likely decrease the quality of the packaging and limit their low-cost line to "defeatured" versions requiring no support. In the HC market, analysts are predicting that personal database applications will far outsell spreadsheets.

LOW-PRICED PRODUCTIVITY COMBOS CREATE PRINTER DURABILITY PROBLEMS

Although business applications such as word processing are migrating down from high-cost professional systems to mass-market implementations, new letter-quality printers in this price range cannot be built as solidly as their more expensive cousins. Service engineers are concerned that consumers who operate small businesses and are eager to put their new systems "to serious work" may inadvertently over-tax printer duty cycles and cause premature failures by pushing equipment to do more than manufacturers have intended.

TI SECURES 1-YEAR MARKET LEAD WITH MBX EXPANDER

Although other big names in personal computing have been courting Milton Bradley to latch on to their speech recognition technology as implemented in the MBX Expander peripheral, MB's agreement with TI precludes another microcomputer implementation of MBX until the TI-compatible unit is on the market for 1 year. MB can and will release the Atari VCS video game version in time for holiday sales. The package marketed by Texas Instruments includes the keypad controller, a headset microphone, and one joystick unit at a suggested retail price of $129.95. An additional joystick is available for $39.95. The second joystick port on the keypad unit, coupled with the rotation capability (Theta control) in the firmware, suggests the possibility of "mouse-like" applications for the device in 1984.

P-BOX PROMO AND CP/M AVAILABILITY TO DRIVE DISK USAGE

Significant new numbers of Home Computer users are expected to add floppy disk capability as TI's promotion continues in full force. TI gives away a free Peripheral Expansion Box with the purchase of 3 cards or designated software packages. Additional impetus for HC users to obtain disk capability is expected to come from the recent announcement by Morning Star Software (of Beaverton, OR) of a CP/M processor board for TI's free P-BOX, plus a CBASIC interpreter.

99'er Digest is a marketing information service for retailers, distributors, third-party vendors, sales representatives, industry analysts, and other TI-watchers interested in the home computing, personal computing, and portable computing markets in which Texas Instruments is present. The publication is issued biweekly and mailed First Class. Appropriate items of consumer interest are excerpted from the Digest in the monthly 99'er Home Computer Magazine. For subscription details contact: Emerald Valley Publishing Co., 1500 Valley River Drive, Suite 250, Eugene, OR 97401.

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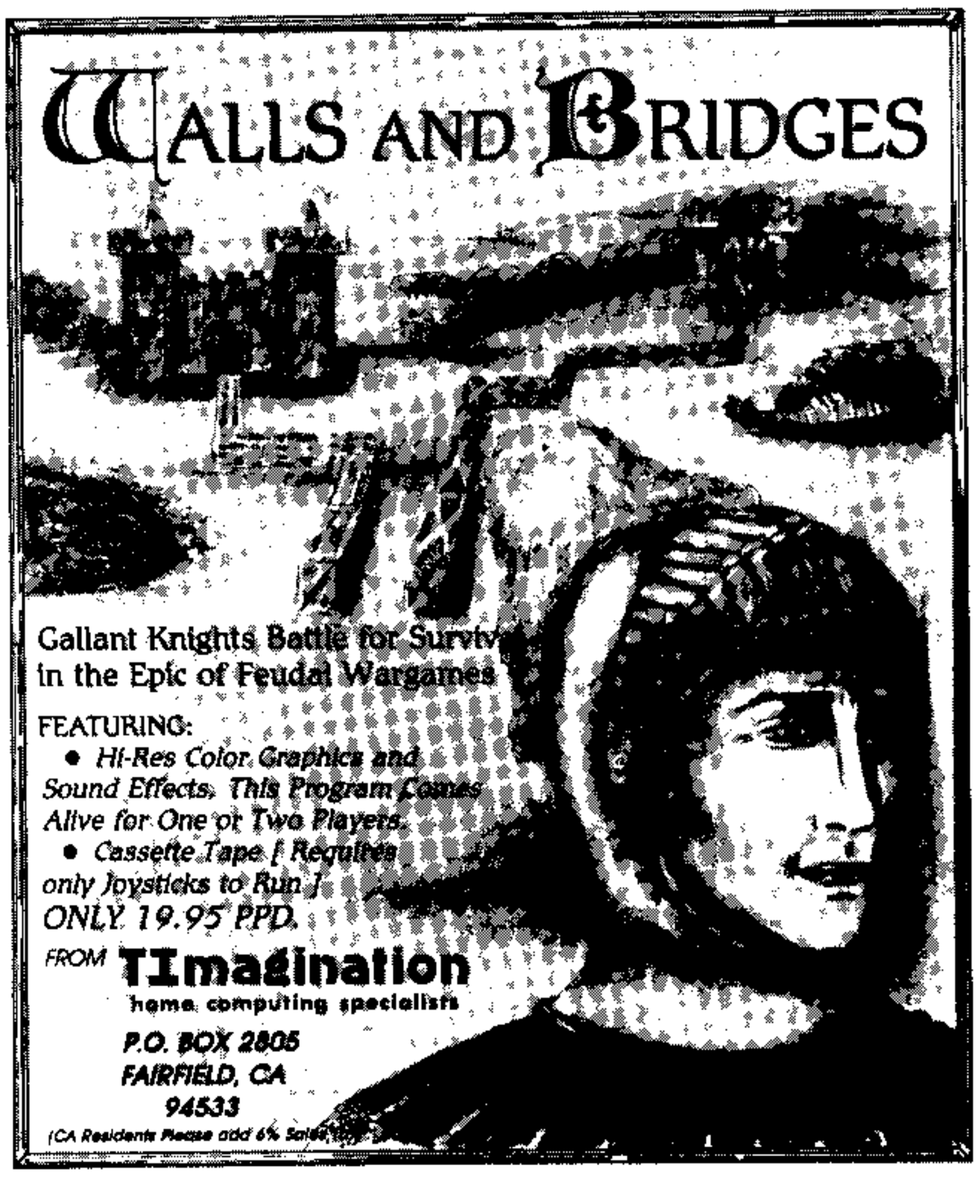

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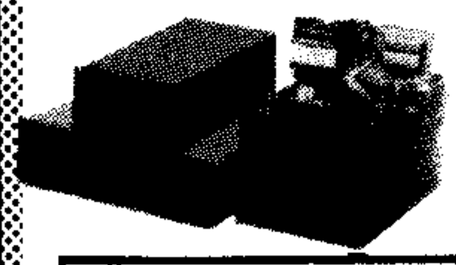

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Assemblers . . . from p. 17

use it for output from ASM2. If you have a printer, you can both LIST your source statements from BASIC with ASM1 loaded and produce an assembly listing with AMS3.

All this reading and saving on cassette causes the MAX Assembler to run slowly. For example, it took about 30 minutes to run ASM1 against the sprites sample program mentioned before, after the source code had been typed in and edited so that no syntax errors remained. It then took ASM2 another 50 minutes or so to load the Mini Memory with machine code.

The Dow Editor/Assembler

John T. Dow
6360 Caton
Pittsburgh, PA 15217
Cassette, $25.00

The Dow Editor/Assembler is also a BASIC program which uses the console's RAM. As the name implies, it contains its own editor for Assembly Language source statements. To use the program, you use BASIC's OLD command to read it from tape and immediately RUN the program. The Dow Editor/Assembler comes to life and is ready to accept any of several commands:

NEW: start a new program.
SAVE: store the source program on tape.
OLD: read in a previously-saved source program from tape.
LIST: list the source program with relative addresses on the thermal printer.
TITLE: view or change the program's title.
LOAD: load the machine code to the Mini Memory at the specified address.
LINK: call the machine-code program via BASIC's CALL LINK command, for testing purposes.
MINI: view or change contents of memory.
EDIT: use the Dow Editor on your source program.

To start entering a source program, you might enter NEW and then EDIT. The editor itself has several commands that let you move around in and change the source program. Typing E puts you into enter mode for putting new statements into your source program. If you insert source statements, the program automatically moves any following statements down by adjusting their addresses. As you enter each source statement, the Dow Editor/Assembler will object to any syntax errors right away. Correct statements cause a "program counter" to be incremented for the next statement, so you can see how many bytes of machine code have been generated so far. You can also delete source statements. You generally stay in edit mode until the source program looks just right, and then exit and SAVE your source program to tape. Then you use the LOAD command to make the assembler put the machine code into Mini Memory at the specified address. The LOAD portion of the processing for the sprites sample program took about five minutes.

The format of the Dow Editor/Assembler's source statements is fixed. (See Figure 1C for a sample.) The first three columns contain a label (of up to three characters), and there is a colon in column 4; you can have up to 40 labels. If a statement has no label, then the first four characters must be blank. Next comes the op code; all 9900 Assembly Language op codes except RT and NOP are supported. The operands start in column 10 and are separated by semicolons instead of commas (again, hard on old programmers but necessary because the assembler is written in BASIC). After these come the operands, which are similar in form to 9900 Assembly Language operands except that the symbol $ (meaning the current location) cannot be used, and register operands must be preceded by R. The Dow Editor/Assember supports the assembler directives DATA, BYTE, TEXT, BTXT (to bias text characters by >60 for you, if your program will be called from BASIC later), BSS and EQU. After these fields, you may put some comments. When you press ENTER to tell the computer that the statement is finshed, there is a pause while the program processes the statement. An incorrect statement is rejected right after it is entered.

Continued on p. 61

CAVERN QUEST

A Review
By Greg Roberts
99'er HCM Staff

Program Type:	**Multi-screen arcade game.**
Author:	**Joe Macchiarulo**
Language:	**Extended BASIC**
Distributor:	**Moonbeam Software** **2 Bridge St.** **Northampton, Ma. 01060**
Price:	**$19.95 cassette or diskette**

	Poor	Fair	Good	Excellent
Performance				
Engrossment				
Documentation				

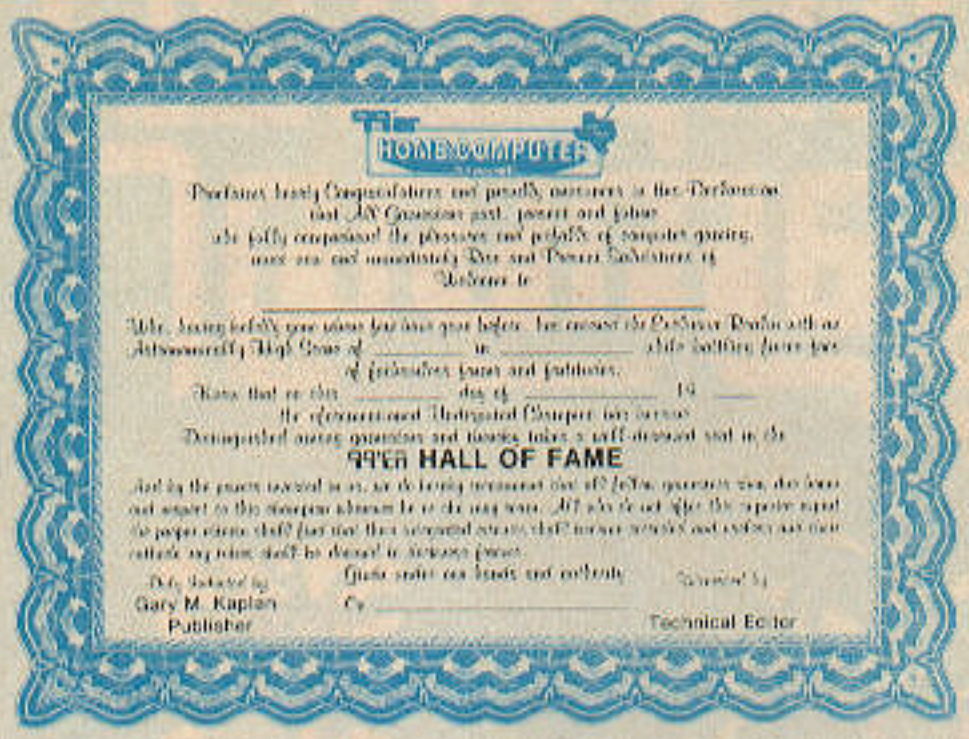
Taking my first look at *Cavern Quest*, I didn't see a cavern at all; the screen's pattern of green stones suggested a pond full of lily pads—as if to say that here was yet another (heaven forbid) frog game. Paying closer attention, I was intrigued to find tunnels inhabited by menacing troglodytes. As I spelunked my way through the dark and the dank, I ran into bats, ghosts, scorpions, and snakes. How to avoid these dangers? Jump over them, naturally—a trick familiar to anyone who has played *Donkey Kong*. Yes, repetition in games design is inevitable—limited as we are by the technology. But there is nothing wrong with variations on a good idea (think of grapes and dogs), and the smattering of *Kong* in *Cavern Quest* only adds to the richness of its pedigree.

Cavern Quest offers much more than a jump-rope challenge: It features three radically different screens—three separate games, really. After you make it through the four caverns of the first screen, your second quest takes you to the edge of a bottomless pit; you cross it by getting a grip on some vines swinging by—and grabbing them before the deadly spider climbs up to you. Clinging to the vines, you must drop safely to the other side, reaching the door of the magic chamber.

In the third act you fight off a bevy of beasts to win their treasures. (The game holds to an intriguing old folk tradition of dumb beasts guarding things they have no business caring about. . .like the contents of King Kong's fist). A treasure appears at the bottom left side of the screen, its point value displayed at the top of the screen. Also at the top are three creatures who compete with you for the treasure. If you can destroy all three with your arrow (located at the right of the screen and released via the joystick fire button), you get the treasure. Once you've achieved success, the game takes you back to the first screen,

Continued on p. 37

99'er Hall of Fame



Computer gaming devotees! We are delighted to announce that the recognition to which you have so long been entitled is now yours. In this history-making issue of *99'er Home Computer Magazine* we proudly display our *99'er Hall of Fame Certificate of Induction*. From this day forward, all of you record-breakers (past, present and future) will receive your own special certificate bearing your name, game and outstanding score! Hall of Famers of the past will also be rewarded if they send in their current address as soon as possible. We'll verify your eligibility and send you your certificate post haste! Aspiring Hall of Famers—send in those screen pictures and polish up your 8x10 frame to prepare to receive the coveted certificate which preserves your high score for posterity. So, good luck, all of you game players passionately engrossed in the pursuit of high scores. We'd love to reserve a spot for you in the prestigious *99'er Hall of Fame*.

We are proud to induct the following gamesters into the 99'er Hall of Fame:

Name: **Jonathan Kalman, age 11 (Ontario, Canada)**
Game: **Attack**
Score: **256,000 (level 4)**

Name: **Janie Reddington (Palatine, IL)**
Game: **Car Wars**
Score: **32,740**

Name: **Pam Jenness, age 19 (Orangevale, CA)**
Game: **TI Invaders**
Score: **32,003**

Name: **Randy Shamblin (Pomeroy, OK)**
Game: **Tombstone City**
Score: **6,597,850**

Name: **Matthew O'Connor (Victoria, Australia)**
Game: **Parsec**
Score: **2,994,100**

Name: **Sam Earl, age 4 (Carmel, IN)**
Game: **Parsec**
Score: **48,000**

Name: **Dwayne Williams, age 14 (Ontario, Canada)**
Game: **Munchman**
Score: **249,620**

Name: **Robert Waech, Sr. (Milwaukee, WI)**
Game: **Henhouse**
Score: **128,560**

STAR PROBE

A Review by Erin O'Connor & Deborah Amity

99'er HCM Staff

Name:	Starprobe 99
Author:	Mark C. Sumner
Program Type:	Scrolling maze
Language:	BASIC
Distributor:	Challenger Software International P.O. Box 50150 St. Louis, Missouri 63105
Price:	$17.95

System Requirements:
Cassette Recorder and Cable

	Poor	Fair	Good	Excellent
Performance				
Engrossment				
Documentation				

Way out in the galaxy, hovering over a small moon in the Gamma-Hydra system, your starprobe is poised, ready to descend into who knows what nefarious Xyolian activity in their underground military base. You are calm because you don't face any personal danger. Your remote control via the NIC (Near-Infinite Communications) Beam will guide the starprobe down into a cave on this moon. Your mission is to knock out the threat of Xyolian attack. When the probe reaches the Xyolian cave it must thread

Continued on p. 80

computer gaming

Computer Gaming is a section for all game lovers—players, designers, and programmers of microcomputer games. Regular features include product reviews, letters to the editor, player strategy, a question and answer forum, a Hall of Fame for high scorers, tutorial articles on game design and programming, plus interviews with professionals in the world of computer gaming.

All submissions for *Pros on Programming* are governed by the same conditions and payment rate as manuscripts sent to other departments of *99'er Home Computer Magazine*. Materials submitted for the features shown below are treated the same for Copyright purposes as *Letters to the Editor* in *99'er Home Computer Magazine* (as explained in the Masthead); if chosen for publication, the material (except for *99'er Hall of Fame*) will earn for its author a free computer game (either TI or third-party) and/or a one-year subscription to this magazine.

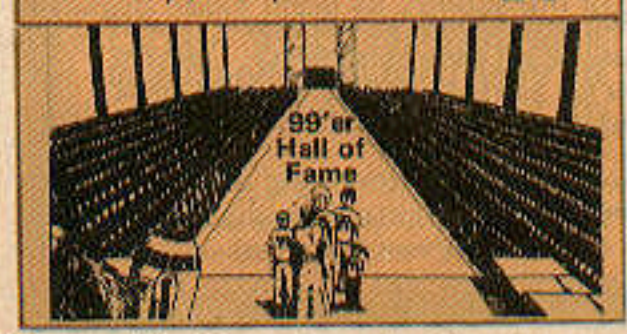
99'er Hall of Fame candidates with high scores in TI, third-party, or *Computer Gaming* games must completely describe the conditions under which their scores were achieved (i.e., skill level, keyboard or joystick use, screen number, partner participation, appearance of screen, etc.). Candidates may not be directly related to or affiliated with the programmer of the game or the publishing firm. No compensation will be provided to new inductees whose names are chosen to be immortalized—Fame is its own reward.

Game Review Criteria

Game Performance measures how well the game responds to the player's commands, rates the quality and realism of the graphics and animation, and examines how well the sound effects, music or speech are integrated into the game. It also determines whether the game delivers what is promised in its advertisements.

Engrossment focuses on that intangible quality that holds the player on the edge of his seat while the hours tick by unnoticed. The game's *staying power* is also assessed.

Documentation rates the printed matter that comes with the game. It notes whether the instructions are clear, comprehensive and easy to use, whether the machine configuration requirements are spelled out, and looks for such information as how to load the program, use the keyboard, and restart the game.



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GAMEWARE

BUFFET

ESTABLISHED FOR THE 99/4A

Jungle Jim

By Michael McCue

27 Curie Road
Cornwall-On-Hudson, NY 12520

The dense, dark Brazilian jungle turns and twists menacingly, but you are not afraid. You know that the acid pits, rolling logs, hungry cannibals, slithering snakes and sudden bonfires are only temporary hazards thrust upon you to test your persistence and prevent you from gathering the giant diamonds which lie in the bush.

Not only can you rise above these obstacles by jumping over them, but you have allies in the trees. Benevolent monkeys will appear to rescue you from perilous pits, spiriting you up gently and musically above the bubbling acidic ooze. If you can catch one, a prehensile-tailed deliverer will carry you through the trees beyond harm. Thanks to them and your own athletic prowess, you can gather piles of the sparkling diamonds and rack up quite a fortune to show for your time spent in this jungle adventure.

This game has bright appealing graphics to keep your spirits high. All the action takes place in front of a three-dimensional backdrop of jungle complete with trees, flowers, grass and mountains. Even the obstacles you encounter are visually entertaining as they try to thwart your diamond gathering mission.

It's a Jungle Out There

The dangers you encounter on your way to wealth and high scores will put your reflexes to a real test. Particularly treacherous are the cannibals and rolling logs. To avoid these hazards, you must jump over them by pressing [I] on your keyboard. The arrow keys [S] and [D] move Jungle Jim backwards and forwards. To grab a diamond you need only to run past it.

The acid pits provide a real challenge. You cannot jump over them; instead you must jump up and grab onto a passing monkey—a bit like catching the brass ring on a merry-go-round. To do this, press [I] and release it *as soon as you are in the air*. If you have the right touch and have jumped under the monkey, it will carry you safely across the pits—or any other hazard. You can boogie through the trees forever, but when you *do* want down, simply press any key to be released. Once you have run the full length of the screen, you will automatically be transported to the next one.

Behind the Screens

In creating *Jungle Jim* my goal was to come up with a new COINC routine and a new key scan set-up in a game that wasn't a space shoot'em-up exercise. After many hours of programming, I came up with a game I think you'll find fast, fun and challenging, with exacting coincidence checks. All that remains for you to do now is power up your TI and key in *Jungle Jim*.

A Challenge

Now that you're privy to all the goings on in the jungle, prepare to collect precious gems while you jump and jog your Jungle Jim to new heights. Before you pack up your belongings and bid civilization *adieu*, here's a challenge to you from our editors: Anyone who can beat our *Jungle Jim* record of 1500 points (and send us a screen photograph verifying the score) will receive special mention in an upcoming issue and will be inducted into the "99'er Hall of Fame." So, go for it, treasure hunters! We'll see you in the jungle and maybe even in the record books!

EXTENDED BASIC

Jungle Jim
Explanation Of The Program

Line Nos.	
100-210	Program header.
220-260	Sets flag for first play; branches to subroutines for first play or replay.
270-310	Displays game scene.
320-470	Controls movement of Jungle Jim and obstacles; determines if Jungle Jim has run into an obstacle.

Continued on p. 38

Counting Fun

By Rolynda Brantley

4282 Taos Drive
San Deigo, CA 92117

You and your best friend are in an enchanted toy chest counting your favorite playthings over and over. The toys in this toy chest never break and never get lost. In fact, the more you play with these toys the more toys you seem to have.

Does this sound like a preschooler's dream? Well, in a way it is. *Counting Fun* began as a way to motivate my three-year-old daughter to learn to count. Since I wanted her to be drawn into the program, I began by designing pictorial representations of her favorite things: ducks, hearts, school buses and her special pal, E.T. My artistic talents leave a lot to be desired. But even though E.T. looks more like a gas pump than an appealing alien, Karen loves him. Together they conquer counting and number concepts while playing in the never-empty toy chest that is our TI-99/4A.

Let's Play

The screen displays two lines of toys, with 0 to 5 toys in each line. Each toy announces its appearance with its own unique sound. The bus, for example, honks its horn. Those who have a Speech Synthesizer might want to have E.T. say his famous line when he comes on the screen.

The computer asks HOW MANY ? and displays three miniature pictures of the toy the child is supposed to count in the two lines above. The child, therefore, does not have to be able to read to enjoy doing this program activity by himself. Correct answers receive an audio and visual reward. An incorrect answer is indicated by a different tone and followed by a display of the correct answer.

After the questions have been asked and answered, an encouraging message designed to personalize the game and boost the learner's self-esteem appears. The message I LOVE YOU not only accomplishes both of the above goals, but it is also a friendly, easily recognizable message for any child to read. You may want to change the messages from time to time after your preschooler has learned to recognize them.

The game is very friendly, and young children will have few problems playing it by themselves. All they need to do is press a number key and [ENTER] to go on to the next problem. Although children will feel independent when they can play this computer game by themselves, it is still special for them to have Mom or Dad close by to appreciate the wonders of their learning accomplishments.

Play's the Thing

Our children's fascination with this new technological toy can help them learn all manner of things from letter and number concepts to exercising their imaginations. You can personalize *Counting Fun* with your child's favorite toys and appropriate reward messages, and then just watch the magic happen. If you get a chance, do "phone home" and let us in on the *Counting Fun* in your household.

BASIC

Counting Fun
Explanation of the Program

Line Nos.	
100-160	Program header.
170-200	Clear screen, input name, and set starting values for variables. (F # of right answers) (W # of wrong answers)
210-270	Initialize colors for character sets.
280-600	Initialize character patterns.
610-670	Set starting values and clear screen.
680-900	Pick random characters and random number of characters and place on screen using subprograms.
910-1470	Ask questions and input responses.
1480-1500	Print total of right and wrong responses.
1510-1520	Input to start game over.
1530-1950	Subprograms to make characters.
1960-2030	Subprograms to make different sounds for right or wrong answers.

```
100 REM **********************
110 REM *   COUNTING FUN    *
120 REM *        BY         *
130 REM * ROLYNDA BRANTLEY *
140 REM **********************
150 REM 99'ER VERSION 2.10.1
160 REM
170 CALL CLEAR
180 INPUT "WHAT IS YOUR NAME? ":K$
190 W=0
200 F=0
210 CALL SCREEN(8)
220 CALL COLOR(10,9,1)
230 CALL COLOR(11,9,1)
240 CALL COLOR(13,7,1)
250 CALL COLOR(14,11,1)
260 CALL COLOR(15,2,1)
270 CALL COLOR(16,16,1)
280 A$="FFFFFFFFFFFFFFFF"
290 CALL CHAR(128,"387CFEFFFF7F7F3
F")
300 CALL CHAR(129,"071F3F7FFFFFFFF
E")
310 CALL CHAR(130,"0000B0B0B0")
320 CALL CHAR(131,"3F1F1F0F0F070703
")
330 CALL CHAR(132,"FEFCFCF8F8F0F0E
0")
340 CALL CHAR(133,"0301010101")
350 CALL CHAR(134,"E0C0C08")
360 CALL CHAR(136,"FF0F0F0F0F0F0FF
F")
370 CALL CHAR(137,"FF0303030303030F
F")
380 CALL CHAR(139,"3F3F3F3F3F3F3FFF
F")
390 CALL CHAR(138,A$)
400 CALL CHAR(144,"FF7E3C")
```

Continued on p. 42

Moonbeam Software: Superior Software for the TI-99/4(A)* Home Computer

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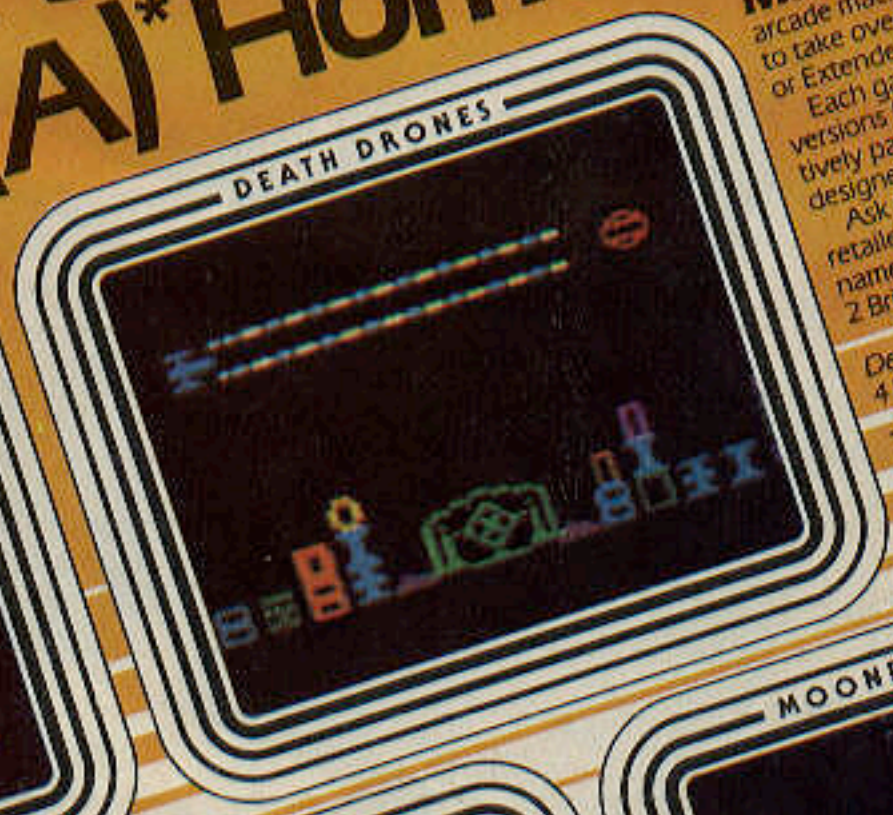

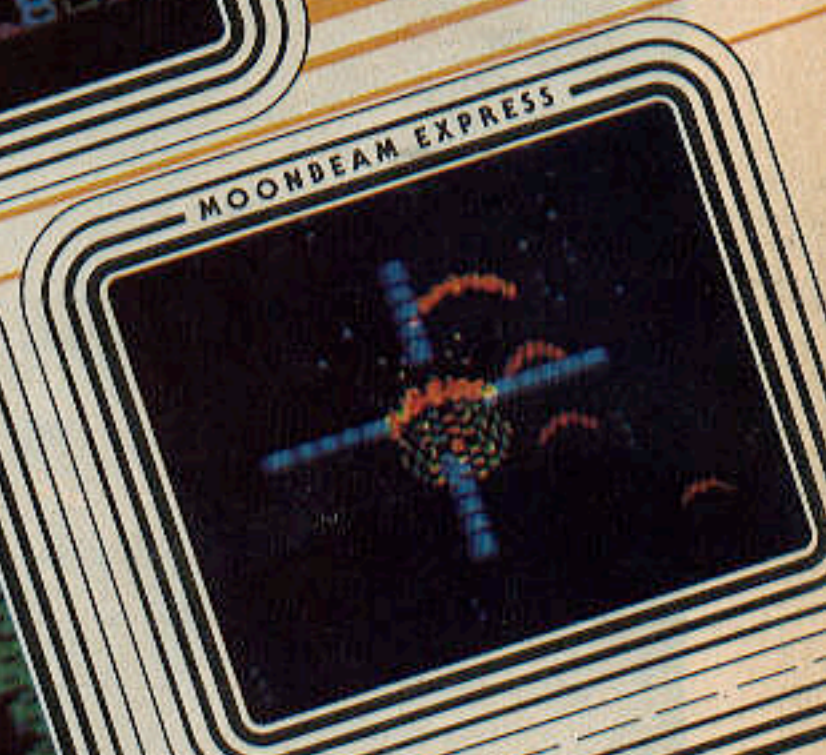

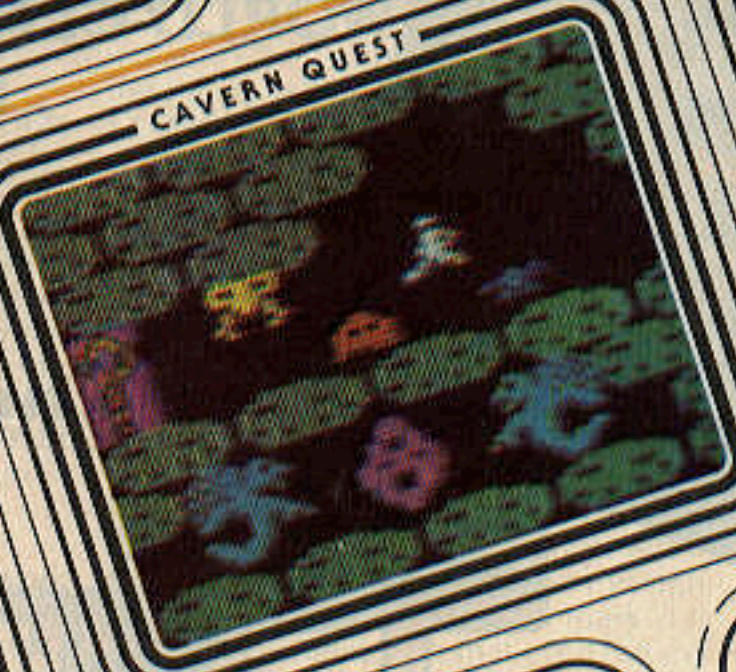

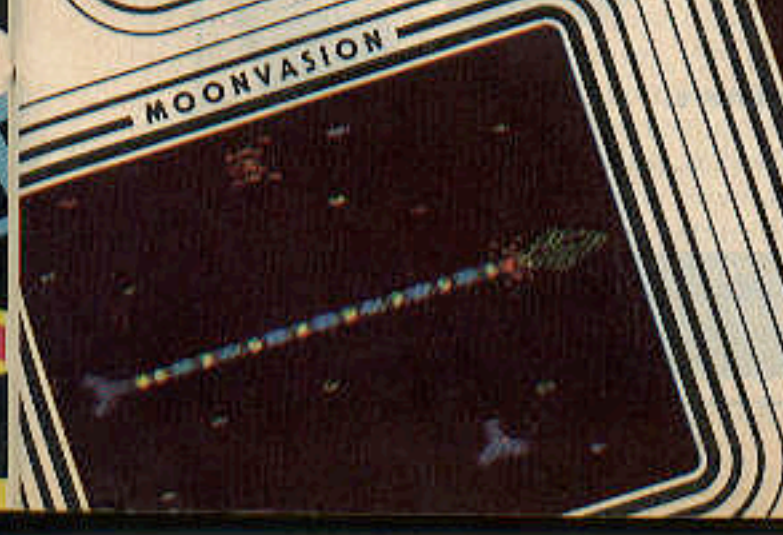

NOTE: All games require extended BASIC, except Death Drones and Moonvasion

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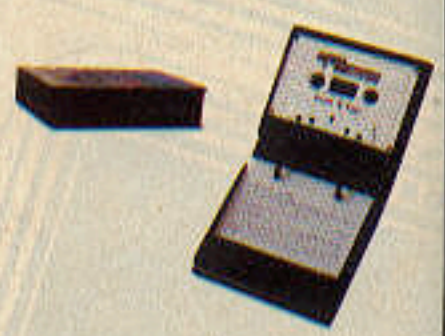

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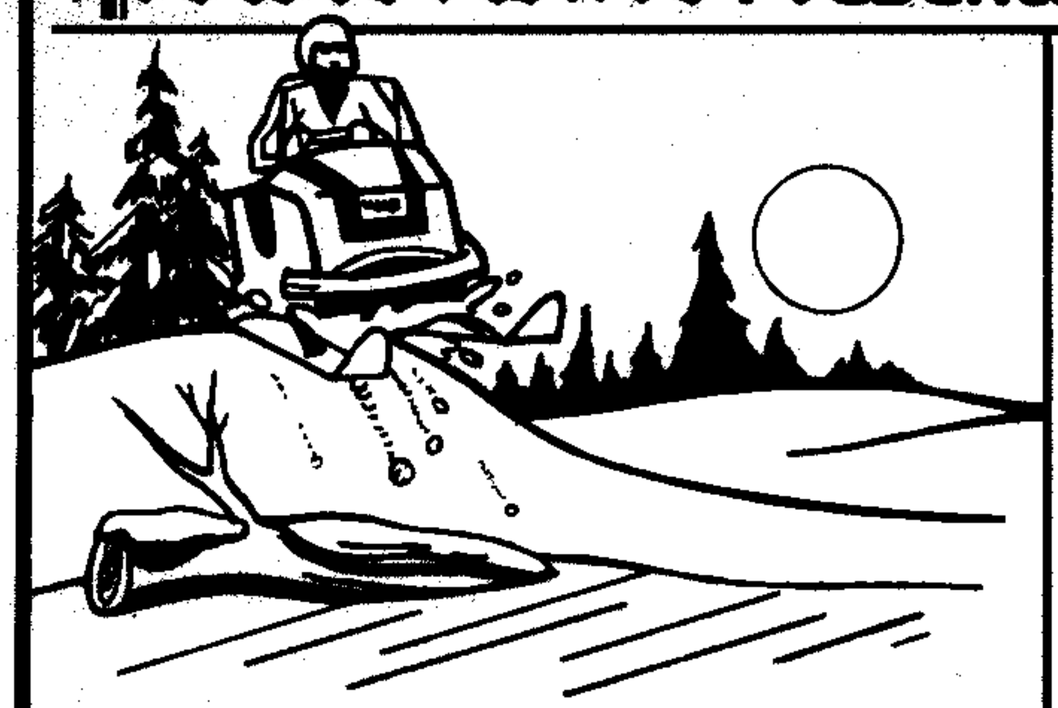

SNOW TREK

You load your snowmobile into your van and head for the country. But watch out! The road is icy! You must avoid stalled cars and stay on the road. You unload your snowmobile and zip into the the field where you see a cute little number running across the snow. You cannot resist and chase it. But be careful. Number crunching can be dangerous! Quick thinking and good reflexes are necessary to score the highest on this game for one player.
(TI-Basic)

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Cavern Quest . . . from p. 29

and you have to jump over the beasts again. But this time your quest will be harder because of a "claw monster" hanging from the ceiling. This new addition to the cavern seemed an impossible obstacle until I realized that I had to run backwards after jumping over each beast in that first onrushing line. Then, when the long space opened up after the third beast, I ran under the claw monster as fast as my joystick could carry me.

Fazed by Phase Two

Negotiating the remaining cavernwork on the first screen, and quickly gliding through the vine sequence of the second, you try for another, more valuable treasure by killing monsters with your longbow. If you succeed, you return to the cavern to find—you guessed it—a second claw monster. Such is the challenge; with each treasure recovered, the cave sprouts a new horror, until you've taken on twenty claw monsters (plus untold thousands of other beasts) and saved up twenty treasures. At this point the quest would seem impossible to anyone but a thorough video loco.

The game can be frustrating at first. While I was running it for review, several people in this office stopped by and took a turn with the joysticks, each one giving up long before they could see the light at the end of the tunnel. For my part, there must have been a little of the General Westmoreland in me, and I dug in for a while, concentrating on timing the jumps. After a half-hour of practice I could consistently get to the second screen within a few minutes. Riding that magic vine and shooting the monsters with arrows is really not very difficult; it provides a relaxing interlude between the maddening forays through caverns—an engaging feature that shows the overall high quality of this software. The designers of this game are definitely onto the right recipe for difficulty: they know that a simple game soon gets boring and ends up in a drawer, whereas a very difficult game can meet the same fate without ever being played through to the end. To hit the middle mark is a rare achievement, one that even the expensive Command Cartridges sometimes miss. Cavern Quest can get very tricky, but only the impatient and clumsy need despair.

What the game does lack is stunning graphics. You definitely will not confuse these screens with the Technicolor bravura of an uptown arcade game. No, here the monsters are tiny, simply-defined little beasts, and the appearance of the ubiquitous computer ghost with two eyes is almost annoying. Sure, ghosts are easy to make in second grade we cut lots of them out of white paper—but we're expected to move on, aren't we? And the vines, bottomless pit, and magic room are blockier than a Mondrian painting. Nevertheless, the action of the game more than redeems the simplicity of the playing field. After all, would we go to a football game to find beauty in billboards and Astroturf?

Considering the high quality of the game and the slick packaging it comes in (a sturdy four-color carton), the documentation is surprisingly thin; in fact, it's about as well-produced as a grocery-store flyer, and confusing to boot. It fails, for example, to state specifically that the joystick fire button makes your figure jump to the vines and then to the ledge. Neither does it tell you exactly how you acquire the series of treasures—that you have to keep going through screen one in order to try for the next prize. Fortunately, however, you leave all confusion behind as soon as you've stumbled through the screens a time or two.

Cavern Quest is well composed from beginning to end. Like a concerto, the three "movements" of this piece are distinctive, while still holding their continuity via the intricate quest theme in every screen and in the recapitulations to screen one. For its price I know of no other game of equal interest.

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Assembling the program into the M.M.M. takes about 3 seconds/statement. Large programs must be broken into modules of no more than about 150 statements, but these may be combined to use the entire 4K of M.M.M. RAM. The manual includes a demonstration program with extensive explanations to help get you started.

You can continue to use the program even if you enhance your system to include printer, expansion memory, and/or disk. In fact, you will be able to convert your programs to TI's Editor/Assembler (which requires most of this extra hardware) without rekeying.

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Jungle Jim . . . from p. 32

480-710	Selects obstacles randomly and displays them.
720	Branches to music subroutine.
730-740	Increases score if Jungle Jim gets diamond.
750-850	Decreases number of remaining Jungle Jims and checks for replay if no Jungle Jims left.
860-950	Plays musical theme.
960-1110	Defines characters for initial title screen and displays them.
1120-1390	Redefines characters for first play or replay, and locates them on the screen.
1400-1450	Redefines characters for first play.
1460-1500	Displays messages.

```
100 ! **************
110 ! *            *
120 ! * JUNGLE JIM *
130 ! *            *
140 ! *     BY     *
150 ! *            *
160 ! * MIKE MCCUE *
170 ! *            *
180 ! **************
190 !
200 ! 99'ER VERSION 2.10.1XB
210 !
220 RANDOMIZE
230 DEF RRND(N)=INT(RND*N)+1
240 TIME=1 !SETS FLAG TO DISPLAY T
    ITLE SCREEN 1ST TIME THROUGH
250 GOSUB 960 !DISPLAYS TITLE SCRE
    EN
260 IF TIME<>1 THEN GOSUB 1120 !RE
    SETS CHAR DEFINITIONS FOR REPL
    AY
270 DISPLAY AT(1,1)SIZE(LEN(STR$(S
    C))+1):SC :: DISPLAY AT(2,1)SI
    ZE(-2):GUY :: CALL VCHAR(1,3,3
    3):: CALL VCHAR(2,3,33)
280 RESTORE 910 :: C=96
290 CALL COLOR(2,2,11):: CALL COLO
    R(1,13,1):: CALL COLOR(3,2,13)
    :: CALL COLOR(4,11,1):: CALL C
    OLOR(5,2,11):: CALL COLOR(6,7,
    2)
300 CALL COLOR(8,4,11):: CALL COLO
    R(7,15,11):: CALL COLOR(14,14,
    1)
310 FOR D=1 TO 100 :: NEXT D :: CA
    LL SPRITE(#1,92,16,104,60)
320 CALL KEY(0,T,ST):: CALL COINC(
    ALL,HIT):: IF HIT=-1 THEN CALL
     COINC(#1,#10,32,IT):: IF IT=-
    1 THEN GOSUB 730 ELSE GOTO 750
     !CONTROL LOOP
330 IF ST=0 THEN CALL MOTION(#1,0,
    0):: HV=0 :: GOTO 320
340 CALL POSITION(#1,X,Y):: IF Y>2
    04 THEN 460 ELSE IF Y<60 THEN
    CALL SOUND(1,110,1,112,2,114,3
    ):: CALL LOCATE(#1,X,60)
350 IF T=68 THEN HV=10 :: CALL PAT
    TERN(#1,C):: C=C-4 :: CALL MOT
    ION(#1,0,10):: IF C<=92 THEN C
    =112 :: GOTO 320 ELSE 320
360 IF T=83 THEN HV=-10 :: CALL PA
    TTERN(#1,C):: C=C-4 :: CALL MO
    TION(#1,0,-10):: IF C<=92 THEN
     C=112 :: GOTO 320 ELSE 320
370 IF T=73 THEN 390
380 CALL MOTION(#1,0,0):: HV=0 ::
    GOTO 320
390 CALL MOTION(#1,-16,HV*1.16)
400 FOR D=1 TO 20 STEP 4 :: CALL S
    OUND(-310,-3,D):: CALL COINC(#
    1,#7,17,HIT):: IF HIT=-1 THEN
    CALL MOTION(#1,0,10):: HV=0 ::
     GOTO 710
410 NEXT D
420 CALL MOTION(#1,24,HV*1.5)
430 FOR D=1 TO 6 :: CALL COINC(#1,
    #7,17,HIT):: IF HIT=-1 THEN CA
    LL MOTION(#1,0,10):: GOTO 710
440 NEXT D :: CALL MOTION(#1,0,0)
450 CALL POSITION(#1,X,Y):: CALL L
    OCATE(#1,104,Y):: GOTO 320
460 CALL MOTION(#1,0,0):: CALL LOC
    ATE(#1,104,60):: FOR I=2 TO 18
     :: CALL DELSPRITE(#I):: NEXT
    I :: COL=COL+1 :: IF COL=11 TH
    EN COL=14
470 IF COL=16 THEN COL=5
480 CALL COLOR(7,COL,11)
490 EA=RRND(6):: IF EA=1 THEN GOSU
    B 640 :: GOTO 320
500 TR=RRND(4):: IF TR=1 THEN GOSU
    B 660
510 S=RRND(5):: IF S=1 THEN SV=0 :
    : GOSUB 670 :: A=INT(RND*15)+1
     :: IF A=1 THEN GOSUB 650 :: G
    OTO 320 ELSE 320
520 FI=RRND(5):: IF FI=1 THEN GOSU
    B 690 :: A=RRND(10):: IF A=1 T
    HEN GOSUB 650 :: GOTO 320 ELSE
     320
530 MS=RRND(5):: IF MS=1 THEN SV=I
    NT(RND*50)-30 :: GOSUB 670 ::
    A=RRND(8):: IF A=1 THEN GOSUB
    650 :: GOTO 320 ELSE 320
540 P=RRND(2):: IF P=1 THEN PV=0 :
    : GOSUB 580 :: GOSUB 650 :: GO
    TO 320
```

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```
550 L=RRND(1):: IF L=1 AND TR<>1 T
    HEN GOSUB 610
560 M=RRND(4):: IF M=1 AND LK<>1 TH
    EN GOSUB 650 :: GOTO 320
570 GOTO 320
580 CALL CHAR(116,C1$):: CALL CHAR
    (120,C2$):: CALL CHAR(124,C3$)
590 CALL SPRITE(#2,116,5,120,96,0,
    PV,#3,120,5,120,128,0,PV,#4,12
    4,5,120,160,0,PV)
600 RETURN
610 REM
620 FOR I=2 TO 3 :: CALL SPRITE(#I
    ,128,9,112,(I*64+8)-20,0,-20):
    : NEXT I
630 RETURN
640 CALL SPRITE(#2,44,5,104,240,0,
    20,#3,44,7,104,160,0,20):: RET
    URN
650 CALL SPRITE(#7,140,10,59,120,0
    ,10):: RETURN
660 CALL SPRITE(#10,132,16,96,216)
    :: RETURN
670 CALL CHAR(116,"000C3A071F"&X$&
    "000306050300000B0C0C0C0C0C0C
    2C4C8FEC73FFF")
680 CALL SPRITE(#2,116,INT(RND*9)+
    2,14*8,INT(RND*14)*8+100,0,SV)
    :: RETURN
690 CALL CHAR(116,"000009002406272
    735355D6AA2E6955A4020002080B0F
    8F8FAED6D89BF96859")
700 CALL SPRITE(#2,116,7,14*8,INT(
    RND*14)*8+100):: RETURN
710 CALL KEY(0,V,CV):: IF CV<>0 TH
    EN CALL MOTION(#1,0,0):: CALL
    POSITION(#1,X,Y):: CALL LOCATE
    (#1,13*8,Y):: CV,V=0 :: GOTO 3
    20
720 TE=2 :: GOTO 860
730 CALL SOUND(500,500,1,504,2,508
    ,3):: CALL DELSPRITE(#10):: SC
    =SC+250 :: DISPLAY AT(1,1)SIZE
    (LEN(STR$(SC))+1):SC :: CALL V
    CHAR(1,3,33)
740 RETURN
750 REM
760 T,ST=0 :: CALL MOTION(#1,0,0)
770 FOR I=510 TO 110 STEP -100 ::
    CALL SOUND(1,I,1,I+2,2,I+4,3):
    : NEXT I
780 GUY=GUY-1 :: DISPLAY AT(2,1)SI
    ZE(-2):GUY :: CALL VCHAR(2,3,3
    3):: IF GUY<>0 THEN CALL LOCAT
    E(#1,104,45):: GOTO 330
790 CALL SOUND(2300,220,1,222,2,22
    4,3):: CALL CLEAR :: CALL CHAR
    SET :: IF EA=1 THEN CALL DELSP
    RITE(#2,#3)
800 A$(1)=B$&"ALL YOUR MEN WERE DE
    STROYED AND YOU ONLY SCORED "&
    STR$(SC)&" POINTS."
810 A$(2)=B$&"BETTER LUCK NEXT TIM
    E."
820 A$(3)=B$&"WANT TO PLAY AGAIN?
    (Y OR N)"
830 TE=1 :: GOSUB 1460
840 CALL KEY(0,K,STAT):: IF NOT(K=
    89 OR K=78)THEN 840 ELSE IF K=
    78 THEN STOP
850 CALL DELSPRITE(ALL):: TIME=2 :
    : PV=0 :: GOTO 260
860 READ TP,FR :: ON FR GOTO 880,8
    90,900,870
870 RESTORE 910 :: GOTO 860
880 CALL SOUND(100,TP,1,TP+2,2,TP+
    3,3):: CALL SOUND(100,165,1,19
    6,1,262,1):: ON TE GOTO 1480,7
    10
890 CALL SOUND(100,TP,1,TP+2,2,TP+
    4,3):: CALL SOUND(100,175,1,22
    0,1,262,1):: ON TE GOTO 1480,7
    10
900 CALL SOUND(100,TP,1,TP+2,2,TP+
    4,3):: CALL SOUND(100,196,1,24
    7,1,294,1):: ON TE GOTO 1480,7
    10
910 DATA 262,1,330,1,392,1,440,1,4
    66,1,370,1,392,1,330,1,349,2,4
    40,2,523,2,587,2,622,2
920 DATA 494,2,523,2,440,2,392,3,4
    94,3,587,3,659,3,698,3,554,3,5
    87,3,494,3
930 DATA 349,2,440,2,523,2,587,2,6
    22,2,494,2,523,2,440,2,262,1,3
    30,1,392,1,440,1,466,1
940 DATA 370,1,392,1,330,1,262,1,1
    96,1,262,1,196,1,262,1,196,1,2
    62,1,262,1,294,1,330,1
950 DATA 349,2,262,2,349,2,262,2,3
    49,2,262,2,349,2,349,2,330,2,2
    94,2,262,1,196,1,4,4
960 VD=28 :: Z$=RPT$("0",16):: CAL
    L CHAR(140,"000001010F09090901
    0101013E200000C0C4C4FCC0C0C0C0
    C020100808102030")
970 C1$=RPT$("0",13)&"31FFF1F03"&R
    PT$("0",20)&"C"&RPT$("F",11)
980 C2$=RPT$("0",7)&"3"&RPT$("F",1
    8)&"03"&RPT$("0",10)&"C0"&RPT$
    ("F",18)
990 C3$=RPT$("0",10)&"FC"&RPT$("F"
    ,11)&"C0000"&Z$&"C0FBFFF8F"
1000 C=96 :: C2=104 :: X$=RPT$("0",
    12):: Y=6 :: CALL CLEAR :: DIS
    PLAY AT(12,1):"PRESS ANY KEY T
    O STOP ANY GRAPHICS DISP
    LAYS."
1010 FOR D=1 TO 500 :: NEXT D :: CA
    LL SCREEN(2):: CALL CHAR(36,X$
    &"000C1F1C1C1C0C0C0702"&Z$&"01
    02FCCB90B4BB131654"):: CALL CL
    EAR
```

Continued on p. 42

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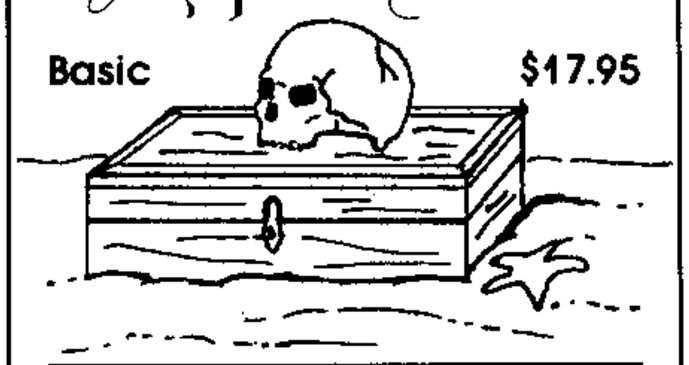

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(Serial interface not yet available)
$9.95 for two rolls of thermal paper (200 feet)

NOTE: The cable you use to connect the STX-80 parallel port to the TI parallel port must connect STX-80 pin 11 to TI pin 10, and STX-80 pin 16 to TI pin 11. If your cable is not configured this way at present, it must be modified.

A quality printer for under $200? Just a year or two ago, the idea would have seemed impossible. But now that we've seen Star Micronics' new STX-80, we are reminded again that good things can indeed come in small packages.

The first thing you notice about the STX-80 is that it takes up only about half the space of most other printers. Weighing 7.5 lbs and measuring 14" by 7.5" by 4", it's a compact package.

At 60 characters per second, the STX-80 is almost as fast as many of the more costly printers. Like those more expensive models, it is bi-directional, logic seeking, and allows bit-image graphics programming. Because it uses thermal paper, it is quieter than dot matrix impact printers, many of which can be quite noisy.

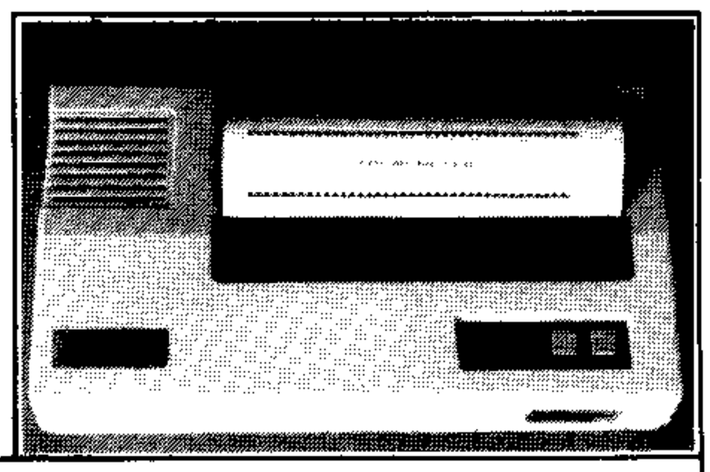
Loading is extremely simple, using thermal paper which comes on a 100-foot roll. Just drop in the roll, feed the paper into the inlet, and you're ready to print. Personally, I find this paper's tendency to curl up a bit annoying, but it can be flattened, and the print does photocopy well. It is about five times as expensive as the non-thermal paper, but this cost is partly negated because the STX-80 has no ribbon cartridge to replace periodically.

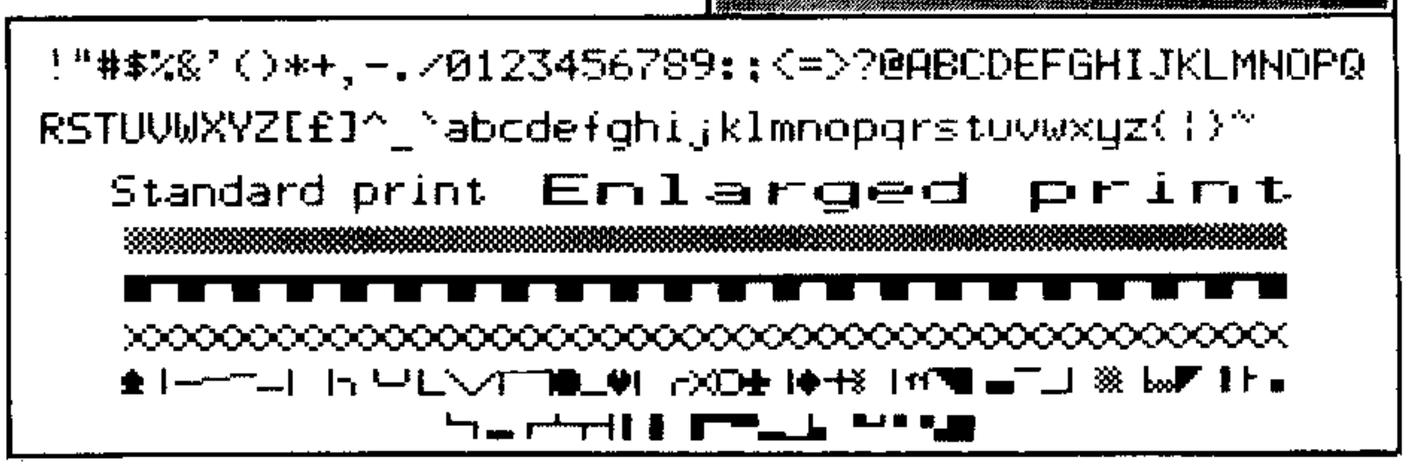
The most surprising thing about this low-cost printer is the high quality of print. Its resolution and tracking are at least as good as that of a dot matrix impact printer, which may be three or four times as expensive. In normal print mode, which uses a 5 × 9 matrix, the characters are clear and readable with the preferred true descenders (full-length tails on the p's and q's). The STX-80 also features enlarged printing and a bit-image graphics mode, using a 6 × 6 matrix, as well as a standard set of block graphics. All of the borders shown in the box were generated using the standard block characters and a few lines of code. Even the finest patterns are printed with a high degree of precision.

Our STX-80 came with a preliminary users' manual which was adequate for us, but would not be very helpful to someone who needs help in setting printing control codes—especially for the graphics mode. We hope the production version of the manual will be more in line with the general quality of the printer.

We were pleased to see that Star Micronics chose not to sacrifice quality in bringing the price of line printers under $200. The STX-80 is quick, precise, very quiet and easy to use. For someone looking for these features, the STX-80 compares well with any printer, at any price.

—Will Schick





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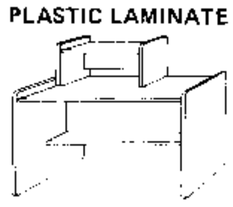

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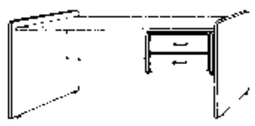

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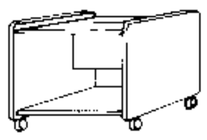

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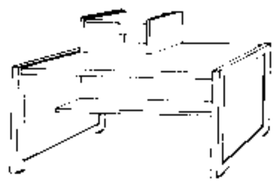

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Jungle Jim . . . from p. 39

```
1020 CALL CHAR(136,"0001071F3FFFFFF
     F0080E0FEFFFFFFF000020F0FCFFF
     FFF10183C7C7EFEFFFF")
1030 CALL MAGNIFY(4):: CALL SPRITE(
     #28,140,16,10*8,15*8)
1040 CALL CHARSET :: FOR I=1 TO 14
     :: CALL COLOR(I,14,1):: NEXT I
      :: DISPLAY AT(1,9):"JUNGLE JI
     M"
1050 B$=RPT$(" ",28)
1060 CALL CHAR(132,"18245ADBDB5D241
     80"&Z$&Z$)
1070 A$(1)=B$&"99'ER MAGAZINE PRESE
     NTS . . . J U N G L E  J I M !
       "
1080 A$(2)=B$&"YOU MUST JUMP OVER T
     HE OBSTACLES BY PRESSING 'I'.
      TO MOVE, USE THE LEFT AND RIG
     HT ARROW KEYS."
1090 A$(3)=B$&"YOU GET 4 MEN, AND Y
     OU SCORE POINTS BY GRABBING TH
     E DIAMOND."
1100 RESTORE 910 :: TE=1 :: GOSUB 1
     460
1110 CALL VCHAR(1,1,32,768):: CALL
     DELSPRITE(ALL)
1120 GUY=4 :: SC=0
1130 CALL CHAR(80,"00183C3E3F1F0F02
     061F3F3F3E3E1000000001C3E7EFEFC
     7870F8FCFCBCBC888")
1140 CALL CHAR(88,"0000000000607030
     04090A0EAFFFFFF8080808090B8F8F0E
     08182AAAB5FFFFFFFFFF")
1150 FOR I=1 TO 14 :: CALL COLOR(I,
     1,1):: NEXT I
1160 CALL CHAR(140,"00010F0F0F13162
     A29"&RPT$("20",5)&"A0E01CF4DEC
     6E030302828 24"&RPT$("0",12))
1170 CALL CHAR(128,Z$&"01030704080B
     0B070000003C7C7CFCFBF0F0E04040
     408")
1180 CALL CHAR(33,RPT$("F",16)):: C
     ALL COLOR(1,1,1):: CALL HCHAR(
     1,1,33,32*9)
1190 CALL CHAR(34,"FFFFFFFFFF7F3F07
     0703030307070701FF7F1F1F070301
     00FFFFFFFEFCFCFCFC")
1200 CALL CHAR(38,"F0F0F0E")
1210 DATA 7,1,34,8,1,35,9,2,36,8,6,
     37,9,6,38
1220 FOR D=1 TO 30 STEP 6
1230 RESTORE 1210
1240 CALL HCHAR(9,D+1,32):: FOR I=1
      TO 5 :: READ A,B,C :: CALL HC
     HAR(A,B+D,C):: NEXT I
1250 NEXT D
1260 CALL VCHAR(7,1,32,3):: CALL VC
     HAR(7,32,32,3):: CALL SCREEN(6
     )
1270 CALL CHAR(40,"030307070F1F7"&R
     PT$("F",19)&"80C0C0E0E0F0F8FF
     )
1280 DATA 10,3,41,4,10,4,41,4,13,2,
     40,1,13,5,42,1
1290 CALL CHAR(44,"01017F130F030303
     030302040438200080084FE84F0888
     80B0C020101010101B")
1300 CALL CHAR(58,RPT$("F",16)):: C
     ALL HCHAR(11,1,58,32*13)
1310 FOR D=1 TO 32 STEP 4
1320 CALL HCHAR(14,D+2,88):: CALL H
     CHAR(14,D,89):: CALL HCHAR(14,
     D+3,90):: CALL HCHAR(14,D+1,9
     ):: NEXT D
1330 FOR F=1 TO 30 STEP 6 :: RESTO
     E 1280
1340 FOR I=1 TO 4 :: READ A,B,C,D :
     : CALL VCHAR(A,B+F+1,C,D):: NE
     XT I
1350 NEXT F
1360 FOR D=1 TO 32 STEP 2 :: CALL H
     CHAR(21,D,80):: CALL HCHAR(22,
     D,81):: CALL HCHAR(21,D+1,82)
     : CALL HCHAR(22,D+1,83)
1370 CALL HCHAR(23,D,88):: CALL HC
     AR(24,D,89):: CALL HCHAR(23,D+
     1,90):: CALL HCHAR(24,D+1,91)
     : NEXT D
1380 CALL CHAR(92,"00000101 0F090909
     0101010 13E200000C0C4C4FCC0C0C
     C0C0201008080B102030")
1390 CALL MAGNIFY(4):: IF TIME<>1 T
     HEN RETURN
1400 CALL CHAR(96,"0101031F13131300
     030303F2000000008088888F8808
     8080808000000804020 30")
1410 CALL CHAR(100,"0000010107090909
     5010101010618100 0C0C0C2F4C8C0C
     0C0C020100808102 03")
1420 CALL CHAR(104,"0000010107050303
     1010101010202020 3C0C0C0E0E0F8C
     0C0C020201010204 06")
1430 CALL CHAR(108,"0000010303030303
     1010101000000704 00C0C0C0E0E0E0F
     0C0C04040C0C0A0 80C")
1440 CALL CHAR(112,"0000010107090909
     5010100000704000 0C0C0C0E0E0F8C
     0C0C040C040A010 203")
1450 RETURN
1460 CALL CHAR(120,X$&"FF")
1470 CALL HCHAR(5,1,120,32):: FOR D
     =1 TO 3 :: FOR I=1 TO LEN(A$(D
     ))STEP 3 :: F$=SEG$(A$(D),I,2
     ):: DISPLAY AT(4,1):F$ :: GOTO
      860
1480 CALL KEY(0,T,S):: IF S=0 THEN
     1490 ELSE 1500
1490 NEXT I :: NEXT D
1500 CALL VCHAR(1,1,32,768):: RETUR
     N
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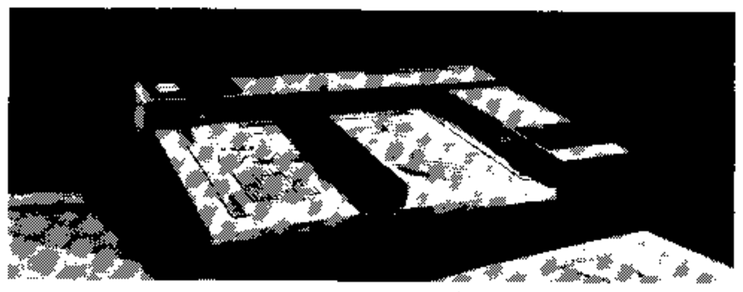

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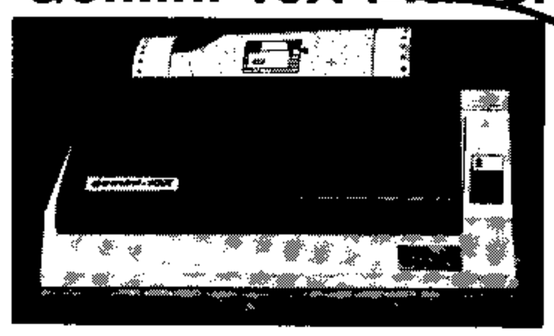

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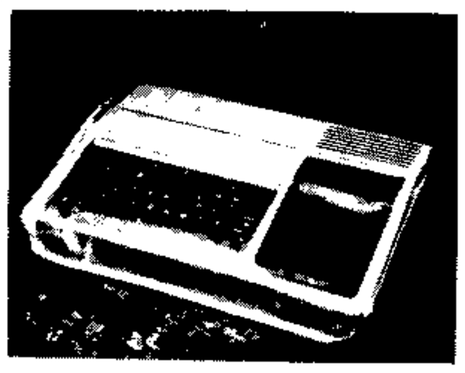

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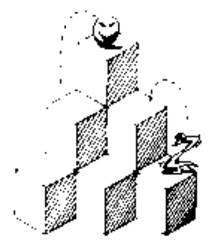

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The Program

This program pushes the resident RAM of the TI-99/4A to its limits and, of necessity, is actually a combination of two programs. The main program contains all of the game logic; the *Supplemental Data* program contains the string data necessary to play the game. The data is INPUT as a data file into the main program each time the game is played.

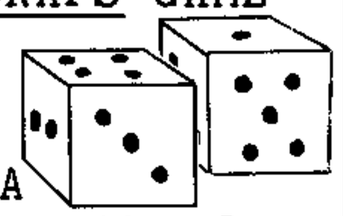
The main program should be SAVEd on tape, then the *Supplemental Data* program should be RUN and the data file recorded on the tape at a spot just after the main program. Then, when the main program is loaded into the computer memory, the data file is ready to be INPUT as soon as the main program is RUN. Also, be sure that the [ALPHA LOCK] key is depressed on the TI-99/4A.

If you have a disk controller and disk drive attached, you must use CALL FILES(1) before running this program.

```
100 REM *SUCCESS FORMULA*
110 REM BY BUD DAVIS
120 REM 99'ER VERSION 2.10.1
130 CALL CLEAR
140 NE=1
150 @=2
160 CALL SCREEN(15)
170 M$="SUCCESS FORMULA"
180 GOSUB 1310
190 OPTION BASE 1
200 DIM S$(21),B(25),E(3),B$(6,10)
    ,E$(5)
210 CALL CHAR(100,"002277777F3E1C0
    8")
220 CALL CHAR(105,"080B7F3E1C36224
    1")
230 FOR C=112 TO 117
240 READ A$
250 CALL CHAR(C,A$)
260 NEXT C
270 FOR C=9 TO 11
280 READ X,Y
290 CALL COLOR(C,X,Y)
300 NEXT C
310 DATA 000000101,000020000004,00
    0040001000002
320 DATA 000044000044,004400100044
    ,005400000054,7,1,16,1,2,16
330 CALL CLEAR
340 PRINT "INPUT DATA": :
350 OPEN #1:"CS1",INTERNAL,INPUT ,
    FIXED 192
360 FOR S=NE TO 6
370 INPUT #1:B$(S,NE),B$(S,@),B$(S
    ,3),B$(S,4),B$(S,5),B$(S,6),B$
    (S,7),B$(S,8),B$(S,9),B$(S,10)
380 NEXT S
390 INPUT #1:E$(NE),E$(@),E$(3),E$
    (4),E$(5),S$(NE),S$(@),S$(3),S
    $(4),S$(5),S$(6),S$(7),S$(8),S
    $(9),S$(10)
400 INPUT #1:S$(11),S$(12),S$(13),
    S$(14),S$(15),S$(16),S$(17),S$
    (18),S$(19),S$(20),S$(21)
410 CLOSE #1
420 CALL CLEAR
430 M$=" MONEY POINTS($/1000) "
440 H$=" HAPPINESS POINTS "
450 F$=" FAME POINTS "
460 PRINT "YOUR 18, AND HAVE":"GRA
    DUATED FROM HIGH SCHOOL.": : :
470 IF M>0 THEN 690
480 GOSUB 720
490 PRINT : :"ENTER YOUR SUCCESS F
    ORMULA.": :"TOTAL POINTS MUST=
    1000.": :
500 INPUT M$:Q
510 INPUT H$:HP
520 INPUT F$:FP
530 IF Q+HP+FP<>1000 THEN 490
540 Q=Q*1000
550 M$="$ "&STR$(Q)
560 H$="   "&STR$(HP)&H$
570 F$="   "&STR$(FP)&F$
580 CALL CLEAR
590 A$=""
600 GOSUB 730
610 L=18
620 N=NE
630 H=5
640 A=5000
650 M=A
660 S=0
670 PRINT : : : :
680 GOTO 460
690 PRINT "PRESS ANY KEY"
700 GOSUB 5740
```

Continued on p. 46

DEMCO'S CRAPS GAME



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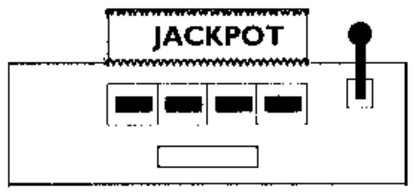

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Success Formula . . . from p. 45

```
 710 GOTO 1790
 720 A$="  XXX"
 730 PRINT "TO WIN YOU MUST GET AND
     KEEP:": :A$;M$: :A$;H$: :A$;F
     $
 740 PRINT :"BY THE TIME YOU ARE":"
     40 YEARS OLD."
 750 RETURN
 760 CALL CLEAR
 770 IF G>10 THEN 790
 780 ON G GOTO 4620,4650,4710,4860,
     850,4900,830,4940,820,5090
 790 ON G-10 GOTO 810,5170,860,5210
     ,5290,5360,800,5460,840,5530,1
     620
 800 S=S+NE
 810 S=S+NE
 820 S=S+NE
 830 S=S+NE
 840 S=S+NE
 850 S=S+NE
 860 RETURN
 870 CALL CLEAR
 880 CALL SCREEN(11)
 890 R=15
 900 M$="OPPORTUNITY KNOCKS"
 910 GOSUB 1320
 920 PRINT "MAY GO TO:": :
 930 FOR X=5 TO 19 STEP @
 940 IF X=13 THEN 980
 950 IF X>9 THEN 970
 960 PRINT " ";
 970 PRINT X;S$(X)
 980 NEXT X
 990 PRINT : :
1000 INPUT "ENTER NUMBER ":G
1010 FOR X=5 TO 19 STEP @
1020 IF G=X THEN 1050
1030 NEXT X
1040 GOTO 1000
1050 CALL SCREEN(15)
1060 S=0
1070 GOSUB 760
1080 IF S=0 THEN 1790
1090 GOTO 2140
1100 X=INT(3*RND)+NE
1110 IF E(X)=5 THEN 1140
1120 E(X)=E(X)+NE
1130 GOTO 1150
1140 X=0
1150 PRINT "EXPERIENCE=";X
1160 RETURN
1170 CALL CLEAR
1180 CALL SCREEN(12)
1190 PRINT "* TELEGRAM *"
1200 PRINT : : :"DRAFT NOTICE!": :,
     "UNCLE SAM": : :
1210 PRINT "2 YEARS IN ARMY.": :"CO
     LLEGE PAID.": : :
1220 L=L+@
1230 B(@)=NE
1240 GOSUB 1100
1250 CALL SCREEN(15)
1260 GOTO 1790
1270 FOR D=NE TO 300
1280 NEXT D
1290 RETURN
1300 M$=S$(G)
1310 R=12
1320 C=INT((32-LEN(M$))/@)
1330 FOR I=NE TO LEN(M$)
1340 D=ASC(SEG$(M$,I,NE))
1350 CALL HCHAR(R,C+I,D)
1360 NEXT I
1370 RETURN
1380 PRINT :"PRESS ANY KEY"
1390 GOSUB 5740
1400 RANDOMIZE
1410 O=INT(6*RND)+NE
1420 P=INT(6*RND)+NE
1430 DD=O+P
1440 ON D GOTO 1520,1480,1450
1450 Y=P
1460 C=7
1470 GOSUB 1570
1480 Y=O
1490 C=5
1500 GOSUB 1570
1510 PRINT
1520 IF (DD=7)+(DD=11)+(O=P)THEN 15
     50
1530 X=@
1540 RETURN
1550 X=NE
1560 RETURN
1570 FOR I=112 TO 117
1580 CALL HCHAR(24,C,I)
1590 NEXT I
1600 CALL HCHAR(24,C,111+Y)
1610 RETURN
1620 M=M+A
1630 R=10
1640 M$="DOUBLE"
1650 GOSUB 1320
1660 M$="PAYDAY"
1670 CALL SOUND(240,392,@)
1680 CALL SOUND(360,523,@)
1690 CALL SOUND(120,392,@)
1700 CALL SOUND(360,494,@)
1710 CALL SOUND(120,523,@)
1720 GOSUB 1310
1730 M=M+A
1740 L=L+NE
1750 B(NE)=@
1760 GOSUB 1270
1770 CALL CLEAR
1780 RETURN
1790 GOSUB 1270
1800 CALL CLEAR
1810 B(NE)=B(NE)+NE
1820 IF B(NE)<5 THEN 1840
1830 GOSUB 1660
```

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Success Formula

```
1840 PRINT TAB(8);"CAREER RESUME":T
     AB(21);"AGE:";L;"SALARY: $";A:
     "EDUCATION: ";E$(N)
1850 PRINT :"     CASH-ON-HAND:$";M:
     TAB(8);"HAPPINESS: ";H:TAB(13)
     ;"FAME: ";F
1860 PRINT "EXPERIENCE:"
1870 FOR I=5 TO 19 STEP 2
1880 IF B(I)=0 THEN 1900
1890 PRINT B(I);S$(I)
1900 NEXT I
1910 PRINT :"YOUR OBJECTIVES:":"   $
     ";Q:"   ";H$:"   ";F$
1920 IF B(NE)=9 THEN 5880
1930 IF (M<Q)+(H<HP)+(F<FP)THEN 207
     0
1940 GOSUB 1270
1950 CALL CLEAR
1960 M$="A WINNER!"
1970 GOSUB 1310
1980 FOR C=10 TO 22
1990 CALL SOUND(-99,1047,0)
2000 CALL HCHAR(11,C,36)
2010 CALL HCHAR(13,C,100)
2020 CALL SOUND(-99,2885,5)
2030 CALL HCHAR(14,C,105)
2040 NEXT C
2050 B(NE)=9
2060 GOTO 1840
2070 IF L>40 THEN 5630
2080 IF M<-20000 THEN 5600
2090 D=NE
2100 GOSUB 1380
2110 IF (B(0)=NE)+(L>30)THEN 2130
2120 IF (DD=0)+(DD=12)THEN 1170
2130 IF (DD=7)+(DD=11)THEN 870
2140 IF S=0 THEN 2160
2150 PRINT :"ENTER":"   ";S$(G):"OR
     "
2160 PRINT :"YOU HAVE THESE OPTIONS
     :"
2170 FOR X=NE TO 3
2180 IF E(X)=0 THEN 2230
2190 Y=0
2200 IF G+X<=21 THEN 2220
2210 Y=21
2220 PRINT "   ";S$(G+X-Y)
2230 NEXT X
2240 PRINT "   CHANCE": :
2250 INPUT "ENTER CHOICE ":M$
2260 IF S=0 THEN 2280
2270 IF M$=S$(G)THEN 2420
2280 IF M$="CHANCE" THEN 2500
2290 FOR X=NE TO 3
2300 Y=0
2310 IF G+X<=21 THEN 2330
2320 Y=21
2330 IF M$=S$(G+X-Y)THEN 2360
2340 NEXT X
2350 GOTO 2250
2360 IF E(X)=0 THEN 2250
2370 E(X)=E(X)-NE
2380 IF G+X>21 THEN 2410
2390 G=G+X
2400 GOTO 2420
2410 G=G+X-21
2420 S=0
2430 GOSUB 760
2440 IF S=0 THEN 2570
2450 IF B(G)=3 THEN 2620
2460 K=NE
2470 M$="ENTER "&S$(G)
2480 GOSUB 1310
2490 ON S GOTO 2650,2950,3010,3070,
     3120,3190
2500 D=NE
2510 GOSUB 1400
2520 IF G+DD<=21 THEN 2540
2530 G=G-21
2540 G=G+DD
2550 S=0
2560 GOSUB 760
2570 IF G<21 THEN 1790
2580 G=0
2590 GOTO 1790
2600 GOSUB 4560
2610 PRINT :"NOT ENOUGH CASH-ON-HAN
     D."
2620 PRINT :"YOU CAN'T ENTER."
2630 S=0
2640 GOTO 1790
2650 IF N>3 THEN 2620
2660 IF B(0)=0 THEN 2690
2670 PRINT "VETERAN--TUITION PAID"
2680 GOTO 2720
2690 PRINT "TUITION= $ 5000"
2700 IF M<5000 THEN 2610
2710 M=M-5000
2720 IF N>NE THEN 2880
2730 PRINT : :NE;
2740 PRINT E$(0);" IN:": :"    HUMA
     NITIES":"    SOCIAL SCIENCES":
      : :
2750 IF N>NE THEN 2850
2760 PRINT 0;
2770 PRINT E$(3);" IN:": :"    SCIE
     NCE":"    ENGINEERING": : : :
2780 IF N>NE THEN 2850
2790 INPUT "ENTER  1 OR 2 ":X
2800 IF (X<>NE)*(X<>0)THEN 2790
2810 N=X+NE
2820 CALL CLEAR
2830 IF N=0 THEN 2740
2840 IF N=3 THEN 2770
2850 PRINT :"4 YEARS--NO SALARY"
2860 L=L+4
2870 GOTO 2920
2880 N=N+0
2890 PRINT :"2 YEARS--RECEIVE SALAR
     Y"
```

Continued on p. 48

HARVEY'S SPECIAL OF THE MONTH PROGRAMMING WITH FILES

PROGRAMMING TIPS OF THE MONTH:

1. Write file processing programs on the premise the file exists. 2. Write another program whose only objective is to provide the file for the first run of the other program. The file created will contain one record, the end of file record. The above tips apply to sequential file processing on a cassette system.

GUIDE TO FILE PROCESSING ON A TI99/4A CASSETTE SYSTEM: Reg. $25. A programming guide written specifically for cassette system owners who want to learn how to write programs that use data stored on cassette tape. You should have some previous experiences writing Basic. The text covers: Program development planning suggestions; program organizations; sequential file processing; end of file checking; the concept of 1 and 2 dimensional array processing; and with numerous programing code examples. Text is 8 x 11 inch pages, from a Daisy Wheel printer, and bound in a Duo-Tang cover. For $25. you get the text and free delivery in the US.

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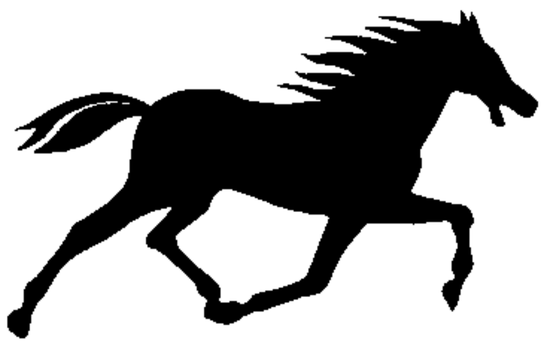

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Success Formula . . . from p. 47

```
2700 L=L+@
2710 M=M+A+A
2720 RESTORE 32767
2730 GOSUB 5770
2740 GOTO 3340
2750 X=30000
2760 RESTORE 5830
2770 GOSUB 5770
2780 IF N=3 THEN 3340
2790 IF N=5 THEN 3330
3000 GOTO 3280
3010 X=5000
3020 RESTORE 5840
3030 GOSUB 5770
3040 IF N=NE THEN 3060
3050 K=@
3060 GOTO 3290
3070 X=1000
3080 RESTORE 5850
3090 GOSUB 5770
3100 IF N>NE THEN 3330
3110 GOTO 3280
3120 X=30000
3130 RESTORE 5860
3140 GOSUB 5770
3150 IF N=4 THEN 3330
3160 GOTO 3280
3170 K=B(13)+NE
3180 GOTO 3290
3190 IF L<36 THEN 3220
3200 PRINT :"YOU'RE OVER 35."
3210 GOTO 2620
3220 X=40000
3230 RESTORE 5870
3240 GOSUB 5770
3250 IF B(17)<@ THEN 3270
3260 K=3
3270 IF N>NE THEN 3340
3280 IF B(G)>0 THEN 3340
3290 PRINT "PAY $";X
3300 IF M<X THEN 2600
3310 M=M-X
3320 GOTO 3340
3330 K=@
3340 J=@
3350 PRINT :"POINTS AND MONEY X";K
3360 GOSUB 1270
3370 CALL CLEAR
3380 PRINT "EXPERIENCE OPTIONS:": :
3390 FOR X=NE TO 3
3400 IF (E(X)=0)+(J+X>10)THEN 3460
3410 M$=B$(S,J+X)
3420 IF LEN(M$)<26 THEN 3450
3430 PRINT X;SEG$(M$,NE,25):SEG$(M$
     ,26,28)
3440 GOTO 3460
3450 PRINT X;M$
3460 NEXT X
3470 PRINT :"OR": :"4 TAKE A CHANCE
     ": : :
3480 M$=""
3490 INPUT "ENTER NUMBER ":X
3500 X=INT(X)
3510 IF (X<NE)+(X>4)THEN 3490
3520 IF X=4 THEN 3570
3530 IF (E(X)=0)+(SB+X>10)THEN 349
3540 E(X)=E(X)-NE
3550 J=J+X
3560 GOTO 3600
3570 D=NE
3580 GOSUB 1400
3590 J=J+D
3600 CALL CLEAR
3610 IF J>10 THEN 4460
3620 PRINT B$(S,J): : : : : : : :
     : : : :
3630 ON J GOTO 3830,3830,3830,421
     3870,3870,3910,3910,4270,445
3640 IF U=0 THEN 3680
3650 CALL HCHAR(14,3,100,U)
3660 H=H+U
3670 U=0
3680 IF V=0 THEN 3720
3690 CALL HCHAR(19,3,105,V)
3700 F=F+V
3710 V=0
3720 IF W=0 THEN 3760
3730 PRINT "$";W
3740 M=M+W
3750 W=0
3760 PRINT M$: :
3770 IF T=0 THEN 3360
3780 FOR Y=NE TO T
3790 GOSUB 1100
3800 NEXT Y
3810 T=0
3820 GOTO 3360
3830 T=K*INT(3*RND)
3840 U=U+(K*INT(9*RND))
3850 V=V+(K*INT(9*RND))
3860 GOTO 3640
3870 U=K*INT(11*RND)*B(4)
3880 V=K*INT(11*RND)*B(10)
3890 W=K*1000*B(16)
3900 GOTO 3840
3910 U=K*B(6)
3920 V=K*B(12)
3930 W=K*1000*B(18)
3940 IF J=7 THEN 3970
3950 IF B(23)>0 THEN 4150
3960 GOTO 3840
3970 IF B(22)>0 THEN 3990
3980 GOTO 3840
3990 ON B(22)GOTO 4000,4050,4080,4
     20
4000 F=INT(F/@)
4010 U=0
4020 V=0
4030 M$="LOSE HALF YOUR FAME"
4040 GOTO 3640
4050 H=0
4060 M$="LOSE ALL HAPPINESS"
4070 GOTO 3640
```

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Success Formula

```
4080 M=0
4090 U=0
4100 M$="LOSE ALL CASH"
4110 GOTO 3640
4120 A=A+(5000*K)
4130 M$="INCREASE SALARY $"&STR$(50
     00*K)
4140 GOTO 3640
4150 A=INT(A/2)
4160 U=0
4170 V=0
4180 W=0
4190 M$="SALARY REDUCED"
4200 GOTO 3640
4210 D=2
4220 GOSUB 1380
4230 U=K*10*B(8)
4240 V=K*10*B(14)
4250 W=K*10*1000*B(20)
4260 GOTO 3640
4270 IF S<>NE THEN 4290
4280 IF (B(17)=3)+(L>35)THEN 4460
4290 IF K<3 THEN 4310
4300 B(17)=3
4310 GOSUB 4560
4320 G=B(24)
4330 IF G=17 THEN 4360
4340 GOSUB 760
4350 GOTO 1790
4360 B(25)=15
4370 GOSUB 4410
4380 S=6
4390 CALL CLEAR
4400 GOTO 2470
4410 A=A+(B(25)*1000*K)
4420 PRINT "NEW SALARY= $";A: :
4430 GOSUB 1270
4440 RETURN
4450 GOSUB 4410
4460 PRINT :"EXIT ";S$(G): :
4470 IF S>NE THEN 4500
4480 GOSUB 4410
4490 GOTO 4540
4500 B(G)=B(G)+NE
4510 FOR Y=NE TO B(G)
4520 GOSUB 1100
4530 NEXT Y
4540 GOSUB 4560
4550 GOTO 1790
4560 FOR X=4 TO 22 STEP 2
4570 B(X)=0
4580 NEXT X
4590 B(23)=0
4600 S=0
4610 RETURN
4620 GOSUB 1300
4630 Z=INT(A*(A/30000))
4640 GOTO 5050
4650 M$="BUY A "&S$(G)
4660 GOSUB 1310
4670 X=INT(A/1000)
4680 Y=0
4690 Z=A
4700 GOTO 4990
4710 GOSUB 1300
4720 PRINT "YOU ARE SUED FOR LIBEL"
     : :
4730 D=NE
4740 GOSUB 1380
4750 IF X=NE THEN 4830
4760 PRINT : :"GUILTY!"
4770 IF M<=0 THEN 4800
4780 Z=INT(M/2)
4790 GOSUB 5050
4800 PRINT :"LOSE 1/2 YOUR FAME": :
     :
4810 F=INT(F/2)
4820 GOTO 4840
4830 PRINT : :"NOT GUILTY--": : :
4840 GOSUB 1100
4850 RETURN
4860 GOSUB 1300
4870 L=L+NE
4880 PRINT "LOSE 1 YEAR'S TIME & SA
     LARY"
4890 RETURN
4900 GOSUB 1300
4910 PRINT "LOSE 25% OF YOUR CASH"
4920 M=M-INT(M/4)
4930 RETURN
4940 M$="INVEST IN A HOBBY"
4950 GOSUB 1310
4960 X=INT((A/1000)*RND)
4970 Y=X
4980 Z=A-(X*1000)
4990 IF X=0 THEN 5020
5000 H=H+X
5010 CALL HCHAR(16,3,100,X)
5020 IF Y=0 THEN 5050
5030 F=F+Y
5040 CALL HCHAR(18,3,105,Y)
5050 M=M-Z
5060 PRINT :"PAY $";Z
5070 GOSUB 1270
5080 RETURN
5090 GOSUB 1300
5100 IF M>0 THEN 5130
5110 Z=0
5120 GOTO 5050
5130 D=3
5140 GOSUB 1380
5150 Z=X*INT(M/2)
5160 GOTO 5050
5170 M$="RENT IS DUE"
5180 GOSUB 1310
5190 Z=INT(A/2)
5200 GOTO 5050
5210 GOSUB 1300
5220 IF M>0 THEN 5250
5230 PRINT "FORGET IT!"
5240 RETURN
5250 D=2
5260 GOSUB 1380
5270 Z=INT(.1*M*O)
5280 GOTO 5050
5290 M$=S$(G)&"AN HOLIDAY"
5300 GOSUB 1310
5310 X=INT(30*RND)+10
5320 Y=0
5330 Z=0
```

Continued on p. 50

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Success Formula . . . from p. 49

```
5340 PRINT "TRIP TO THE ISLANDS!":
     : :
5350 GOTO 5000
5360 GOSUB 1300
5370 IF M<A THEN 5440
5380 D=3
5390 GOSUB 1380
5400 Z=(X*5*A)-A
5410 M=M+Z
5420 PRINT "$";Z
5430 IF Z>0 THEN 5450
5440 PRINT :"SORRY"
5450 RETURN
5460 GOSUB 1300
5470 IF M<20000 THEN 5440
5480 X=24
5490 Y=4
5500 Z=20000
5510 PRINT "WEEKEND TO REMEMBER!"
5520 GOTO 5000
5530 GOSUB 1300
5540 IF M>0 THEN 5560
5550 PRINT "THANKS, ANYWAY."
5560 Z=INT(.1*M)
5570 Y=4
5580 X=INT(Z/1000)+4
5590 GOTO 4990
5600 CALL CLEAR
5610 PRINT "DECLARE BANKRUPTSY"
5620 GOTO 5650
5630 CALL CLEAR
5640 PRINT "YOU ARE";L;"AND HAVEN'T
     ":"REACHED YOUR OBJECTIVES."
5650 GOSUB 1270
5660 CALL CLEAR
5670 M$="YOU LOSE"
5680 GOSUB 1310
5690 X=14080
5700 CALL SOUND(-99,X,0)
5710 X=X/0
5720 IF X=55 THEN 2050
5730 GOTO 5700
5740 CALL KEY(0,R,ST)
5750 IF ST=0 THEN 5740
5760 RETURN
5770 READ B1
5780 FOR B2=NE TO B1
5790 READ B3,B4
5800 B(B3)=B4
5810 NEXT B2
5820 RETURN
5830 DATA 7,4,1,6,12,8,6,10,1,12,12
     ,24,17,25,5
5840 DATA 7,4,1,16,5,20,3,22,4,23,1
     ,24,10,25,3
5850 DATA 7,4,1,6,8,8,1,14,1,20,1,2
     4,4,25,2
5860 DATA 7,6,5,12,10,14,4,16,10,22
     ,1,24,10,25,5
5870 DATA 7,4,1,12,10,16,5,18,-5,2
     ,10,24,4,25,7
5880 END
```

Success Formula Supplemental Data Program
Explanation of the Program

Line Nos.	
100-190	Program header.
200-330	Dimension arrays, read DATA into arrays from DATA statements.
340-400	Output DATA to the cassette tape.
410-570	Supplemental DATA for the main program *Success Formula*.

```
 100 REM ****************
 110 REM *SUCCESS FORMULA*
 120 REM *              *
 130 REM * SUPPLEMENTAL  *
 140 REM * DATA PROGRAM  *
 150 REM ****************
 160 REM BY BUD DAVIS
 170 REM 99'ER VERSION 2.10.1
 180 REM
 190 REM
 200 CALL CLEAR
 210 PRINT "RECORD DATA ON TAPE FO
     INPUT TO SUCCESS FORMULA
     PROGRAM.": : : :
 220 DIM B$(6,10),E$(5),S$(21)
 230 FOR S=1 TO 6
 240 FOR SB=1 TO 10
 250 READ B$(S,SB)
 260 NEXT SB
 270 NEXT S
 280 FOR EP=1 TO 5
 290 READ E$(EP)
 300 NEXT EP
 310 FOR SQ=1 TO 21
 320 READ S$(SQ)
 330 NEXT SQ
 340 OPEN #1:"CS1",INTERNAL,OUTPUT
     FIXED 192
 350 FOR S=1 TO 6
 360 PRINT #1:B$(S,1),B$(S,2),B$(S
     3),B$(S,4),B$(S,5),B$(S,6),B$
     S,7),B$(S,8),B$(S,9),B$(S,10)
 370 NEXT S
 380 PRINT #1:E$(1),E$(2),E$(3),E$
     4),E$(5),S$(1),S$(2),S$(3),S$
     4),S$(5),S$(6),S$(7),S$(8),S$
     9),S$(10)
```

Continued on p.

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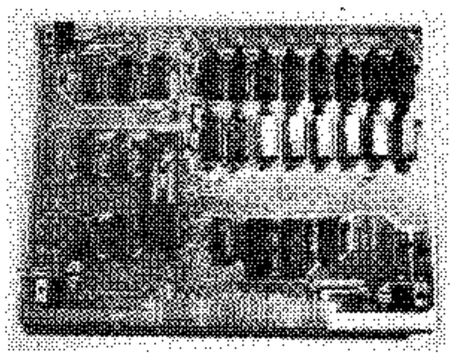

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Cashflow . . . from p. 26

```
460 GOSUB 1580 :: GOSUB 1600 :: GO
    TO 380
470 CALL CLEAR :: C=16-LEN(I$(I))/
    2
480 DISPLAY AT(1,C):I$(I):TAB(C-1)
    ;RPT$("_",LEN(I$(I))+2):"MONTH
    :":"_____":"$ DUE:":"_____"
490 B=8 :: FOR PT=1 TO 4
500 IF MO(I,PT)<>0 THEN DISPLAY AT
    (3,B):STR$(MO(I,PT)):: DISPLAY
     AT(5,B):STR$(X(I,PT))ELSE DIS
    PLAY AT(3,B):"-" :: DISPLAY AT
    (5,B):"-"
510 B=B+5 :: NEXT PT
520 DISPLAY AT(8,10):"AMOUNT SAVED
    ":TAB(9);"_____"
530 FOR M=1 TO 12 :: DISPLAY AT(M+
    9,9):M$(M);TAB(19);"$";STR$(RD
    (AK(I,M))):: NEXT M
540 DISPLAY AT(23,1)BEEP:"**PRESS:
     1. TO ALTER":TAB(10);"2. TO C
    ONTINUE"
550 CALL KEY(0,K,S):: IF S=0 OR K<
    49 OR K>50 THEN 550
560 IF K=50 THEN GOSUB 1580 :: GOS
    UB 1600 :: GOTO 380
570 IF I$(I)="" THEN C=C-1
580 ACCEPT AT(1,C)SIZE(-14)VALIDAT
    E(UALPHA,"'-")BEEP:I$(I)
590 B=8 :: FOR PT=1 TO 4 :: ACCEPT
     AT(3,B)SIZE(-2)VALIDATE(DIGIT
    ,"-")BEEP:MO$(I,PT)
600 IF MO$(I,PT)="-" THEN MO(I,PT)
    =0 ELSE MO(I,PT)=VAL(MO$(I,PT)
    )
610 IF MO(I,PT)<0 OR MO(I,PT)>12 T
    HEN 590 ELSE IF MO$(I,PT)="-"
    THEN 640
620 ACCEPT AT(5,B)SIZE(-4)VALIDATE
    (DIGIT,"-")BEEP:X$(I,PT):: IF
    X$(I,PT)="-" THEN X(I,PT)=0 EL
    SE X(I,PT)=VAL(X$(I,PT))
630 IF VAL(X$(I,PT))<0 THEN 620 EL
    SE B=B+5 :: NEXT PT
640 FOR M=1 TO 12 :: ACCEPT AT(M+9
    ,20)SIZE(-5)VALIDATE(DIGIT)BEE
    P:AK(I,M):: NEXT M
650 GOTO 540
660 !     ENTER NEW ITEMS
670 GOSUB 980 :: GOSUB 1580 :: GOS
    UB 1600 :: GOTO 380
680 !     DELETE ITEMS
690 DISPLAY AT(21,1):"ENTER THE NU
    MBER OF THE ITEM":"YOU WANT TO
     DELETE. IF YOUR":"DELETIONS A
    RE COMPLETE,":"PRESS '0': 0"
700 ACCEPT AT(24,12)SIZE(-2)VALIDA
    TE(DIGIT)BEEP:I :: IF I=0 THEN
     720 ELSE IF I<1 OR I>A THEN 6
    90 ELSE I$(I)=""
710 FOR M=1 TO 12 :: AK(I,M)=0 ::
    NEXT M :: FOR PT=1 TO 4 :: MO(
    I,PT),X(I,PT)=0 :: NEXT PT
720 GOSUB 1580 :: GOSUB 1600 :: GO
    TO 380
730 !     CHANGES COMPLETED
740 GOSUB 1570 :: GOSUB 1220 :: GO
    TO 300
750 ! DISPLAY ACCOUNTS
760 DATA TOTAL," -SAVINGS"," -EXPE
    NSES",PAY SAVINGS
770 RESTORE 760 :: FOR B=13 TO 16
    :: READ M$(B):: NEXT B
780 FOR I=1 TO 16 :: U(I)=0 :: NEX
    T I
790 GOSUB 1480 :: C=1 :: GOSUB 159
    0
800 CALL HCHAR(20,3,95,29):: FOR B
    =21 TO 24 :: DISPLAY AT(B,1):M
    $(B-8):: NEXT B
810 DISPLAY AT(1,1):"MONTH? 1   ('0
    '=BACK TO MENU)" :: DISPLAY AT
    (2,9):RPT$(" ",10)
820 ACCEPT AT(1,8)SIZE(-2)VALIDATE
    (DIGIT)BEEP:M :: IF M<0 OR M>1
    2 THEN 810
830 IF M=0 THEN 300
840 C=16-LEN(M$(M))/2 :: DISPLAY A
    T(1,1):RPT$(" ",53):: DISPLAY
    AT(1,C):M$(M):TAB(C-1);RPT$("_
    ",LEN(M$(M))+2)
850 IF U(M)=1 THEN 860 ELSE RESTOR
    E #1,REC M*2-1
860 FOR I=1 TO A :: IF U(M)=1 THEN
     870 ELSE INPUT #1:AK(I,M),
870 DISPLAY AT(I+2,16):USING 200:A
    K(I,M):: NEXT I
880 IF U(M)=1 THEN 890 ELSE INPUT
    #1:T(M),SA(M),EX(M),P(M),NP(M)
890 DISPLAY AT(21,16):USING 200:T(
    M):: DISPLAY AT(22,16):USING 2
    00:SA(M)
900 DISPLAY AT(23,16):USING 200:EX
    (M):: DISPLAY AT(24,16):USING
    200:P(M)
910 IF NP(M)=0 THEN U(M)=1 :: GOTO
     960
920 FOR B=1 TO NP(M)
930 IF U(M)=1 THEN 940 ELSE INPUT
    #1:IT(B,M),X(B,M),
940 DISPLAY AT(IT(B,M)+2,22):"(-"&
    STR$(X(B,M))&")"
950 NEXT B :: U(M)=1
960 CALL KEY(0,K,S):: IF S=0 THEN
    960 :: GOTO 810
970 ! INPUT SUBROUTINE
980 FOR A=A+1 TO 16
990 DISPLAY AT(10,1)ERASE ALL:"ENT
    ER NAME OF ITEM ";STR$(A);".":
     :"IF ALL ITEMS ARE COMPLETE,"
    : :"PRESS ENTER:"
1000 ACCEPT AT(14,14)SIZE(14)VALIDA
    TE(UALPHA,"-'")BEEP:I$(A):: IF
     I$(A)="" THEN A=A-1 :: RETURN
1010 DISPLAY AT(10,1)ERASE ALL:"HOW
     MANY TIMES PER YEAR WILL": :"
    MONEY BE DUE ON THIS ITEM?": :
    "(0-4): 1"
1020 ACCEPT AT(14,8)SIZE(-1)VALIDAT
    E(DIGIT)BEEP:PT :: IF PT<0 OR
    PT>4 THEN 1020 ELSE IF PT=0 TH
    EN 1130
1030 DISPLAY AT(6,1)ERASE ALL:"FOR
    EACH PAYMENT, ENTER THE": :"NU
    MBER OF THE MONTH THE": :"PAYM
    ENT IS DUE, AND THE": :"AMOUNT
     TO BE PAID."
1040 DISPLAY AT(15,3):"MONTH";TAB(1
    7);"AMOUNT":TAB(3);"_____";TAB
    (17);"_____"
1050 FOR B=1 TO PT :: ACCEPT AT(B+1
    6,5)VALIDATE(DIGIT)BEEP:MO(A,B
    ):: IF MO(A,B)<1 OR MO(A,B)>12
     THEN 1050
1060 DISPLAY AT(B+16,17):"$" :: ACC
    EPT AT(B+16,18)SIZE(4)VALIDATE
    (DIGIT)BEEP:X(A,B):: IF X(A,B)
    <0 THEN 1060
```

Continued on p. 54

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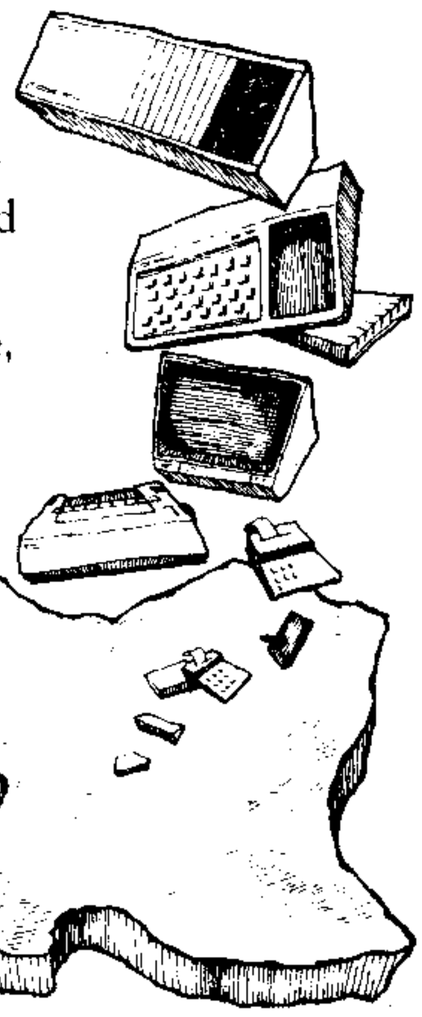

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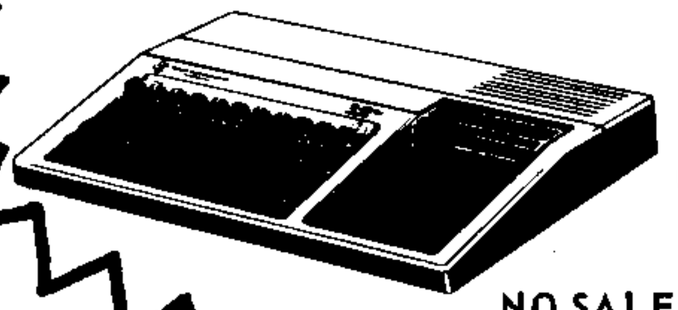

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PHD 5047	Mission Impossible	29.95	24.00
PHD 5048	VooDoo Castle	29.95	24.00
PHD 5049	The Count	29.95	24.00
PHD 5050	Strange Odyssey	29.95	24.00
PHD 5051	Mystery Fun House	29.95	24.00
PHD 5052	Pyramid of Doom	29.95	24.00
PHD 5053	Ghost Town	29.95	24.00
PHD 5054	Savage Island I & II	39.95	32.00
PHD 5056	Golden Voyage	29.95	24.00
	Cassette		
Texas Instruments Packages			
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PHT 6017	Oldies But Goodies—Games II	19.95	9.00
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PHT 6037	Draw Poker	19.95	9.00
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PHT 6051	Mystery Fun House	29.95	24.00
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OTHER APPLICATION PROGRAMS			
	Command Modules		
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PHM 3014	Statistics (Data storage system is recommended)	44.95	32.00
PHM 3026	Extended BASIC	99.95	75.00
PHM 3035	Terminal Emulator II	49.95	40.00
PHM 3055	Editor/Assembler	99.95	80.00
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PHD 5008	Electrical Engineering Library	29.95	24.00
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PHD 5013	Graphing Package	19.95	16.00
PHD 5016	Structural Engineering Library	29.95	24.00
PHD 5044	AC Circuit Analysis	29.95	24.00
PHD 5063	UCSD-PASCAL® Compiler (32K Memory Expansion and P-Code required)	124.95	100.00
PHD 5064	UCSD p-System® Assembler/Linker (32K Memory Expansion and P-code required)	99.95	80.00
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	Cassette		
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PHT 6006	Math Routine Library	24.95	9.00
PHT 6008	Electrical Engineering Library	24.95	9.00
PHT 6013	Graphing Package	14.95	9.00
PHT 6016	Structural Engineering Library	24.95	9.00
PHT 6044	AC Circuit Analysis	24.95	9.00
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Grades 1-8	Grammar	PHD 5248-PHD 5264 (December)
High School		
Grades 9-12	Writing	PHD 6265-PHD 5272 (October)
Grades 9-12	Mathematics	PHD 5273-PHD 5280 (September)
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PHM	3008	Video Chess	53.95
PHM	3010	Physical Fitness	22.95
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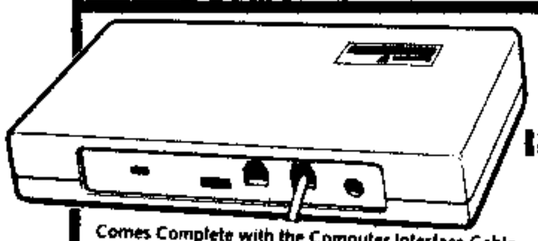

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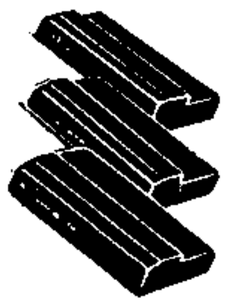

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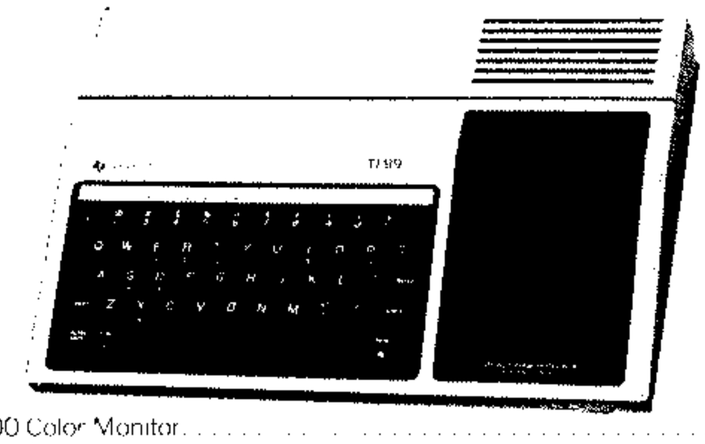

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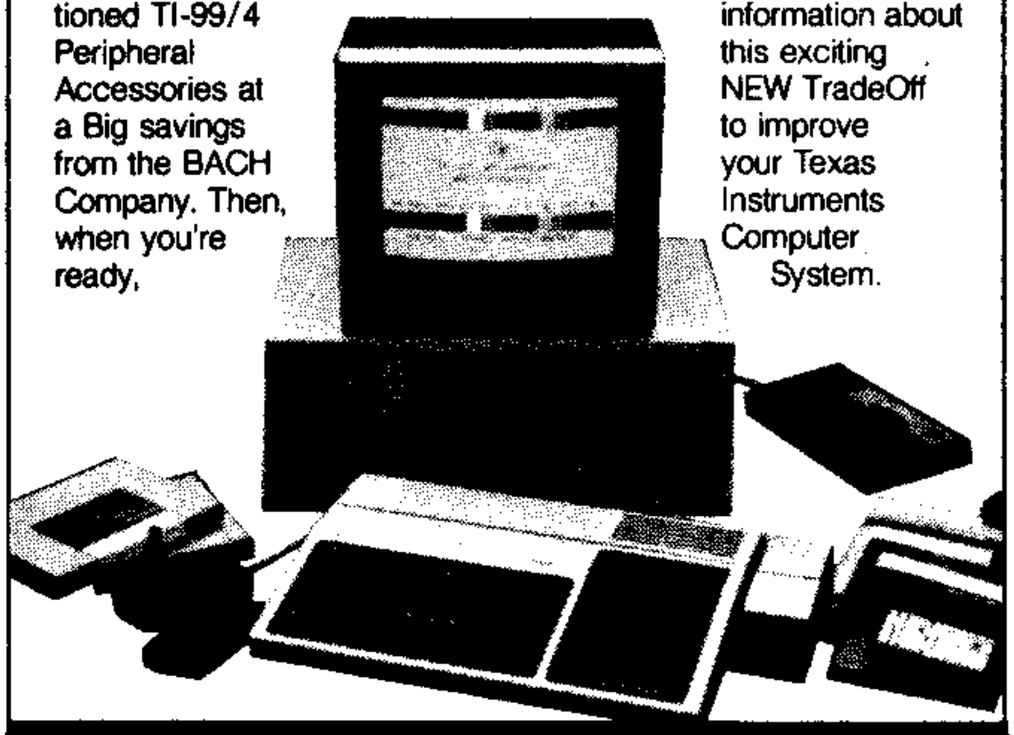

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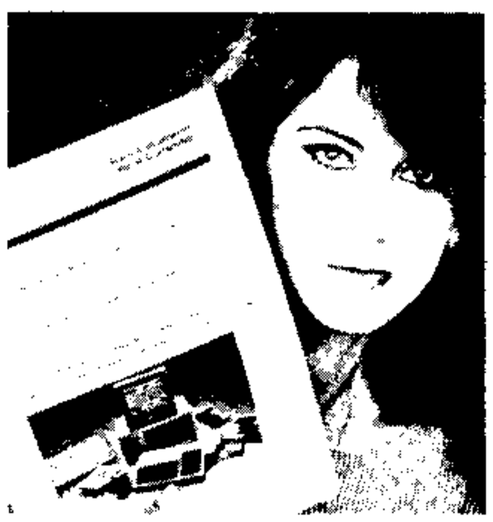

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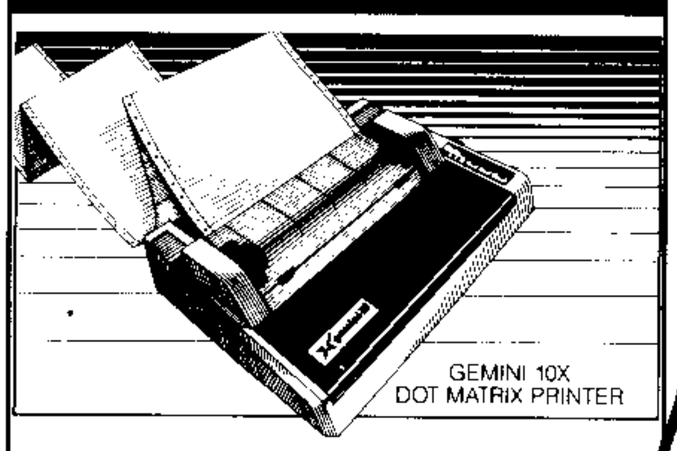

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Cashflow . . . from p. 51

```
1070 NEXT B
1080 DISPLAY AT(10,1)ERASE ALL:"DO
     YOU WANT TO RESERVE AN": :"EQU
     AL AMOUNT EACH MONTH": :"TOWAR
     D THIS BILL? (Y/N)  Y"
1090 ACCEPT AT(14,26)SIZE(-1)VALIDA
     TE("YN")BEEP:A$ :: IF A$="N" T
     HEN 1130
1100 FOR B=1 TO 12 :: AK(A,B)=0 ::
     NEXT B
1110 FOR B=1 TO PT :: M=MD(A,B):: A
     K(A,M)=AK(A,M)+X(A,B):: FOR C=
     1 TO 11 :: M=M+1 :: IF M=13 TH
     EN M=1
1120 AK(A,M)=AK(A,M)+X(A,B)/12*C ::
      NEXT C :: NEXT B :: GOTO 1150
1130 DISPLAY AT(2,1)ERASE ALL:"FOR
     EACH MONTH, ENTER THE": :"AMOU
     NT YOU WISH TO HAVE": :"ACCUMU
     LATED TOWARD THIS": :"ITEM:"
1140 FOR M=1 TO 12 :: DISPLAY AT(M+
     9,3):M$(M);TAB(15);"$" :: ACCE
     PT AT(M+9,16)SIZE(6)VALIDATE(D
     IGIT,".")BEEP:AK(A,M):: NEXT M
1150 NEXT A :: IF A=17 THEN A=16 ::
      DISPLAY AT(12,10)ERASE ALL:"F
     ILES FILLED" :: FOR C=1 TO 400
      :: NEXT C :: RETURN
1160 DISPLAY AT(7,1)ERASE ALL:"ENTE
     R THE NUMBER": :"OF THE PRESEN
     T": :"MONTH (1-12):";TAB(21);"
     1"
1170 ACCEPT AT(11,21)SIZE(-2)VALIDA
     TE(DIGIT)BEEP:PM :: IF PM<1 OR
      PM>12 THEN 1160
1180 DISPLAY AT(15,1):"ENTER THE AM
     OUNT": :"YOU HAVE ALREADY": :"
     SAVED, IF ANY:";TAB(20);"$0"
1190 ACCEPT AT(19,21)SIZE(-7)VALIDA
     TE(DIGIT,".")BEEP:SA(PM):: IF
     SA(PM)<0 THEN 1180
1200 SAV=SA(PM):: RETURN
1210 ! TOTAL ACCOUNTS
1220 FOR M=1 TO 12 :: T(M),EX(M),NP
     (M)=0 :: FOR I=1 TO A :: T(M)=
     T(M)+AK(I,M)
1230 FOR PT=1 TO 4 :: IF MD(I,PT)=M
      THEN NP(M)=NP(M)+1 :: EX(M)=E
     X(M)+X(I,PT)
1240 NEXT PT :: NEXT I :: NEXT M
1250 M=PM-1 :: FOR B=1 TO 12 :: M=M
     +1 :: IF M=13 THEN M=1
1260 P(M)=T(M)-SA(M)-EX(M)
1270 IF B=12 THEN 1280 ELSE IF M<>1
     2 THEN SA(M+1)=SA(M)+P(M)ELSE
     SA(1)=SA(12)+P(12)
1280 NEXT B
1290 DEL=0 :: FOR I=1 TO A :: IF I$
     (I)="" THEN DEL=DEL+1
1300 NEXT I
1310 ! PRINT DATA FILE
1320 PRINT #1,REC 0:A-DEL,:: FOR I=
     1 TO A :: IF I$(I)<>"" THEN PR
     INT #1:I$(I),
1330 NEXT I
1340 M=1 :: FOR R=1 TO 23 STEP 2 ::
      RESTORE #1,REC R :: FOR I=1 T
     O A :: IF I$(I)<>"" THEN PRINT
      #1:RD(AK(I,M)),
1350 NEXT I
1360 PRINT #1:RD(T(M)),RD(SA(M)),RD
     (EX(M)),RD(P(M)),NP(M)
1370 DEL=0 :: FOR I=1 TO A :: IF I$
     (I)="" THEN DEL=DEL+1 :: GOTO
     1400
1380 FOR PT=1 TO 4 :: IF M=MD(I,PT)
     THEN PRINT #1:I-DEL,X(I,PT),!
     MAXIMUM OF 14 PAYMENTS IN ONE
     MONTH
1390 NEXT PT
1400 NEXT I :: M=M+1 :: NEXT R
1410 R=25 :: C=0 :: RESTORE #1,REC
     R :: FOR I=1 TO A :: IF I$(I)=
     "" THEN 1440
1420 FOR PT=1 TO 4 :: PRINT #1:MD(I
     ,PT),X(I,PT),:: NEXT PT
1430 C=C+1 :: IF C=3 THEN C=0 :: R=
     R+1 :: RESTORE #1,REC R
1440 NEXT I
1450 PRINT #1:PM,SAV
1460 RETURN
1470 ! INPUT RECORDS TO ALTER
1480 INPUT #1,REC 0:A,
1490 FOR I=1 TO A :: INPUT #1:I$(I)
     ,:: NEXT I :: RETURN
1500 M=1 :: FOR R=1 TO 23 STEP 2 ::
      RESTORE #1,REC R :: FOR I=1 T
     O A :: INPUT #1:AK(I,M),:: NEX
     T I :: M=M+1 :: NEXT R
1510 R=25 :: C=0 :: RESTORE #1,REC
     R :: FOR I=1 TO A
1520 FOR PT=1 TO 4 :: INPUT #1:MD(I
     ,PT),X(I,PT),:: NEXT PT :: C=C
     +1 :: IF C=3 THEN C=0 :: R=R+1
      :: RESTORE #1,REC R
1530 NEXT I
1540 INPUT #1:PM,SAV
1550 RETURN
1560 ! DISPLAY ITEMS
1570 DISPLAY AT(12,10)ERASE ALL:"WO
     RKING..." :: RETURN
1580 C=5 :: CALL CLEAR :: FOR B=1 T
     O A+1 :: DISPLAY AT(B+2,1):STR
     $(B);"." :: NEXT B
1590 FOR I=1 TO A :: DISPLAY AT(I+2
     ,C):I$(I):: NEXT I :: RETURN
1600 DISPLAY AT(I+2,5):"*PRESENT MO
     NTH/SAVINGS" :: RETURN
1610 END
```

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Persuasion . . . from p. 13

Hence the black outline. It shuts off the electron beam and assists the eye, making the bars appear sharper. Because the bars are the main part of the graph, a third consideration is involved: Outlining makes them stand out.

Putting outlines around bars with TI BASIC is difficult because only two colors are allowed within a character block. For instance, if the screen is blue and the bar is to be red and have a black outline around it, many bar heights cannot be defined because they would require blue, red, and black in the character block used for the top of the bar. The program gets around this problem by having a rather wide black band across the top of each bar in conjunction with the use of two characters at the bar top. This black band is distributed between the two characters so that only two colors are needed in either character. The topmost character (I call it a *barcap* in the program) has the colors black and the screen color. The character just below has the colors black and the bar color (it is called *a barhead* in the program). How much of the black band is

Continued on p. 62

TABLE 1. PROGRAM MODIFICATION EXAMPLES

TO CHANGE:	IN LINE NUMBER: INSERT:
Title	290 TITLELINE1$="CITY OF" 300 TITLELINE2$="PECAN GAP"
Title to one line	290 TITLELINE1$="CORN YIELD" 300 TITLELINE2$=""
Location of title box	310 RO=3 320 CL=15 NOTE: Will start title at row three, column fifteen. Upper left corner of title box will be at row two, column fourteen.
Labels	330 LABEL$="PLOT NUMBER" 340 ROW=23 350 COLMN=17 360 GOSUB 2480 . . . 640 GOSUB 2480 NOTE: GOSUB 2430 prints vertical labels and GOSUB 2480 prints horizontal labels.
The data	670 DATA 32,15,14,7,106,60,39,18 NOTE: Bar number one will be plotted 32 units high and 15 could be printed on the bar. Bar number two will be plotted fourteen units high and 7 could be printed with that bar, etc. Data should be coordinated with the scale on line 720
Tick marks	770 DATA 91,003800380038003800 38, 92,003800380038003800E,93,003800FF0 0380038 NOTE: Many other possiblities exist. Tick marks need to be coordinated with grid lines.
Scale numbering to 0,2,4,6,8.	730 SCALE$=" 8 6 4 2 0" NOTE: Will be printed vertically.
Vertical axis label.	740 VERTICAL1$="POWER" 750 VERTICAL2$="JOULES/SEC" NOTE: To print a label vertically use: 2040 GOSUB 2430 2080 GOSUB 2430
The "%" label on the bars to A,B,C,D.	191 DIM LETTER$(4) 192 LETTERS(1)="A" 193 LETTERS(2)="B" 194 LETTERS(3)="C" 195 LETTERS(4)="D" 1900 LABEL$=LETTER$(BAR)
Bar spacing to one column.	1330 CLMN=4*BAR
1st bar location to column 14	1330 CLMN=4*BAR+11
The number of bars to three.	1320 FOR BAR=1 TO 3
Grid line spacing	1030 FOR ROW=20 to 1 STEP -N (where N=1,2, or 5) NOTE: Other possibilities exist.
To remove my name from your graph.	Delete lines 1130 and 1140.
The colors of the bars.	680 BARCOLOR1= *numbers from* 690 BARCOLOR2= *1 to 16* 700 BARCOLOR3= *representing* 710 BARCOLOR4= *colors*
Move the vertical axis to column 10	1010 COL=10

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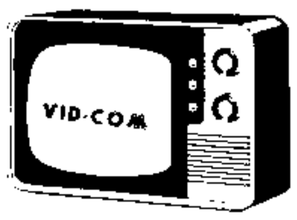

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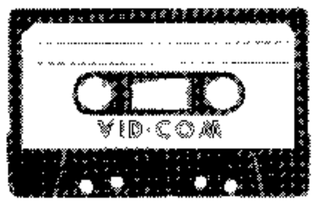
What will your computer say next? Your computer can say any word you can type in on the keyboard! This program will allow speech with control of pitch, slope, primary and secondary stress, and delay utilizing the T.E.II module protocols. In addition, you can create custom files that can be saved, recalled at your instruction, and also be used with your basic programs.

DARK AGES A text adventure game. Basic Order #209D Disk #209C Cassette $14.95

You are a warrior in a time when your best weapon is not a sword, but your mind. In a dark dismal corner of the earth there lies a kingdom now ruled by an evil emperor. The emperor has filled his castle with the most horrendous creatures he could pull from the dark recesses of his mind. No one has tried to stop him, until now.... Your task is to find the legendary scepter and rescue the princess so she may rightfully regain the throne. Trust no one, for the emperor's creatures will seek to deceive you. If your courage fails you, the answers lie in a sealed envelope supplied with the program.

GHOST WRITER Basic Order #207D Disk #207C Cassette $14.95

Just supply ghost writer with a few choice words and away it goes. Four totally different stories will be created and the results can be amazingly funny. The same words can be used again and again, while ghost writer changes each and every story, if you desire. You can save any story for future use. The only option required is a sense of humor.



X-BASIC DIRECTORY 4.0 Full documentation included. Order #203D Disk #203C Cassette $14.95

This easy to use program will allow you to build custom phone directories. By including simple additional circuitry, it can auto-dial (tones) any number with the touch of a key. Some of the features include: Auto-dial on-off, full editing (by index or entry), call log with timer, redial, date and a separate area for access codes.

INFORMATION BULLETIN Order #IB-1 $9.95

This is one in a series of information bulletins designed to help you get the most out of your computer and accessories. Now you can swap programs and files over standard radio and telephone circuits without the use of RS232, modems, expansion, etc. If that isn't enough, it works faster than the 300 baud program exchange, requires no modifications to your computer, and can be done with inexpensive off the shelf items. Now how can you resist?

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Counting Fun . . . from p. 34

```
410 CALL CHAR(152,"7EFFFFE7E7FFFFF
    F")
420 CALL CHAR(153,A$)
430 CALL CHAR(154,"FFFFFFFF7F3F0F0
    1")
440 CALL CHAR(155,"FFFFFFFFFEFCF8F
    0")
450 CALL CHAR(156,"0103070F1F3F7FF
    F")
460 CALL CHAR(157,"80C0E0F0F8FCFEF
    F")
470 CALL CHAR(142,"FFFFFFFF")
480 CALL CHAR(143,"0101010101010
    F")
490 CALL CHAR(104,"8080D1537373333
    1")
500 CALL CHAR(105,"0078FEFF9393FFF
    E")
510 CALL CHAR(106,"3030303030303
    0")
520 CALL CHAR(107,"30303B1F0F03030
    3")
530 CALL CHAR(108,"30FCFFFFFFFFFF
    F")
540 CALL CHAR(109,"0303030303011F3
    F")
550 CALL CHAR(110,"FFFFFFFFFFFECFC
    F")
560 CALL CHAR(111,"0000000000000E0F
    0")
570 CALL CHAR(118,"C3E7FF7E7E3C3C1
    8")
580 CALL CHAR(141,"0000003F35FFFF2
    2")
590 CALL CHAR(159,"0060E17E7E3E0B1
    8")
600 CALL CHAR(119,"9C9C8B88FE3E3E1
    4")
610 RANDOMIZE
620 P=0
630 X=0
640 Y=0
650 Z=0
660 R=10
670 CALL CLEAR
680 FOR L=1 TO 2
690 C=2
700 A=INT(4*RND)+1
710 B=INT(6*RND)
720 FOR N=1 TO 8
730 IF A=1 THEN 790
740 IF A=2 THEN 820
750 IF A=3 THEN 850
760 P=P+1
770 GOSUB 1850
780 GOTO 870
790 X=X+1
800 GOSUB 1530
810 GOTO 870
820 Y=Y+1
830 GOSUB 1630
840 GOTO 870
850 Z=Z+1
860 GOSUB 1730
870 C=C+5
880 NEXT N
890 R=R+6
900 NEXT L
910 PRINT "HOW MANY          ? "
920 CALL HCHAR(23,16,118)
930 CALL HCHAR(23,12,118)
940 CALL HCHAR(23,14,118)
950 INPUT G
960 IF G=X THEN 1010
970 W=W+1
980 GOSUB 2010
990 PRINT "NO...";X
1000 GOTO 1030
1010 F=F+1
1020 GOSUB 1960
1030 PRINT "HOW MANY          ? "
1040 CALL HCHAR(23,16,141)
1050 CALL HCHAR(23,12,141)
1060 CALL HCHAR(23,14,141)
1070 INPUT H
1080 IF H=Y THEN 1130
1090 W=W+1
1100 GOSUB 2010
1110 PRINT "NO...";Y
1120 GOTO 1150
1130 F=F+1
1140 GOSUB 1960
```

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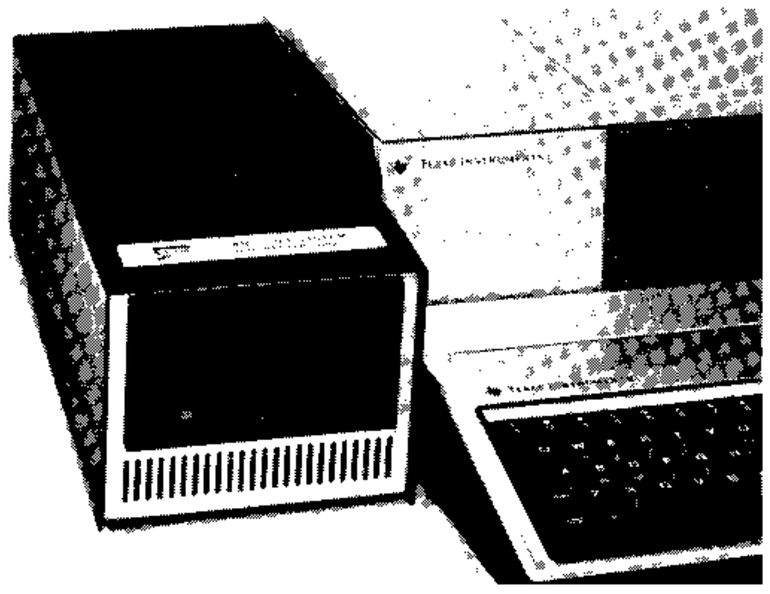

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Counting Fun

```
1150 PRINT "HOW MANY                ? "
1160 CALL HCHAR(23,16,159)
1170 CALL HCHAR(23,12,159)
1180 CALL HCHAR(23,14,159)
1190 INPUT I
1200 IF I=Z THEN 1250
1210 W=W+1
1220 GOSUB 2010
1230 PRINT "NO...";Z
1240 GOTO 1270
1250 F=F+1
1260 GOSUB 1960
1270 PRINT "HOW MANY                ? "
1280 CALL HCHAR(23,16,119)
1290 CALL HCHAR(23,12,119)
1300 CALL HCHAR(23,14,119)
1310 INPUT J
1320 IF J=P THEN 1370
1330 W=W+1
1340 GOSUB 2010
1350 PRINT "NO...";P
1360 GOTO 1390
1370 F=F+1
1380 GOSUB 1960
1390 INPUT "HOW MANY OF ALL OF THEM
     ? ":O
1400 V=X+Y+Z+P
1410 IF O=V THEN 1460
1420 GOSUB 2010
1430 PRINT "NO...";V
1440 W=W+1
1450 GOTO 1480
1460 F=F+1
1470 GOSUB 1960
1480 PRINT "YOU HAVE GOTTEN ";F;" R
     IGHT"
1490 PRINT "YOU MISSED ";W
1500 PRINT "I LOVE YOU, ";K$
1510 INPUT U$
1520 GOTO 610
1530 REM  HEART
1540 CALL HCHAR(R,C+2,128)
1550 CALL HCHAR(R,C+3,129)
1560 CALL HCHAR(R,C+4,130)
1570 CALL HCHAR(R+1,C+2,131)
1580 CALL HCHAR(R+1,C+3,132)
1590 CALL HCHAR(R+2,C+2,133)
1600 CALL HCHAR(R+2,C+3,134)
1610 CALL SOUND(500,-1,2)
1620 RETURN
1630 REM  BUS
1640 CALL HCHAR(R,C+1,136)
1650 CALL HCHAR(R,C+2,137,3)
1660 CALL HCHAR(R+1,C,139)
1670 CALL HCHAR(R+1,C+1,138,4)
1680 CALL HCHAR(R+2,C+1,144)
1690 CALL HCHAR(R+2,C+3,144)
1700 CALL SOUND(200,-2,2)
1710 CALL SOUND(300,-2,2)
1720 RETURN
1730 REM  DUCK
1740 CALL HCHAR(R,C+2,152)
1750 CALL HCHAR(R+1,C+2,153)
1760 CALL HCHAR(R+2,C+3,153)
1770 CALL HCHAR(R+2,C+2,154)
1780 CALL HCHAR(R+2,C+4,155)
1790 CALL HCHAR(R+1,C+4,156)
1800 CALL HCHAR(R+1,C+3,157)
1810 CALL HCHAR(R+1,C+1,142)
1820 CALL HCHAR(R+3,C+3,143)
1830 CALL SOUND(800,-3,2)
1840 RETURN
1850 REM  ET
1860 CALL HCHAR(R,C+2,104)
1870 CALL HCHAR(R,C+3,105)
1880 CALL HCHAR(R+1,C+2,106,2)
1890 CALL HCHAR(R+2,C+2,107)
1900 CALL HCHAR(R+2,C+3,108)
1910 CALL HCHAR(R+3,C+2,109)
1920 CALL HCHAR(R+3,C+3,110)
1930 CALL HCHAR(R+3,C+4,111)
1940 CALL SOUND(700,-4,2)
1950 RETURN
1960 REM  RIGHT SOUND
1970 CALL SOUND(200,880,8)
1980 CALL SOUND(200,988,9)
1990 CALL SOUND(300,1047,0)
2000 RETURN
2010 REM  WRONG SOUND
2020 CALL SOUND(500,-7,8)
2030 RETURN
```


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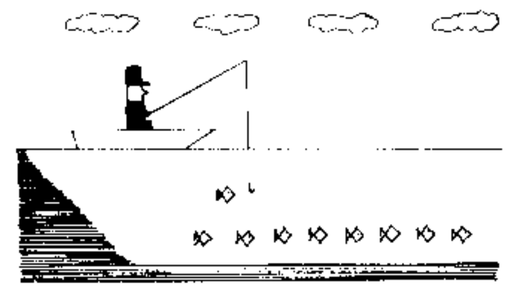

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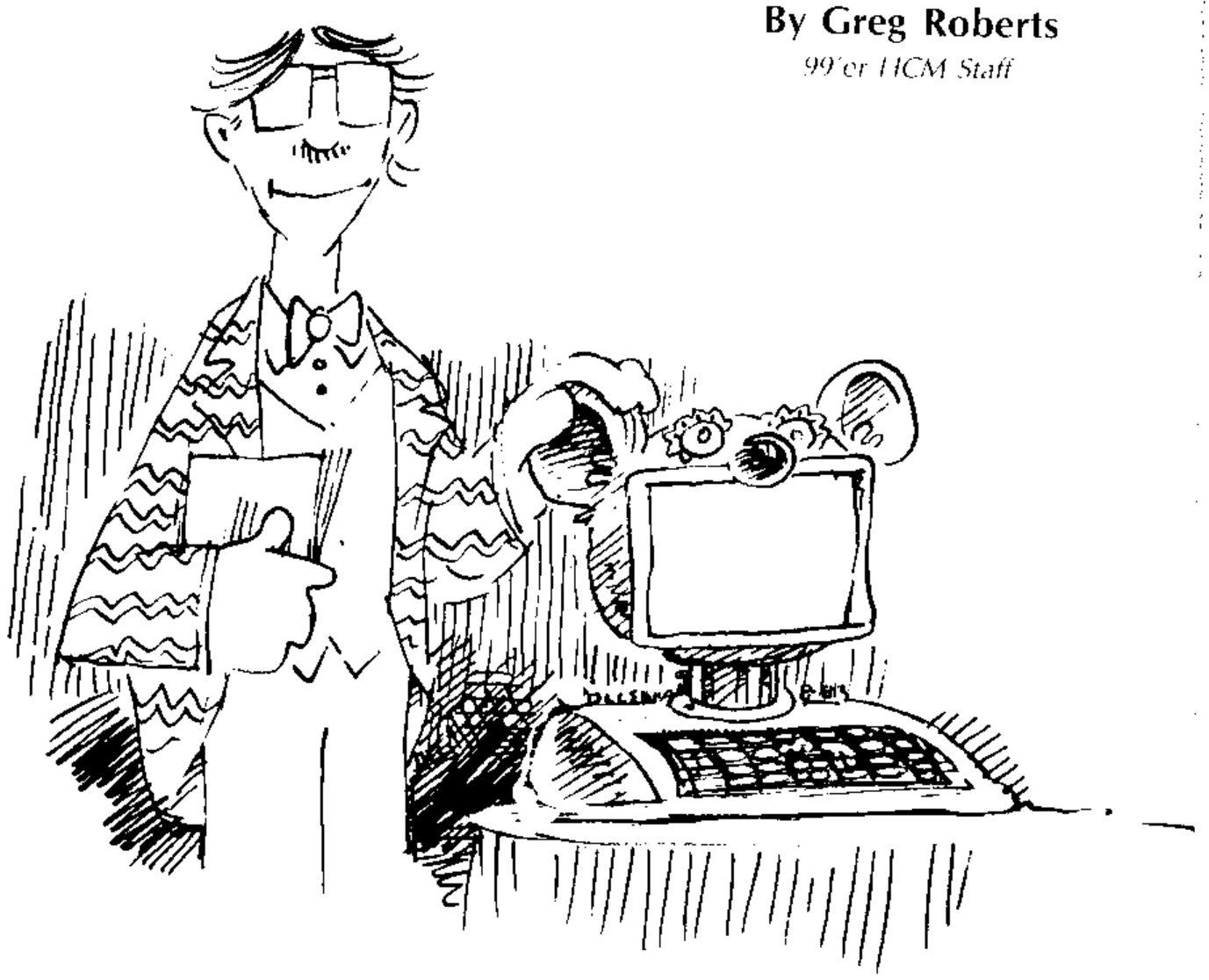
Mean Machines and Small Potatoes

By Greg Roberts
99'er HCM Staff



Choosing the right-sized computer is not as bewildering as it was just a few years ago. There are now enough salespeople (trained ones, not just refugees from the real estate crash) to give good advice, and give it free. And yet the consultants' files (and their bank accounts) are still getting fat from clients who get into a terrible mess—simply because they pay less attention to choosing the right-sized computer than they do to getting their exact choice in a pizza.

Many computer enthusiasts have done well with the "small is beautiful" trend for home use, and even for businesses of Kool-Aid stand status. But sometimes a small beautiful thing can turn on you like a baby coral snake—leading to irreversible nerve damage.

In the case of the Pay 'N' Throw discount stores, someone in middle management decided that the store in Backwater, Washington could be handled by the Trymex Unclear computers—a few in each department, a small swarm in all.

Dick Dren, an MBA fresh out of Tupelo Business College and Skin Diving School, had surfaced in Backwater last winter and immediately came on board at Pay 'N' Throw as their systems manager. When Dren hit upon the Trymex Unclear plan, he confidently walked into the office of store manager Herb Winemouth and boldly stated, "I think we should. . .

"Go for it!" said Winemouth, slamming his bottom desk drawer and wiping his chin. That week the computers were configured, the interfaces implemented, the documentation deciphered, the hardware handshooked, and the employees enabled.

The computers went straight to their main task: inventory. One department—Pets—actually managed all right with the new machine. There the inventory was low because of certain trends in society, e.g., there was a preference for robot dogs because they didn't get rabies and didn't shed on the lawn. (Robot breeds were in the hardware department.) And sales of tropical fish were gasping too. After all, who would want to maintain an aquarium when you could program a whole screenful of neon tetras in Extended BASIC? And if you got tired of a video fish, you could always delete it without the guilt that comes with pulling the handle on the toilet.

Such being the case, the pet people were able to cram most of their data into the little black box, but other departments were not so successful. When the pharmacy logged in its Tylenol substitutes, the machine's memory swelled to capacity and caused all sorts of headaches. Unable to make the machine snap out of its narcosis, one of the pharmacists looked for solutions in—of all things—a printer manual, and ended up soaking the computer in Epsom salts.

In the store cafeteria the computer got a health inspector's welcome. The cooks just let it sputter and fry.

"But you're supposed to be using it to keep track of your recipes," Dren told them.

"Everything we need is printed on the door of the microwave," they snarled, shaking their Teflon spatulas menacingly.

Dren slinked away to the clothing department where he tried to ensconce himself in a dressing room; here a polyester-sheathed salesman buttonholed him and complained that static electricity from an Icelandic muff had wiped out an afternoon of data processing. Dren hovered over the computer in a nice bit of theater, already aware that there was no pulse. The Unclear really didn't have the power to keep track of a tie rack, much less a whole department.

But what is the point of training our telescope on every square yard of battlefield? Suffice it to say, the inventory could have been handled better had the clerks marked down the number of purchases on the back of an old Weedeater carton , deducted 25% for shoplifting, and flipped a nickel to close any remaining gaps.

The Trymex Unclears coughed their last—and stirred up the worst panic—in the payroll office. An overworked computer printed out a $20,000 paycheck to a stockboy who rode his bicycle to the nearest bank before payment could be stopped. His last postcard was plastered with Tahitian stamps. The machine allotted a paycheck of $1.36 cents to Dick Dren. His boss, Winemouth, suggested that this amount was more than adequate severance pay—considering the havoc brought down on the store.

Yes, small is not always beautiful—anyone who has been snapped at by a locked-up chihuahua in a parking lot knows that—and some computers can turn out just as nasty.

Grandma Makes a Wrong Turn

Out at the end of a completely different flow chart is one Grandma Leathers, who opened a little mashed potatoes shop in Peelings, Idaho. The shop soon got to be one of the most successful businesses in Tuber County. "The food is terrible," Grandma admitted, "but it's fast—and that's what people care about most. We've got a drive-up window you don't even have to slow down for. We can throw a mashed potato pie through your car window, take the license number, and send a monthly bill. If you don't pay on time , we can always resort to an old trick from the sheep and cattle wars: burn down your barn."

Eyed Vegetables Inc. grew steadily until Grandma was talked into buying a huge mainframe computer—a muscle-bound Greenby-Packard 5000 loaded with a thousand megabytes. The salesman, a Richard Tater from Pocatello, had been peddling used Pontiacs and stove-piped trailers for sheepherders when he switched overnight to computers.

The plaid-jacketed hustler with the hair combed up from the back of his neck to his occipital tori surveyed Grandma's business for about eight minutes; then, working from the premise that the bigger the computer the bigger the sales commission, he urged purchase of the GP 5000 with super quad Winchesters, supported by a whole drawerful of complex software programs including Wordscar, Viscera-calc, and many others too mind-warping to mention.

It is almost incredible that a shrewd businesswoman like Grandma could be taken on such a ride, but we must consider that she was 91 at the time, and possibly some of her cerebral circuitry was starting to short out. And there may be some explanation in her description of Tater, "Dick is so sincere—and cute too—kind of reminds me of Douglas Fairbanks."

So Grandma reached into a Shirley Temple cookie jar with its nose taped on with yellowed strips of cellophane tape and pulled out wrinkled handfuls of hundred-dollar bills. Tater hadn't seen so many Franklins since the crash of the woodstove market—and Grandma had gone in only as far as the second knuckle.

Acting quickly, the salesman took it upon himself to line up some support services for Grandma's mainframe, making sure that he was getting a cut from all of them. He recommended a systems analyst, remote diagnostician, applications programmer, coordinator of operating systems software, hardware maintenance personnel, and a computer operator.

"Who is this army?" asked Grandma. "They sound like they're from outer space or Boise or something. What the devil is an applications programmer?"

"Someone to write a program that keeps track of your pie recipes," said Dren.

"But I've only got three pie recipes to work with," she told him, "plain, medium, and normal."

Within a few months the cookie jar's belly clinked a lower, emptier note, and Grandma was concerned. "The computer seems expensive," she told Tater. "Do we really need all this power?"

"Let well enough alone," the salesman told her as the two sat in front of a glowing cathode ray tube munching popcorn. The hustler enjoyed the company of this older, self-assured businesswoman. "Remember, if the dip's too thick you can kill the sheep."

"But I'm losing a fortune."

"There's more than one way to skin a grape," he advised. "Have you considered using mutton fat in your recipes instead of butter?"

"Why, I wouldn't even consider such a thing unless I were absolutely desperate," she said, reaching for the yellow pages and looking under "controlled substances." Eventually she not only used the mutton fat in place of butter, she replaced the real potatoes with "imitation freeze-dried potatoes" made from old paper-mill leavings. It had a telling effect on business. Even the graveyard shift from the mines at Anaconda couldn't handle her cooking anymore.

"Now what do I do with this fancy electronic brain?" she asked Dren, "eat it?"

"No need," he told her. "I'm taking you out for dinner at the Trail Boss In Paris Buffet."

And while the two entrepreneurs sat peeling the pate off a very rare Filet Rossini, Grandma's enterprise was buckling like a newborn lamb on bumpy ground.

A few nights later, while she sat staring into a stein at the Pine Slivers Bar, Brian the bartender—who was also doing summer theater up at Sun Valley—said "The loss must be simply devastating, Grandma dear."

"Not really," she said wistfully. "What's a couple of million dollars to someone my age? I'd just as soon have real teeth." But she shook her head and added, "It would be nice to afford a catalytic heater for the camper—now that winter is almost here—and maybe some new eight-track Conway Twitty tapes too."

Just then the saloon doors swung open and the local barber rushed in. He handed Grandma two huge Safeway bags full of money. "This is from Dick Tater," he blathered. "He was down at the shop getting a hair transplant, and when the operation started to go bad and it looked like he might not make it, he went to pieces. He had me go over to the bank and clean out his lettuce crisper for you."

"Well, this knocks me flatter than a stepped-on horned toad," said Grandma, tipping the barber a dollar.

But there's more: Richard Tater suddenly made a remarkable comeback from the operation. He and Grandma re-opened the shop and sold off the mainframe with enough money left over to buy a TI Pegasus. Lately the couple has been spending their weekends in Twin Falls.

The moral? We won't need a consultant to tell us what that is. Ever since our first hearing of The Three Bears we've heard about a thing called "just right."

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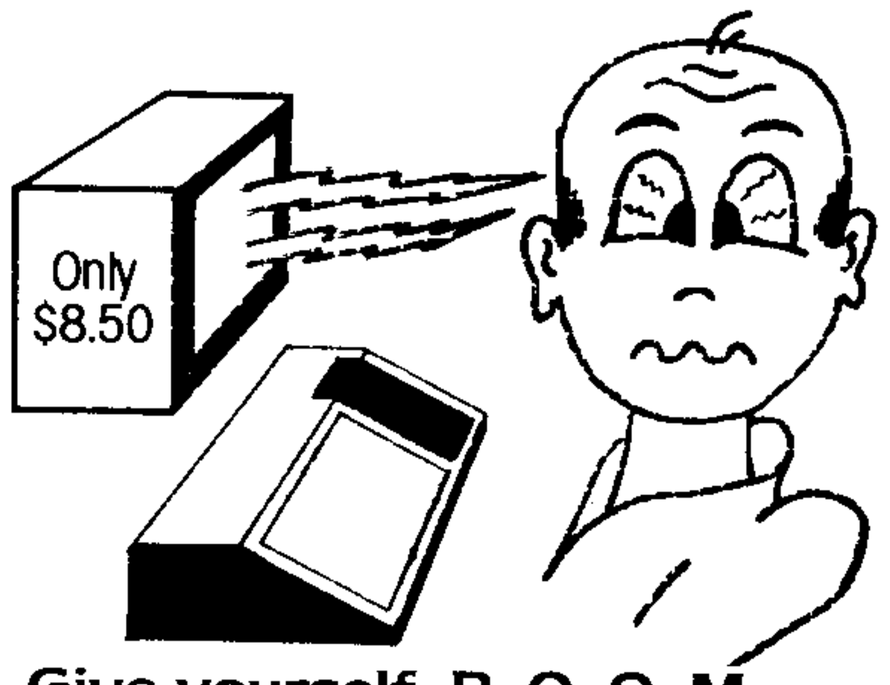

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Assemblers . . . from p. 28

Figure 1: Assembler Statements

These samples show the form of the assembler statements for a *portion* of the sample sprite program for the three assemblers. Note that this figure shows only what you enter into the assemblers. The labels SS and SA would be defined later in the programs.

Figure 1A: Line-By-Line Assembler

```
L1 LWPI >70B8
   LI 0,>0384
   LI 1,>FF00
   BLWP 9>6024
   LI 0>0400
   LI 1,SS
   LI 2,40
   BLWP @>6028
   LI 0,>0300
   LI 1,SA
   LI 2,21
   BLWP @>6028
```

Figure 1B: MAX Assembler

```
10 DATA # DEF @SPRITE
20 DATA # AORG >7D00
30 DATA SPRITE LWPI >70B8
40 DATA L1 LI R0.>0384
50 DATA # LI R1.>FF00
60 DATA # BLWP @VSBW
70 DATA # LI R0.>0400
80 DATA # LI R1.@SS
90 DATA # LI R2.40
100 DATA # BLWP @VMBW
110 DATA # LI R0.>0300
120 DATA # LI R1.@SA
130 DATA # LI R2.21
140 DATA # BLWP @VMBW
```

Figure 1C: Dow Editor/ Assembler

```
L1  :LWPI   >70B8
    LI      0;>0384
    LI      1;>FF00
    BLWP    @>6024
    LI      0;>0400
    LI      1;SS
    LI      2;40
    BLWP    @>6028
    LI      0;>0300
    LI      1;SA
    LI      2;21
    BLWP    @>6028
```

Figure 2: Statistics

MFGR	DISK DRIVE	PRINTER	MAXIMUM SEGMENT SIZE	LABELS PER SEGMENT	MAXIMUM PROGRAM SIZE
TI	N	N	744	9	744
ECKHAUS	N	Y	varies	108	3808
DOW	Y	Y	512	40	3808

MFGR	MAXIMUM LABEL LENGTH	NUMBER OF ASSEMBLER DIRECTIVES	SAVES SOURCE STATEMENTS	TIME TO ASSEMBLE SAMPLE
TI	2	7	N	0 MINUTES
ECKHAUS	6	11	Y	80 MINUTES
DOW	3	6	Y	5 MINUTES

Before you can execute your machine-code program from outside the Dow Editor/Assembler environment, you must make an entry for it in the REF/DEF table. You can do this easily with the MINI command, or you can use the assembler to do it. In either case, you must specify the entry point of the program (or programs) explicitly and adjust the LFAM if appropriate.

The largest program the Dow Editor/Assembler can process is 512 bytes of machine code. Again, you can segment your program if necessary. The manual estimates that this is roughly 150 source statements, but this can vary greatly. You can see how close you're getting by looking at the program counter as you go along; the beginning of the program is at absolute location 0 as far as this counter is concerned. Each segment can be SAVEd to tape by the Dow Editor/Assembler and LOADed into Mini Memory at a different address. You can start the next segment with a NEW command and finish the whole process without ever leaving the assembler.

When you need to change a program, you use the OLD command to read it from tape and then edit it. When the revisions look correct, you LOAD the entire program or segment to Mini Memory again.

The Dow Editor/Assembler can work with a printer or a disk drive. You must change the assembler program (in BASIC) to use either peripheral. Directions for this are provided in the manual.

Summary

The TI Line-by-Line Assembler, the MAX Assembler and the Dow Editor/Assembler all help you accomplish the task of turning your Assembly Language idea into machine code. Your own needs—whether you want to use a printer and disk drive or modify your source program, as well as your speed preference and programming style—will determine your best choice. Hopefully the descriptions of these three assemblers will help you understand the differences between them and choose the most efficient one for you.

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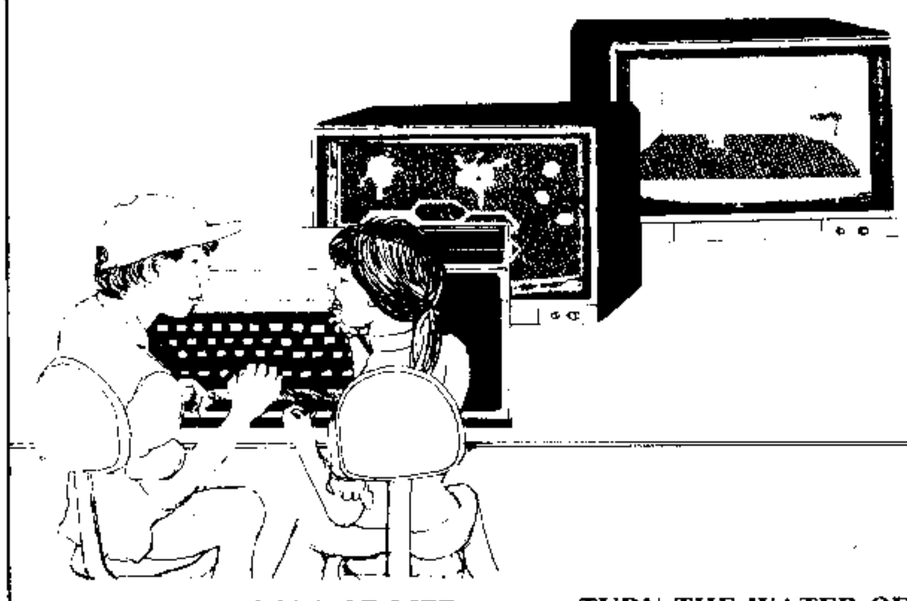

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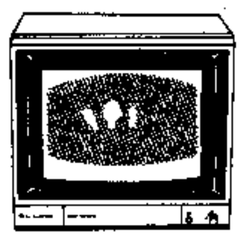

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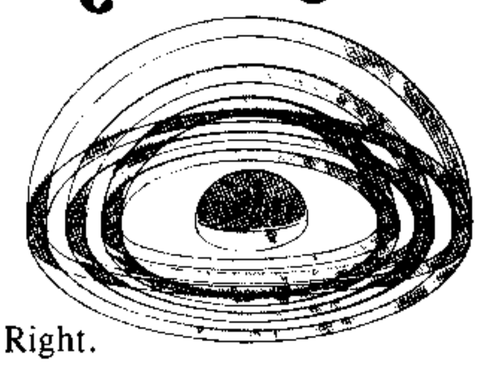

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Persuasion . . . from p. 55

in the barcap and how much is in the barhead is fixed by the data values for bar heights.

The bar ends up having three parts. Figure 3 shows these three parts and gives parameters for the datum used in the figure as an example.

Payoff With the Microcomputer

Many people enjoy looking at good graphs. It is especially pleasing to view them on a color monitor. It is exciting to watch one come into existence right before your eyes. In the past I used graphs sparingly because they were so time-consuming to produce. Also, a good graph, produced with pens, brushes, and transfers, requires a lot of work. A commercial artist will charge you $50 for a custom graph on a 35mm slide. The money spent on ten slides buys you a TI-99/4A with color monitor, and with this set-up you can have dozens of graphs on 35mm slides or prints just for the cost of film and processing.

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Bargrapher
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100-270	Program header.
280-650	Defines labels.
660-990	Defines bars and barcolors.
1000-1260	Prints baselines, grid lines, tick marks and labels.
1270-2080	Draws bars.
2090-2230	Creates title box.
2240-2400	Creates second line in title box if necessary.
2410-2460	Subroutine to print vertical labels.
2470-2510	Subroutine to print horizontal labels.
2520-2560	Subroutine to print bar stems.

```
100 REM **************
110 REM * BARGRAPHER *
120 REM *     BY     *
130 REM * FRED ELLIS *
140 REM **************
150 REM
160 REM  99'ER VERSION 2.10.1
170 REM PRESS ANY KEY TO EXIT PROG
RAM.
180 REM ABOUT 10400 BYTES
190 REM RESERVED TO OPEN FILES
200 GOTO 680
210 REM INSTRUCTIONS: STATEMENTS M
OST LIKELY TO BE CHANGED ARE B
ETWEEN THE BARBED WIRE -*-*-*-
.
```

```
220 REM INSTRUCTIONS: ADD DESIRED
 TITLE AS 'TITLELINE$'. TO MOVE
  TITLE BOX CHANGE 'RO' AND 'CL
'.
230 REM  ADD DESIRED LABELS AS 'LA
BEL$'. LOCATE THE LABELS WITH
'ROW' AND 'CLMN'. THERE ARE TW
O
240 REM  SUBROUTINES FOR LABELS. O
NE MAKES HORIZONTAL LABELS AND
 THE OTHER MAKES VERTICAL LABE
LS.
250 REM ENTER DATA FOR THE BARS AN
D FOR THE PERCENTS IN THE DATA
 STATEMENT. CHOOSE COLORS FOR
BARS AS
260 REM 'BARCOLOR1', 'BARCOLOR2',
ETC.
270 REM -*-*-*-*-*-*-*-*-*-*-*-*-*
280 REM *------ SUBROUTINE FOR
LABELS ------*
290 TITLELINE1$="CITY OF"
300 TITLELINE2$="MCALLEN"
310 RO=3
320 CL=18
330 LABEL$="GOVERNOR"
340 ROW=12
350 CLMN=11
360 GOSUB 2420
370 LABEL$="CONGRESS"
380 ROW=12
```

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```
370 CLMN=25
380 GOSUB 2420
390 LABEL$="CLEMENTS"
400 ROW=22
410 CLMN=4
420 GOSUB 2470
430 LABEL$="HILL"
440 ROW=23
450 CLMN=12
460 GOSUB 2470
470 LABEL$="MC-"
480 ROW=22
490 CLMN=20
500 GOSUB 2470
510 LABEL$="DONALD"
520 ROW=23
530 CLMN=18
540 GOSUB 2470
550 LABEL$="DE LA"
560 ROW=22
570 CLMN=26
580 GOSUB 2470
590 LABEL$="GARZA"
600 ROW=23
610 CLMN=26
620 GOSUB 2470
630 RETURN
640 REM *----- END OF SUBROUTINE
    FOR LABELS ---*
650 DATA 4535,5B,3317,42,3929,50,3
    845,49
660 BARCOLOR1=5
670 BARCOLOR2=11
680 BARCOLOR3=7
690 BARCOLOR4=3
700 SCALE=500
710 SCALE$="9 8 7 6 5 4 3 2 1 0"
720 VERTICAL1$="VOTES IN"
730 VERTICAL2$="THOUSANDS"
740 REM  *--- CHARACTERS 91,92, AN
    D 93 ARE AVAILABLE FOR TICK
    MARKS ---*
750 DATA 91,0000000000000038,92,00
    0000000000FE,93,000000000000
    003B
760 REM -*-*-*-*-*-*-*-*-*-*-*-*
770 DATA 94,FF000000000003C,95,00
    80FE0092FE00E0,96,FFFF00FF0000
    FF00,97,C0C000FF0000FF00,98,00
    0000FF0000FF00
780 DATA 99,030300FF0000FF,104,004
    F79004F007F00,105,7F00497F0001
    4B7F,106,00FE90F000FE90F0,107,
    0000000000000FF
810 DATA 112,C0C0C0C0C0C0C0C0,113,
    00,114,0303030303030303,120,C0
    C0C0C0C0C0C0C0,121,00,122,0303
    03030303030303
820 DATA 128,C0C0C0C0C0C0C0C0,129,
    00,130,0303030303030303,136,C0
    C0C0C0C0C0C0C0,137,00,138,0303
    03030303030303
830 DATA 144,FFFF000000000000,145,
    FFFFFCECFCFCC0C,146,C0C0C0C0C0
    C0C0C,147,C0C0FCFCECFCFFFF,148
    ,0000000000000FFF
840 DATA 149,03033F3F373FFFFF,150,
    0303030303030303,151,FFFF3F373
    F3F0303,152,00000000000000FF,1
    53,FF
850 RESTORE 770
860 FOR K=1 TO 35
870 READ CHARACTERNUMBER,HEX$
880 CALL CHAR(CHARACTERNUMBER,HEX$
    )
890 NEXT K
900 CALL COLOR(9,2,14)
910 CALL COLOR(10,2,8)
920 CALL COLOR(11,2,BARCOLOR1)
930 CALL COLOR(12,2,BARCOLOR2)
940 CALL COLOR(13,2,BARCOLOR3)
950 CALL COLOR(14,2,BARCOLOR4)
960 CALL COLOR(15,16,8)
970 CALL COLOR(16,16,8)
980 CALL SCREEN(8)
990 CALL CLEAR
1000 REM *------- BASELINE AND GRID
     LINES -------*
1010 COL=1
1020 CALL HCHAR(21,COL,96,33-COL)
1030 FOR ROW=20 TO 2 STEP -2
1040 CALL HCHAR(ROW,COL+1,152,30)
1050 NEXT ROW
1060 CALL HCHAR(1,COL+1,153,30)
1070 REM *---- VERTICAL SCALE ----*
1080 LABEL$=SCALE$
1090 ROW=2
1100 CLMN=2
1110 GOSUB 2420
1120 REM *------ TICK MARKS ------*
1130 CALL HCHAR(23,COL,105)
1140 CALL HCHAR(22,COL,104)
1150 CALL HCHAR(23,32,106)
1160 CALL HCHAR(22,32,95)
1170 FOR ROW=20 TO 2 STEP -2
1180 CALL HCHAR(ROW,COL,92)
1190 CALL HCHAR(ROW-1,COL,91)
1200 CALL HCHAR(ROW,32,92)
1210 CALL HCHAR(ROW-1,32,93)
1220 NEXT ROW
1230 CALL HCHAR(1,COL,94)
1240 CALL HCHAR(1,32,94)
1250 REM *-------- LABELS --------*
1260 GOSUB 290
1270 REM *-------- DRAW BARS -------*
1280 MASTER1$="000000000000000FFFFFF
     FFFFFFFFFFFC0C0C0C0C0C0C0C0C0
     C0"
1290 MASTER2$="7F00497F00014B7FFFFFF
     FFFFFFFFFFF0000000000000000000
     00"
1300 MASTER3$="004F79004F007F00FFFF
     FFFFFFFFFFF0303030303030303030
     03"
```

Continued on p. 98

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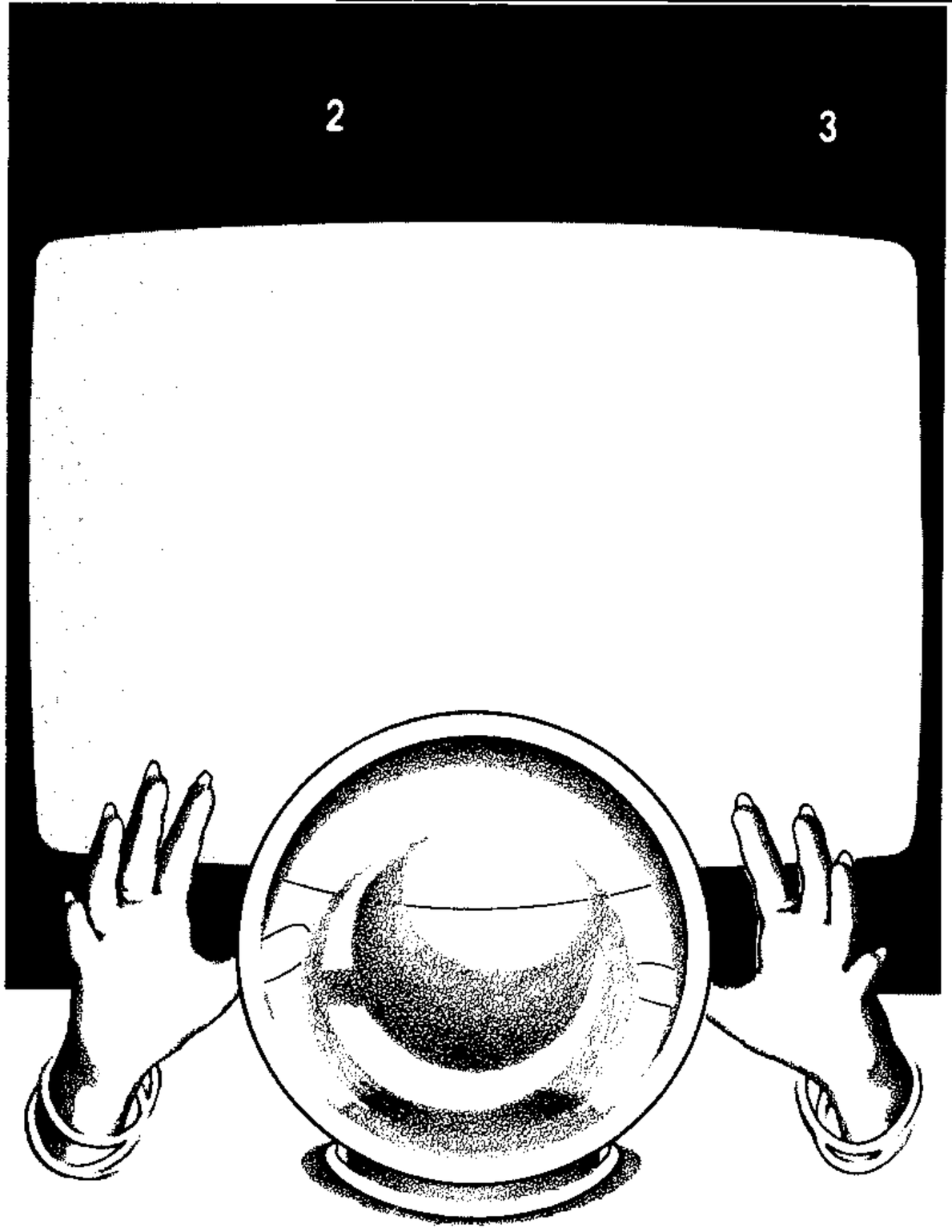
This column is an ongoing tutorial on the *Multiplan* software package. To obtain full benefits from this column, a newcomer to *Multiplan* may find it useful to read the previously printed columns.

The smallest addressable unit on the *Multiplan* worksheet is the cell. This means that you can "converse" with *Multiplan* about the contents of any cell on the worksheet. But *Multiplan* is not just a single-celled organism. In many cases, it can think in terms of rectangular groups of cells. And this capability expands *Multiplan's* usefulness significantly.

Rectangular groups of cells go by many names: tables, matrices, arrays. What you call a particular area depends on both its contents and how it will be used. You use a special syntax to indicate a rectangular area to *Multiplan*, namely *upper-left-cell: lower-right-cell*. For example, in Figure 1 the boxed area would be called R1C1:R4C3.



Once you start thinking in terms of rectangular areas, you will see how basic this concept is to *Multiplan*. Rows and columns on the worksheet are just rectangular areas which are one cell wide or long respectively. Even a single cell is just the smallest possible rectangular area.

Commands and Rectangular Areas

You can refer to rectangular areas in five of *Multiplan's* commands: Blank, Copy, Format, Name, and Print. Copy is the most interesting of these, so we will explore it first.

The Copy command has three sub-commands: Right, Down, and From. Copy From lets you move a whole rectangular area to another part of the worksheet while retaining it in the original spot as well. You can also Copy From a single cell to a rectangular area, although this is not nearly so useful. To see the difference, refer to Figure 1. The original worksheet contained only the rectangular area R1C1:R4C3. The top part of Figure 1 was the result of copying from R1C1:R4C3 to R6C2. Notice that you don't have to specify the boundaries of the destination area; *Multiplan* assumes that you are referring to the upper left corner of a rectangle that is the same shape as the "from" area. The lower part of Figure 1 was produced by copying from R1C1 to R6C2:R9C4. In this case the single "from" cell was duplicated throughout the rectangular destination.

Copy Right is a special case of Copy From. You can use Copy Right to make more than one copy of a rectangular area, but the cells you copy from must all be in the same column and the destination area(s) must be in adjacent columns. Copy Down is similar to Copy Right except that portions of rows are copied to adjacent rows. There is one thing you should always keep in mind when you use all the Copy commands. The information in the destination areas is wiped out when it is replaced, so you can lose whole areas of your worksheet by specifying a destination which contains information you meant to keep.

If you have a rectangular area that will be used frequently on your worksheet, then you may want to Name it to make things easier on yourself. The Name command assigns the label of your choice to the area. After that you can refer to it by its label instead of the more cumbersome upper-left: lower-right notation.

The Blank command is used to blank out areas on a worksheet. If you use the Copy commands extensively, you will sometimes find that a finished worksheet has several cells containing zeroes. You can use the Blank command to clean up your finished worksheet.

The Print Options command lets you designate any rectangular area for printing. If you don't want to print the whole worksheet, use Print Options to specify the area to be printed, and then use Print Printer to actually print it out. This is a real time- and paper-saver when you are developing a worksheet.

The Format Cells command can be used to change the format in which the contents of a cell (or area of cells) are presented. A common example, which we have seen before in this series, occurs when most of the figures on a worksheet are dollars and cents but you need to use whole numbers in one column. You can accomplish this by setting the default format (command Format Default) to the most common format (say dollars and cents) and then using the Format Cells command to change just the area you need to integer format.

Multiplan makes it easy to use the complicated-looking rectangular area designations. You don't have to type them in; you can use the cell pointer to indicate the boundaries of the area you want. After you have selected the command (and possibly the sub-command) and arrived at the spot where the designation should be placed, just move the cell pointer to the upper-left cell of the area (if it's not already there). Then type : (colon) to tell the system you're ready to do the lower-right cell. Then move the cell pointer to the lower right boundary of the area. *Multiplan* will build the area designation on the command line for you as you follow these steps. This technique helps prevent mistakes, and it's easier on non-typists.

Tables

A *table* is a very useful type of rectangular area. As you might suspect, tables are used for looking up information. With

Multiplan you can define a table on the worksheet and reference it from other places on the sheet.

An example which jumps to mind is preparing estimates for repair work. Imagine you run a very specialized business which repairs just one type of sewing machine. These hypothetical machines are so simple that most repairs consist of 5 common jobs. The business offers free repair estimates, and you would like to automate these estimates to cut down on the time it takes to prepare them and to increase their accuracy by eliminating addition errors.

Figure 2 shows the model for this example. I have taken poetic license and shown a bit more here than would appear on the screen at any one time. The "job table" for these 5 common jobs is at the bottom of the worksheet. To keep things simple, numbers 1 though 5 were assigned to the jobs. Each job has a verbal description, a price for parts to be used, and an estimated number of hours it takes to do the job. This description is there to save time; you only have to type the one-digit job number instead of the longer description. The parts prices are kept separately so they can be changed easily when appropriate. The labor is depicted in hours so that the labor portion of each job can be figured against the shop's current hourly rate, which may change from time to time. To make this figure meaningful, we will have to supply the hourly rate elsewhere and have *Multiplan* do the calculation. Because we will refer to this job table often, we will name it TABLE. Use the Name command, and specify TABLE to refer to R19C1:R23C4.

Now to set up the estimate form itself, shown in the upper part of Figure 2. The company's heading is typed in, and the hourly labor rate is also prominently displayed. Space is left to fill in the current date when the estimate is used. The plan is to have the person type only job number(s) and have *Multiplan* fill in the rest of the row. When job number is filled in, the program should get the description from the table and plug it in. The amount for each item should be calculated as the parts price plus the labor hours, multiplied by the labor rate.

To calculate this we will use the INDEX function. INDEX returns the value of a cell from a table, which is just what we need. The general form of the function for this case is INDEX (TABLE, row, column). This example will be very simple because the job numbers 1 through 5 can be used as the row designators in the INDEX function. When we want to get the description, we'll specify column 2. In other words, the description for job #3 would be just INDEX (TABLE,3,2). Similarly, the parts price is always in column 3 and the labor hours are in column 4. Thus the only variable we'll have is the job number; everything else depends on that.

Now to make the formulas for the first detail row of the estimate. The job number will be filled in when the worksheet is actually used; leave it blank for now. Under DESCRIPTION, we want to use INDEX (TABLE,RC[-1],2). To enter this, put the cell pointer at row 9, column 2 and type = to indicate that a formula will follow. The formula can be typed in directly, except that the RC[-1] can be indicated by moving the cell pointer 1 column to the left. Don't be surprised at the #REF! error which results; that happens because we haven't filled in a job number yet, so *Multiplan* is unable to look it up right now.

The next thing to do is to fill in the formula for AMOUNT. This gets a bit complicated. For one thing, we'll need to use the labor rate here. First we Name the cell containing $25.00 so we can refer to it by name; let's call it RATE. Now put the cell pointer in the first row under AMOUNT, type =, and then enter the formula: INDEX(TABLE,RC[−2],3)+INDEX (TABLE,RC[−2],4)*RATE. The RC[−2] terms refer to the job number again. In English, this formula is just parts amount + hours × rate. Notice that we don't need parentheses around the hours × rate term because *Multiplan* automatically does multiplication before it does addition. The REF! message will appear here too, but it will go away when we fill in a job number.

So much for the prototypes of the formulas. If an estimate has more than one detail line, the person can Copy Down the pro-

Figure 1: Rectangular Areas and Copying

```
#1          1          2          3          4
 1   A A A A                   1   $1.00
 2   B B B B                   2   $2.00
 3   C C C C                   3   $3.00
 4   D D D D                   4   $4.00
 5
 6                A A A A                   1   $1.00
 7                B B B B                   2   $2.00
 8                C C C C                   3   $3.00
 9                D D D D                   4   $4.00
10
11
12
13
14
15
16
17
18
COPY FROM cells:R1C1:R4C3 to:R6C2
```

```
#1          1          2          3          4
 1   A A A A                   1   $1.00
 2   B B B B                   2   $2.00
 3   C C C C                   3   $3.00
 4   D D D D                   4   $4.00
 5
 6                A A A A   A A A A   A A A A
 7                A A A A   A A A A   A A A A
 8                A A A A   A A A A   A A A A
 9                A A A A   A A A A   A A A A
10
11
12
13
14
15
16
17
18
COPY FROM cells:R1C1      to:R6C2:R9C4
```

Figure 2: Estimate Model

```
     1          2                    3                    4
 1              SWANSON REPAIR       OUR CURRENT RATE IS
 2              128 MAIN ST.           $25.00 PER HOUR
 3              NEWTON. OR 98765
 4
 5              REPAIR ESTIMATE      6/15/83
 6
 7
 8         JOB # DESCRIPTION         AMOUNT
 9              3 REPAIR PLATE       50.00
10              2 ALIGNMENT          26.50
11
12
13
14
15              TOTAL                76.50
16
17   JOB TABLE:
18        JOB # DESCRIPTION         PARTS          HOURS
19              1 REPLACE
                MOTORS               59.95           0.50
20              2 ALIGNMENT           1.50          $1.00
21              3 REPAIR PLATE       25.00           1.00
22              4 GEN. OVERHAUL      12.50           1.50
23              5 REPLACE ARM        48.00           1.25
```

Figure 3: Printed Estimate

```
SWANSON REPAIR                  OUR CURRENT RATE IS
128 MAIN ST.                      $25.00 PER HOUR
NEWTON, OR 98765

REPAIR ESTIMATE                 6/15/83

DESCRIPTION                          AMOUNT
REPAIR PLATE                          50.00
ALIGNMENT                             26.50

TOTAL                                 76.50
```

totypes as many lines as needed. We don't want to do that in the model because of the REF! messages, which will remain if there is only one detail line on a particular estimate. But since the maximum job might have 5 detail lines, we want to leave the next five lines clear in case they are needed. We need a total line, so let's put that on row 15. Enter TOTAL under DESCRIPTION. Move over under AMOUNT and fill in the formula SUM(R[-7]C:R[-1]C) using the cell pointer to refer to the rectangular area to be summed into the total.

There's one more thing to consider before we declare the model finished. Presumably the customer will receive a copy of the estimate, but he or she should not get a copy of the jobs table. The job number is also meaningless to the customer. *Multiplan* can take care of this easily. Use the Print Options command to designate that only the area R1C2:R15C4 be printed. Then save the finished model.

The next time an estimate is to be prepared, call up a copy of your model (via the Transfer Load command). Fill in the date. If only one detail line is needed, simply fill in the job number at row 9, column 1. If you need three detail lines, Copy Down 2 cells from R9C2:R9C3 and then fill in the three job numbers on rows 9 through 11. Then print the estimate (and possibly an extra one for your own records), and you're done. Figure 3 shows a printed estimate containing two detail lines.

Absolute vs. Relative References

This example points out the need to distinguish between absolute and relative cell references. A cell reference such as R1C1 is called absolute because it refers to a definite cell, the one at the home position. There is no possible ambiguity with a reference like this. The labels TABLE and RATE are both absolute references.

A cell reference such as RC[-2] is called a relative reference because it designates a cell only with reference to the present location of the cell pointer. This particular example means "the cell which is in the same row and two columns to the right of where I am now," so the meaning of this reference can vary.

In the estimate example, we used relative references for the job number in the INDEX functions. This was because the prototype detail line might be copied down in the future. Suppose we had been short-sighted and specified the DESCRIPTION formula as INDEX(TABLE,R9C1,2) instead of INDEX(TABLE,RC[-1],2). The first line of the estimate would be fine, but what would happen when it was copied down to the next line? The absolute reference would cause *Multiplan* to base the second line on the job number in the first line, with disastrous results.

But don't think that the safe way is to make all references relative. Consider the labor rate, which was an absolute reference in the example. Suppose we had decided to make that a relative reference too. Then suppose that instead of typing RATE (or using its absolute address of R2C3), we had used the cell pointer to pick out that cell in our prototype AMOUNT formula. This would have put R[-7]C in place of RATE in the formula. Again, this would have been fine in the first line of the estimate. But how about the second line, if the formula was copied down? The reference would be one row too low; *Multiplan* would pick up 0 for the labor rate because the referenced cell (R3C3 this time) is blank. As you can see, the concepts of rectangular areas, and relative and absolute addressing are central to understanding *Multiplan*.

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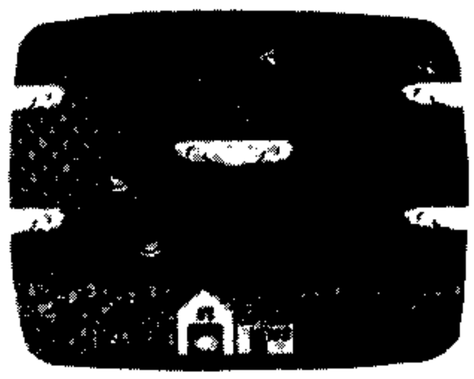

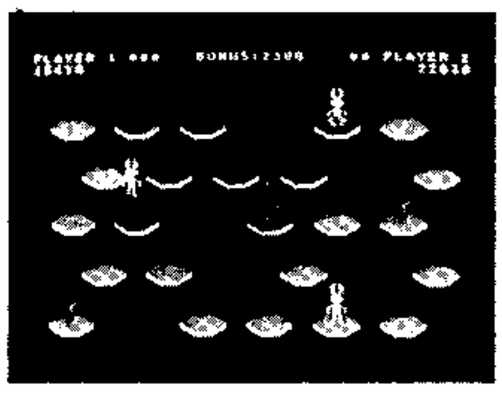

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DISK FIXER

This is a powerful Assembly language program written for those who want more control of the TI-99/4A.

The DISK FIXER is a utility program that acceses floppy disks by "SECTOR" rather than by file name. You can now display or print the actual contents of any sector of a floppy disk.

Other features of DISK FIXER allows you to change any byte on any sector or move data from one sector to another.

This tool is ideal for fixing blown directories, improperly closed files, and recovering data from diskettes otherwise inaccessable.

This program requires EDITOR ASSEMBLER, 32K memory expansion and a Disk drive.

Catalog number: AS-01 on diskette only

PRICE: $29.95 ea.

Letters . . . from p. 7

GROUP GRAPEVINE

Group Grapevine: News of TI Users Groups From Around the World.

A plea for help has come to us from a desperate W. Smythe of Ontario, Canada. Ms. or Mr. Smythe writes that he or she has recently been assigned the task of organizing a "programme. . . which will satisfy and stimulate the interest of a small but enthusiastic Users Group." Those of you with several successful meetings and agenda under your belts may wish to respond directly to the aforementioned W. Smythe at 22 Lavina Crescent, Leslie Park, Nepean, Ontario, K2H 7P2, Canada 830519.

Because Smythe notes in his/her letter that time is of the essence, we will try to oblige this urgent request for a "diversified programme" by here noting some tried and true ideas that have kept users groupies coming back for more.

1. Bring in a Celebrity. It can be both informative and inspiring to see how the experts design, program, debug and run their own software. For example, the **San Gabriel Valley 99/4 User's Group** recently had two professional programmers come in and share their graphics expertise. You can contact the group at 1008 Dore Street, West Covina, CA 91792.

2. Hold a Workshop. Many group newsletters include regular questionnaires for future workshop topics. **The Rocky Mountain 99'ers** (P.O. Box 3400, Littleton CO, 80161) is just one group who has held workshops on Extended BASIC and Assembly Language game programming.

3. Get Competitive. Contests for the best program, game or graphic design are a user group staple. A local computer dealer might even be persuaded to donate a prize. Recently the **Airport Area Computer Club** at P.O. Box 710, Coraopolis, PA 15108 initiated a masthead design contest to come up with a sharp new look for their newsletter.

4. Form Splinter Groups. This is an especially good idea for large groups with diverse interests and proficiency levels. **MUNCH, The Massachusetts Users of the Ninety-Nine and Computer Hobbyists** (1241 Main St., Worcester, MA 01603) has a separate beginners group, and many users groups form special interest groups to delve into such topics as Assembly Language, Computer-Assisted Instruction, and Game Designing.

5. Questions from the Floor. Communication is what users groups are all about. The **Cleveland Area 99/4A Computer Users Group** ends every meeting with an open forum during which members can pose questions, exchange information and offer suggestions. You can contact this group at 2385 Stanford Dr., Wickliffe, OH 44092.

6. Start a Library. The **Central Texas 99/4A Users' Group** (P.O. Box 3026, Austin, TX 78764) is just one of many users groups that provide software libraries for the use of their members. Books and journals can also be shared.

7. Write to Us. Last but not least, send us a note or newsletter letting us know what you are up to. We'll try to print your name, address, appeals for members, entreaties for newsletters to exchange and any other news that's fit to print.

OK, W. Smythe, we expect to hear that your first meeting was a rousing success. Write about it to the **Users Group Editor, 99'er Home Computer Magazine, 1500 Valley River Drive, Suite 250, Eugene, OR 97401.**

"Let Them Munch Cake"

Dear Sir,

Recently my daughter Lauren celebrated her sixth birthday. Like all kids her age she wanted a cake which depicted her favorite thing, in this case MUNCHMAN! My very talented friend, Bob Gwinn (also a 99/4A enthusiast) offered to do the baking and decorating. We thought you might like to see the results. We think many of your readers might like to try to create other theme cakes for their kids—next year PARSEC!

Dee Urban
Orchard Park, NY

Dear Sir:

I was wondering if any of your readers could take the time to help me with some "Call Sounds" that I don't know how to do. I need the sounds for a game I am making based on the game by Williams Electronics called "Joust." Besides these sounds I am interested in learning how to make a variety of sounds other than musical sounds.

Ty Morrison
Riverside, CA

A previous issue of 99'er HCM *will give you some good tips on the production of musical and non-musical sounds using the CALL SOUND subprogram, Ty.* Livening Up Your CALL SOUNDS *in Volume 1, Number 6 (the last issue before* 99'er *went monthly) provides a guide to the production of a variety of sounds: bees, teleprinters, sword clashes, footsteps, sirens . . . We still have a few copies of that back issue in our warehouse, but the supply is limited.*

Dear Sir:

In the May 1983 issue Greg Roberts states in his article "From Cut & Paste to Keystroke" that it would cost from $50 to $1000 to bring a TI-99/4A up to word processing status. From the price list I have from Texas Instruments for the equipment required, as listed in the article "Word Processor Market Basket," it would cost me over $2200 to achieve word process status since all I have is the TI-99/4A, TV and cassette recorder. What accounts for the significant difference?

Melvin Fields
Aptos, CA

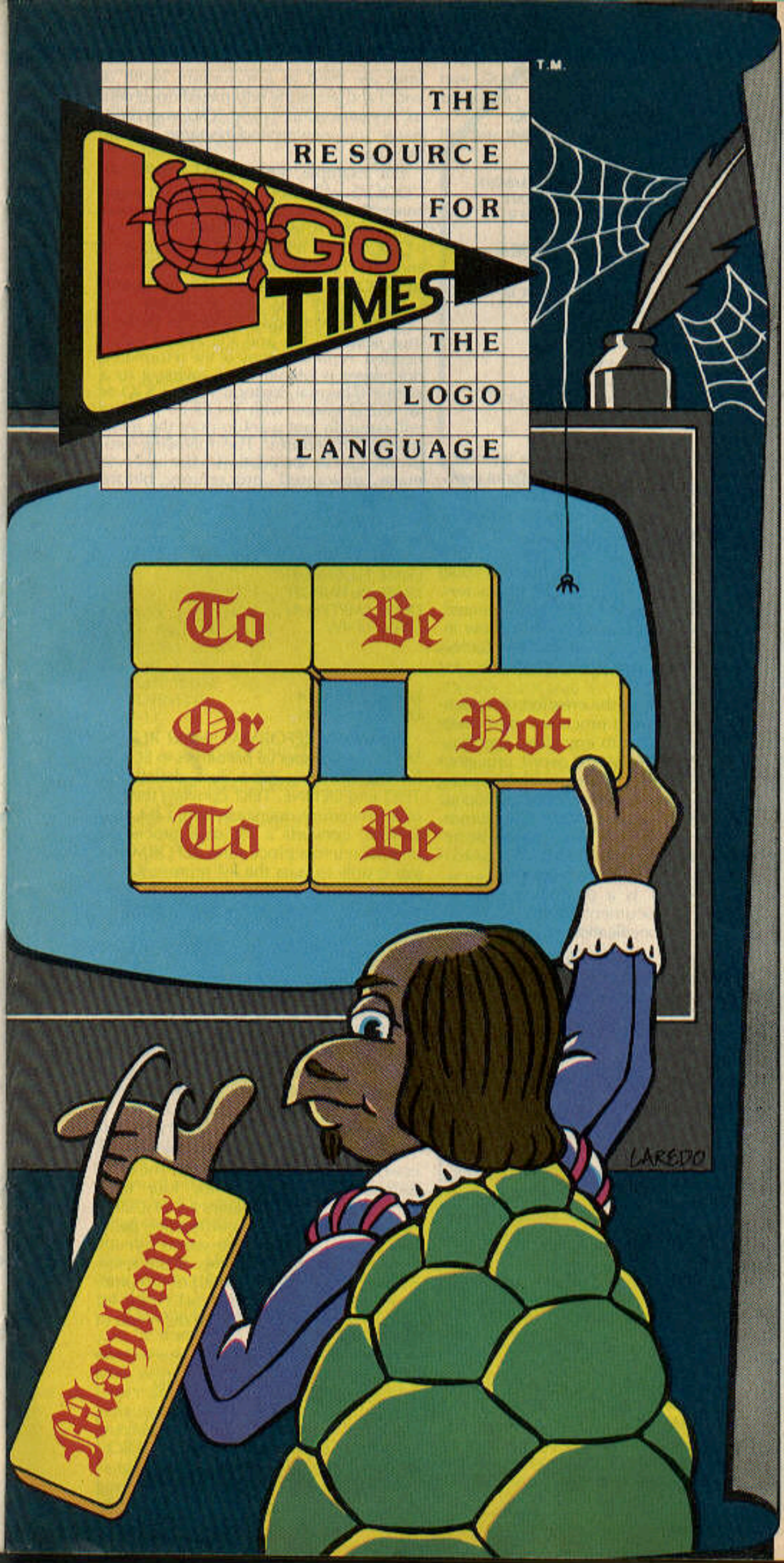
The possible prices depend on a number of things, Melvin. In your case, for instance, the biggest expense would be the hardware components necessary to communicate with a printer, plus the printer itself. Several manufacturers besides TI produce the hardware interfaces, with various capabilities and at various prices. One manufacturer (Model Masters) produces an inexpensive RS232 interface that uses the joystick port. If you want to build your own RS232 interface through the joystick port, the June and July issues of 99'er HCM *gave you the plans and software (*JoyTalk Is Cheap*). For both of these devices, TI's Mini Memory Cartridge is required.*

*The cost of a printer depends on your particular needs. If a no-frills, low-speed dot-matrix impact printer will satisfy your needs, you'll be able to get away with a minimal outlay. And if a plain-paper printout is not mandatory, you might consider a full-feature thermal printer. In this issue (*Peripheral Visions, *p. 41), we review an 80-column $200 thermal printer, for instance. If you want correspondence-quality printing, expect to lay out a good deal more. Printer speed, software options, paper size and type, among other things, will affect the cost of your word processing system.*

Then there's the question of software. The cost here can range from free to substantial. Tex-Scribe *(December, 1982 issue of* 99'er HCM*) only costs the time and effort to key it in. There are also inexpensive software packages that will run on minimal systems. And there soon will be a cassette-based version of TI's word processing software for use with the Mini Memory cartridge (*TI-Mini-Writer, *announced for third quarter, 1983). If these systems are too limited in scope for your particular needs, then there are third-party software packages (advertised in this magazine) of varying degrees of complexity—running all the way up to TI's own package,* TI-WRITER.

In other words, how much you might spend depends on the present state of your system, your projected needs and your ability to shop around and find the best prices for hardware and software.

99'er



TURTLE TEXT

A Response to Muller's Challenge

By Roger B. Kirchner

Last month we published Roger Kirchner's reply to the third of Jim Muller's challenges, that someone write a multi-colored tessellation procedure for TI LOGO to graphically represent multiple depths of recursion. [You may remember that Muller, President of the Young People's LOGO Association, asked other champions of LOGO to come forward with solutions to the problems he posed in order to answer what both he and Kirchner felt were unfair criticisms to the effect that LOGO is somehow deficient.—Ed.] Those of you who saw last month's "Mosaic Designs" know how spectacularly TI LOGO was defended on that count. This month Roger Kirchner responds to the first of Muller's challenges, that a LOGO proponent "write TI LOGO procedures that perform word-processing functions on either a 40- or 80-column screen and printout in 40 or 80 columns." We think you'll agree that Kirchner ably defends LOGO in this instance too, and we're hoping that he—or someone—will soon complete LOGO's exoneration with "an interactive graphics program that includes file access features."

By word processing we will mean the creation and formating for output of a text document such as a letter. As those of you who've worked with TI's word processor TI-Writer know, having a screen with fewer than 80 columns is no limitation in the preparation of well-formated output. What is important are good screen editing commands and the ability to easily format text for output to any given specifications.

Documents are most easily created by using the built-in TI LOGO editor. Since we are primarily interested in printing the documents we create, and since TI LOGO can print only procedure definitions, the trick is to make LOGO think we are defining a procedure. The first line must therefore be TO *procedure-name*, where *procedure-name* is a name for our document, and the last line must be END. Edit mode can be entered by entering either EDIT, or TO *procedure-name*. When BACK is pressed, a procedure will be created with the name *procedure-name*, with the text we have entered as body.

TI LOGO's editor has excellent screen editing commands: Keys move the cursor up or down by lines (UP, DOWN), or within a line forward or back one space (LEFT, RIGHT), or to the beginning or end of the line (BEGIN, PROCEED). The character either under the cursor or behind the cursor can be deleted (DEL, ERASE). Text from the cursor to the end

THE RESOURCE FOR LOGO TIMES THE LOGO LANGUAGE

Introduction

LOGO Times is an information resource for anyone interested in participating in the creation of their own *personal* language—one that will easily allow them to communicate with a computer in a totally new audiovisual realm of applied imagination, exploration, and self-discovery. The articles on these pages concern the use of the new TI LOGO language, but readers do *not* need any additional software or equipment (or even a computer) to understand and learn from the material presented here.

If readers want to actually *experience* a TI LOGO environment, they will need either a TI-99/4 or TI-99/4A computer, the Expansion Memory peripheral, and TI LOGO Command Cartridge. A disk drive, although convenient to have, is *not* required; a user's work may alternately be saved on cassette tape, printed out on the TI Thermal Printer, or hand copied into a notebook (for later re-keyboarding).

In each issue, one or more of the articles may reference or build upon the topics discussed in a previous article. It is therefore recommended that for maximum benefit and understanding, new readers obtain the appropriate back issues of *99'er Home Computer Magazine* containing *LOGO Times* articles.

NOTICE

LOGO Times is actively soliciting articles. Manuscripts should be typed double-spaced, and accompanied by a cassette tape or disk if containing any lengthy procedures or graphics.

Send all materials to:

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All mail directed to the Letters-to-the-Editor column (*Letters on LOGO*) will be published in accordance with the conditions set forth on *99'er Home Computer Magazine*'s Masthead page.

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of the line can be deleted (CLEAR), and lines can be inserted, split, or combined by entering or deleting ENTERs.

Let's write a sample document and call it DOC:

```
THE NUMBER OF SCREEN COLUMNS
ISN'T PARTICULARLY IMPORTANT
IN TEXT PROCESSING. HOWEVER,
IT IS VERY IMPORTANT TO BE
ABLE TO FORMAT OUTPUT FOR A
GIVEN WIDTH LINE.

REFORMAT IS A PROCEDURE FOR
REFORMATING OTHER
PROCEDURES. ITS INPUTS ARE
THE OLD NAME,
THE LINE WIDTH, AND THE
NEW NAME.
THE NEW NAME CAN BE THE SAME
AS THE OLD NAME.
END
```

When we type in EDIT mode, we notice that we can continue typing without pressing ENTER until 127 characters have been entered. The text will simply wrap around. Words will be split arbitrarily, but that is a problem only at the output stage. In the example the lines are short, but they could have been as long as 127 characters. Notice too, that we have not indented. This is because LOGO doesn't allow indenting in procedure definitions (unless we use a non-space character for indenting).

Besides making the creation of a document easy, a word processor must make possible a format to any given specification for printing. A full word processor such as TI-Writer allows much formating flexibility. But because Muller's challenge is to format output to 40 or 80 columns, our main concern in TI LOGO will be formating the width. TI-Writer, of course, is not limited to those two options.

REFORMAT is a procedure that will reformat a document to any width we choose. Its specification is:

REFORMAT *oldprocedure-name width newprocedure-name*. This reformats document *oldprocedure-name* so that lines are filled to a maximum width of *width* and stores the reformated document as *newprocedure-name*. *Oldprocedure-name* and *newprocedure-name* can be the same.

For example, REFORMAT "DOC 25 "DOC25 will reformat DOC to have at most 25-character lines and store the result as DOC25. And REFORMAT "DOC 60 "DOC60 will reformat DOC to have at most 60-character lines and store the result as DOC60. The results are seen in figure 1.

REFORMAT also uses the other procedures listed below. These can be kept in a separate file and RECALLed when needed. A printed copy of the reformated document is obtained by saving it to a printer (Thermal Printer with TI LOGO or an RS232 printer with TI LOGO II). One will naturally not want to print the reformating procedures. The following procedure can be included with the others to erase unwanted procedures before printing:

```
TO CLEANUP
ERASE REFORMAT
ERASE REFORMAT1
ERASE FLUSHBUFF
ERASE PUTINBUFF
ERASE EMPTYBUFF
ERASE FENW

ERASE CLEANUP
END
```

How does REFORMAT work? REFORMAT uses the special primitives in LOGO for manipulating procedure definitions: TEXT and DEFINE. TEXT converts the text of a procedure definition into a list, and DEFINE converts a list of a procedure definition into a procedure. REFORMAT's job is only to pass the list representation of the input procedure definition to REFORMAT1 and to take the output of REFORMAT1 and convert it to a procedure with the name provided. The main work is done by REFORMAT1. The definition for REFORMAT is:

```
TO REFORMAT :TNAME :LL :NTNAME
MAKE "T TEXT :TNAME

MAKE "T REFORMAT1 :T :LL [ ] [ ] 0 [ ]
DEFINE :NTNAME :T
MAKE "T [ ]
END
```

There are six inputs to REFORMAT1. The first two are the list of lines to be processed and the desired line width. The other four are initial values for four local variables. The local variables are 1) :CURL, the list of words in the current line being processed, 2) :BUFF, the words already processed for the next line of the reformated text, 3) :BL, the width of the processed text in :BUFF, and 4) :NTXT, the list of lines processed so far. The definition of REFORMAT1 is:

Figure 1.

```
TO DOC25

THE NUMBER OF SCREEN
COLUMNS ISN'T
PARTICULARLY IMPORTANT IN
TEXT PROCESSING. HOWEVER,
IT IS VERY IMPORTANT TO
BE ABLE TO FORMAT OUTPUT
FOR A GIVEN WIDTH LINE.

REFORMAT IS A PROCEDURE
FOR REFORMATING OTHER
PROCEDURES. ITS INPUTS
ARE THE OLD NAME, THE
LINE WIDTH, AND THE NEW
NAME. THE NEW NAME CAN BE
THE SAME AS THE OLD NAME.
END

TO DOC60

THE NUMBER OF SCREEN COLUMNS ISN'T PARTICULARLY IMPORTANT IN
TEXT PROCESSING. HOWEVER, IT IS VERY IMPORTANT TO BE ABLE TO
FORMAT OUTPUT FOR A GIVEN WIDTH LINE.

REFORMAT IS A PROCEDURE FOR REFORMATING OTHER PROCEDURES.
ITS INPUTS ARE THE OLD NAME, THE LINE WIDTH, AND THE NEW
NAME. THE NEW NAME CAN BE THE SAME AS THE OLD NAME.
END
```

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```
TO REFORMAT1 :TXT :LL :CURL :BUFF :BL
:NTXT
1:
IF :CURL = [ ] THEN GO "2
MAKE "W FIRST :CURL
MAKE "WL LENW :W
TEST :BL + :WL > :LL
IFT FLUSHBUFF
IFF PUTINBUFF
GO "1
2:
IF :TXT = [ ] THEN EMPTYBUFF OUTPUT
:NTXT
MAKE "CURL FIRST :TXT
TEST :CURL = [ ]
IFT EMPTYBUFF FLUSHBUFF
MAKE "TXT BF :TXT
GO "1
END
```

The idea is to consider lines of :TXT one at a time. The next line is made the value of CURL. The words in :CURL are put one at a time into :BUFF (with PUTINBUFF) until the length of :BUFF would exceed :LL. Then FLUSHBUFF empties :BUFF, storing its contents as a list at the end of :NTXT. An empty line in :TXT is understood to be a space between paragraphs. Then anything in :BUFF is removed to :NTXT by EMPTYBUFF, and FLUSHBUFF adds an empty line at the end of the :NTXT. Both EMPTYBUFF and FLUSHBUFF use the primitive LPUT which puts a list at the end of another list.

It must be admitted that although these procedures work, they are suitable only for short documents. I had some trouble with TI LOGO "choking" on longer documents. TI LOGO II should work much better because of its much larger workspace.

REFORMAT proves that text formating can be done in TI LOGO and that it can produce good-looking printed output. If you want to use a more flexible word processor, go into a procedure-oriented language having greater control over output—TI Extended BASIC, Pascal, or FORTH, for instance. But LOGO is a good language for thinking through solutions to problems, a language for learning—even about word processing.

LISTINGS OF THE REFORMAT PROCEDURES

```
TO REFORMAT :TNAME :LL :NTNAME
MAKE "T TEXT :TNAME

MAKE "T REFORMAT1 :T :LL [ ] [ ] 0 [ ]
DEFINE :NTNAME :T
MAKE "T [ ]
END

TO EMPTYBUFF
IF :BUFF = [ ] THEN STOP
PRINT :BUFF
MAKE "NTXT LPUT :BUFF :NTXT
MAKE "BUFF [ ]
MAKE "BL 0
END

TO REFORMAT1 :TXT :LL :CURL :BUFF :BL
:NTXT
1:
IF :CURL = [ ] THEN GO "2
MAKE "W FIRST :CURL
MAKE "WL LENW :W
TEST :BL + :WL > :LL
IFT FLUSHBUFF
IFF PUTINBUFF
GO "1
2:
IF :TXT = [ ] THEN EMPTYBUFF OUTPUT
:NTXT
MAKE "CURL FIRST :TXT
TEST :CURL = [ ]
IFT EMPTYBUFF FLUSHBUFF
MAKE "TXT BF :TXT
GO "1
END

TO PUTINBUFF
MAKE "BUFF SE :BUFF :W
MAKE "BL :BL + :TXT
GO "1
END

TO FLUSHBUFF
PRINT :BUFF
MAKE "NTXT LPUT :BUFF :NTXT
MAKE "BUFF [ ]
MAKE "BL 0
END

TO LENW :W
IF FIRST :W = :W THEN OUTPUT 1
OUTPUT 1 + LENW BF :W
END
```

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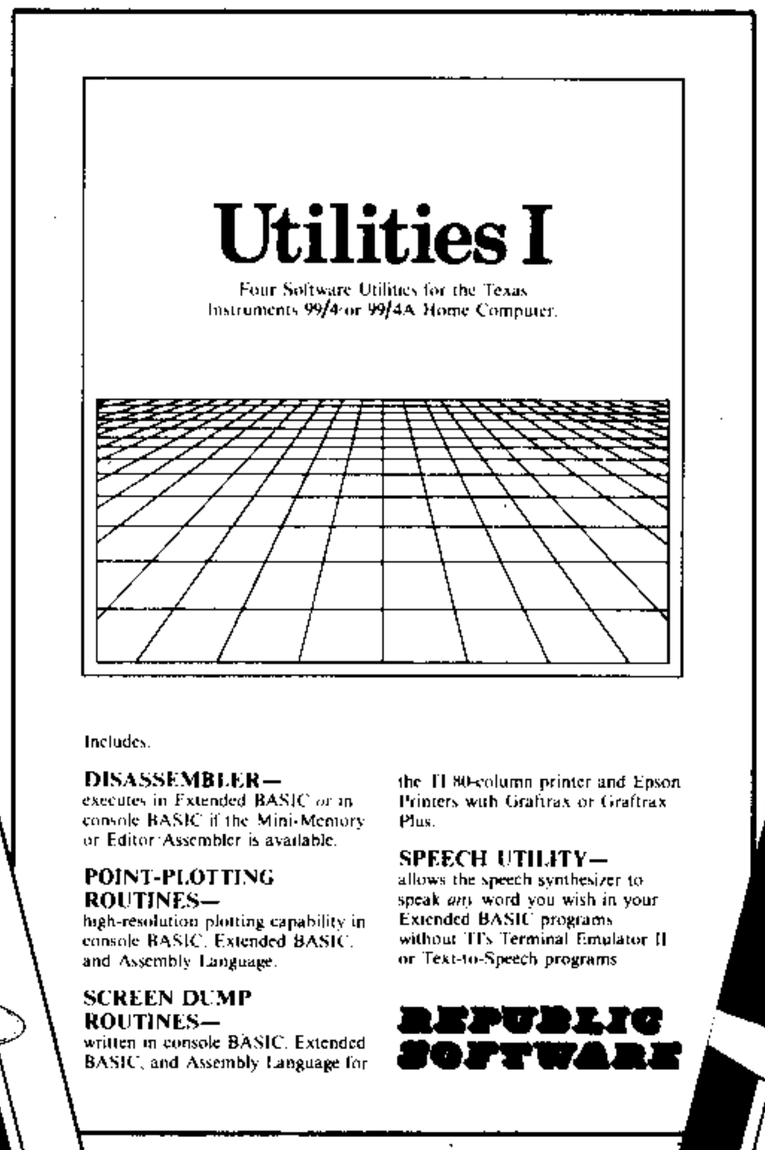

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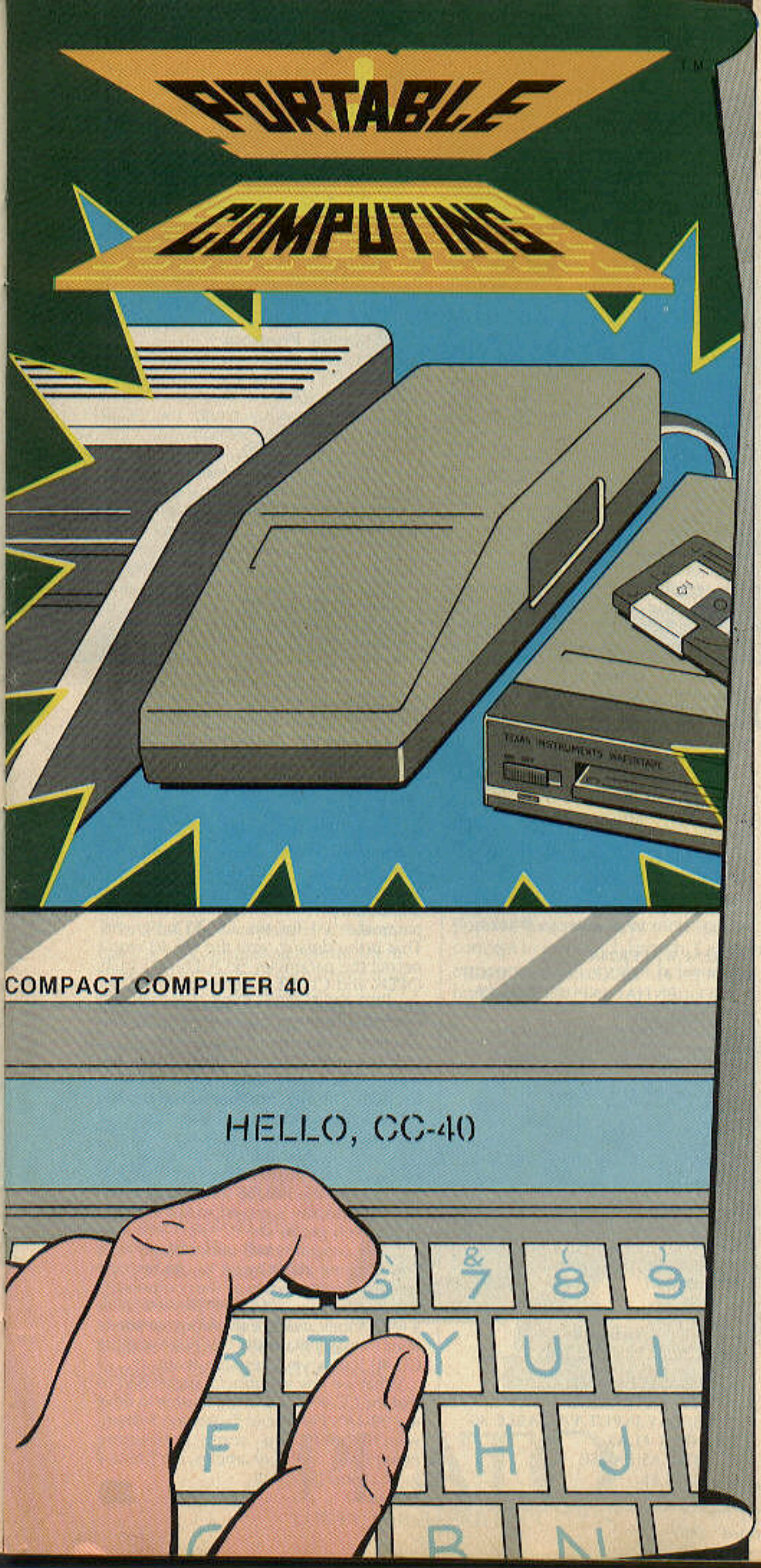

HELLO, LITTLE BROTHER!

By Robert Ackerman
Technical Editor

With the Compact Computer 40, Texas Instruments introduced a new communications interface, the Hex-bus™ Intelligent Peripheral Interface. Devices that make up the CC-40 system communicate with each other through the Hex-bus interface. Since the Hex-bus interface is entirely different from the peripheral interface of the 99/4A, this would seem to preclude any communication between the two systems. Such is not the case, however. TI has developed another peripheral for the 99/4A, the Hex-bus adapter, which we recently saw at the Consumer Electronics Show, and had a chance to "test drive" (along with other of the soon-to-be-released compact peripherals) on a subsequent trip to Lubbock. This device allows the 99/4A to talk to the Compact Computer system.

Consider an engineer or surveyor, for instance, who needs to record raw data in the field. He might like the portability of the CC-40 and its peripherals. To process the data and display the results most advantageously, however, the computing power, capacity or convenience of the 99/4A system might be useful. Now the best of both worlds is available.

There are several ways to communicate between the systems. Here we'll examine a method whereby TI's Wafertape™ drive acts as the intermediary.

The Hex-bus Adapter

The device used to connect these two worlds is the Hex-bus Adapter. It is like one of the old "freight-train" peripherals: It plugs into the accessory connector on the right side of the 99/4A computer console. (The cable to the 99/4A's Peripheral Expansion System can then plug into it—hence the "freight-train" nickname.) It is relatively small (8 x 3 1/2 x 2 inches), so it doesn't take up much room. This device serves two functions: It passes signals through to the Peripheral Expansion System (PES), or it passes signals to the Hex-bus peripherals. When it's used to communicate with the Hex-bus system, the adapter requires its own power source. It has a connector in the back for the output from a 6-volt transformer. It will, however, continue to pass signals to the PES without power. It's only when it has to tap the PES bus and pass signals to the Hex-bus that it must be powered up.

With the adapter in place, the commands or statements to access the PES peripherals are exactly the same as before. In order to access the Hex-bus system, however, the *device* is HEXBUS. This is then followed by the designations used in the Hex-bus system. In this system, all devices have a single number designation

only, rather than an alphanumeric designation like DSK1 or CS1. For instance, the first Wafertape drive is called simply 1. So to save a program from Extended BASIC on the 99/4A to Wafertape drive 1, the command would be SAVE HEXBUS.1.*filename*. Because the CC-40 has only the Hex-bus interface, HEXBUS is superfluous. The command to save a file to the first Wafertape drive from the CC-40 is simply SAVE 1.*filename*.

The Wafertape Drive

The wafertape recording medium itself is an endless strip of magnetic tape, and it always passes across the read/write heads in one direction only. In order for the drive to orient itself with regard to the tape, the tape has a reflective marker that serves as the end-of-tape and beginning-of-tape marker. When the drive needs to find this marker, which is its base reference point, this intelligent peripheral automatically advances the tape until the beginning-of-tape marker passes the read/write heads. From the information on the tape's directory, which is recorded immediately after the beginning-of-tape marker, the drive can then determine where any file on the tape is located and automatically advance to that location.

But even though finding a file requires only a single keyboard operation (and no reading of cassette footage counters, skipped commands in the cassette loading operation, etc.) to find a file, the Wafertape drives are not much faster than the cassette in actual tape transport. It takes about 15 seconds for a 10-foot tape to reach any location on the tape; it takes about a minute and a half on a 50-foot tape. In other words, it seems like an eternity for a 50-foot tape to find the beginning-of-tape marker again. The choice of wafertape involves a trade-off, just as the speed of flying may mean long waits at airports and time-consuming trips to and from downtown.

Physically, the Wafertape drive is much more convenient than a cassette drive. For one thing, it is much smaller—approximately 6 x 4 1/2 x 1 1/2 inches, or about the size of a ham sandwich. The tapes themselves are also smaller: about half the size of a cassette in any dimension. In addition, the Wafertape drive runs from the power of four penlight batteries or from a 6-volt transformer. This minimal power requirement—coupled with its size— means that it's perfectly portable.

File Management on Wafertape

The hybrid parentage of the Wafertape influences its file management system. It has the organizational structure of a diskette—a directory with physical locations indicated on it—along with the physical structure of a cassette tape—a long strip of magnetic medium. The directory after the beginning-of-tape marker contains all the information about the location of the files on the tape. But the physical structure of the tape, coupled with the one-way operation of the drive, dictates that all files be sequential rather than relative—you can't back the tape up.

In addition, files are added to the tape in line, one behind the other. This has consequences for the uses of certain files, as well, according to the preliminary manual for the Wafertape drive. A tape can hold up to sixteen files, but the only one which can be closed and then reopened for output is the last one. Reopening any other file—that is to say, one somewhere in the middle of the tape—for output will cause the system to delete its present directory entry. It will then add a new directory entry which puts the reopened file at the end of the tape. In that case, the previous contents of the file are lost. This means that when you use wafertape to store a file which you will continually be updating—that is, outputting to and inputting from—it *must* be the last file on the tape. Or the *only* file on the tape.

The process of setting up a wafertape for use is called formating, and is similiar to initializing a diskette. From the CC-40, the operation is extremely simple: You put a tape in the drive and type the command FORMAT, followed by a space and the number of the drive. Typing FORMAT 1 and pressing [ENTER] establishes the directory at the head of the tape on Wafertape drive 1. To format a wafertape from the 99-4A requires a slightly different procedure. You will have to run the following miniprogram:

```
100 OPEN #1:"HEXBUS.FORMAT
    MEDIA.1"
110 CLOSE #1
120 END
```

(Note the space between FORMAT and MEDIA.) This accesses Wafertape drive 1 through the Hex-bus Adapter and sets up the directory on the tape. In both cases, the use of the FORMAT command is analogous to initializing a diskette: All previous data on the medium is wiped out.

Listing 1
(Output from 99/4A to Wafertape):

```
100 REM 4A2WAFER
110 OPEN #1:"HEXBUS.1.XCHANGE",
    SEQUENTIAL,OUTPUT,DISPLAY,
    VARIABLE 80
120 CALL CLEAR
130 LINPUT "MESSAGE?":A$
140 PRINT #1:A$
150 CLOSE #1
160 END
```

Listing 2
(Input from Wafertape to 99/4A):

```
100 REM WAFER24A
110 OPEN #1:"HEXBUS.1.XCHANGE",
    SEQUENTIAL,INPUT,DISPLAY,
    VARIABLE 80
120 CALL CLEAR
130 LINPUT #1:A$
140 PRINT A$
150 CLOSE #1
160 END
```

Listing 3
(Output from CC-40 to Wafertape):

```
100 REM CC402WAFER
110 OPEN #1,"1.XCHANGE",
    DISPLAY,OUTPUT,VARIABLE 80
120 LINPUT "MESSAGE?";A$
130 PRINT #1,A$
140 CLOSE #1
150 END
```

Listing 4
(Input from Wafertape to CC-40):

```
100 REM WAFER2CC40
110 OPEN #1,"1.XCHANGE",
    DISPLAY,INPUT,VARIABLE 80
120 LINPUT #1,A$
130 PRINT A$:PAUSE
140 CLOSE #1
150 END
```

The Transfer Program

Now that you can format tapes from either system, the next step is to use them. While in Lubbock, we wrote and tested a series of short programs for the CC-40 and the 99/4A. These programs will allow you to: 1) write to the Wafertape from the 99/4A; 2) read from the Wafertape to the 99-4A; 3) write to the Wafertape from the CC-40; and 4) read from the Wafertape to the CC-40. Listings 1 and 2 are in Extended BASIC, which requires the Extended BASIC cartridge for the 99/4A; Listings 3 and 4 are in Enhanced BASIC, the resident language of the CC-40. These programs permit the the Wafertape drive to serve as an intermediary between the two systems. They are merely skeletons, which will get fleshed out for more comprehensive use in subsequent articles.

All the programs either create or look for a file called XCHANGE, and either write a string to or read a string from the file. Since the internal formats of the two computers are different, the file data type is DISPLAY, because DISPLAY codes the information in one of the universal standards: ASCII code. The length for all the files is common: VARIABLE 80. The files are, of course, SEQUENTIAL. You'll notice that SEQUENTIAL is not included in the parameter list for the CC-40 programs. That is the default, and the CC-40 won't permit the parameter SEQUENTIAL in its OPEN and CLOSE statements which access the Wafertape. Oddly enough, including it in the parameter list gives you a syntax error.

You'll notice some other syntax differences between statements in the two BASICs. The file numbers in Extended BASIC OPEN and LINPUT statements are followed by colons; in Enhanced BASIC, it's commas. And the command to print to the CC-40's display (line 130, Listing 4) has to have the PAUSE statement; otherwise, the display is erased so fast that you don't even get to see it.

These programs will undoubtedly start you thinking about ways to use the two systems together when all the components finally reach your dealer's shelves. With a few modifications, expansions, or alterations they will make the the 99/4A and the CC-40 into a very versatile team.

What we saw in Lubbock suggests to us that the CC-40 alone might be able to drive the 99/4A's Peripheral Expansion System, which opens up some interesting possibilities. In future articles, we'll take a look at this potential.

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Back in January of this year we introduced you to Control Data's PLATO and their concept of a living library of learning. At that time, PLATO was only for the few in government, big businesses and universities who could afford the output of large, expensive computers. Now, we will be able to let you share in our regular audiences with this knowlegeable master. We will use this space to keep you up to date on what's happening in PLATO's realm and beyond.

Our big news this month is that PLATO, the CAI curriculum of 108 courses, is now available to TI Home Computer owners! All you need in the way of hardware to help you become an enlightened PLATOnic scholar is:

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- a Disk Memory system
- Memory Expansion.

Add to this the PLATO firmware (PLATO Interpreter Solid State Cartridge) and the PLATO Program Packages of your choice, and you'll be ready to absorb the wisdom of the ages.

The current PLATO software library for the TI includes instruction diskettes in two large groups: Basic Skills and High School Skills. The Basic Skills program packages (each at a suggested retail price of $49.95) are written to instruct students in grades 3-8 in math, reading and grammar. The High School Skills packages (also $49.95 each) cover math, practical reading, writing, science, and social studies. These packages are not just geared to young people from grades 9 to 12 ; they are also designed to help adults who want to study at home or prepare for the General Educational Development (GED) exam.

Although these packages are an educational value in themselves, the Survey Diskettes in three subject areas (math, reading and grammar) that come with the PLATO Interpreter cartridge (also at $49.95) are an even more impressive bargain because they provide parents with a tool for guiding, understanding and even communicating with their children as their learning progresses.

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Learning System

Tools For Student Assessment

By Sharyn Lyon
Technical Editor

in the proper skills subjects and programs. This diagnostic team, which unfortunately doesn't accompany most learning programs, is made up of a Survey Diskette and a Parent Questionnaire. The child works on the computer with one of the Survey Diskettes, taking short tests of 6 to 8 questions. The purpose of these Survey Disks is to familiarize the learner with the computer and to evaluate the student's skill level in order to help him select the appropriate PLATO courseware. The tests on the Survey Disks use multiple choice questions to measure the child's grasp of specific concepts. Each correct answer receives a one- or two-word reward (EXCELLENT!),and each incorrect answer also elicits a short message (THAT'S NOT IT.) from the computer. But although the incorrect answers are identified, the test taker is not given the correct answer. It seems that this is a teachable moment wasted. Graphics are also omitted from these programs. With the exception of the Math Survey Disk for *Basic Number Ideas*, the questions are not enhanced by any graphics for clarification, entertainment, or reward. This omission may make learning and even understanding the question difficult for all except children who can motivate themselves, read and follow directions well, and be encouraged to continue the quiz by a one- or two-word reward for a job well done. Although this Survey Disk program does not instruct the child during the test, each question has a corresponding program on the teaching disk with which the child can learn what he needs to know in order to master the concept.

"When a child picks out the subject areas himself and decides to complete the survey test, he is really deciding for himself what he is going to learn and when he will learn it."

The Survey Disks are used in combination with the Parent Questionnaire because parents and children need to function as a team for optimal learning. While the child works on the Survey Disk, the parents fill out the Parent Questionnaire which asks them what they think the child's capabilities are. The questions are skill-specific, like this one from the Math Parent Questionnaire which doesn't ask just whether the parent thinks the child can "borrow" or "carry" but—

CAN YOUR CHILD FIND THE DIFFERENCE IN THE SENTENCE 72 – 8?

Responding to questions like these gives parents an opportunity to sit back and reflect on what their children really can do. Rarely do parents have a chance to think so specifically about who their children really are and how they, as educational guides, can help their children get where they need to be academically.

Even with a pause to think carefully about responses, the questionnaire can be filled out in a short time since there are only from 2 to 5 questions for each program package. The time spent filling out the questionnaire is well spent because the parent or teacher acquires a maximum amount of usable guidance information about the child with a minimum of effort.

Where Do We Go From Here?

Once the child and parent have completed their respective surveys, they should record scores and answers on the Survey Scores Sheet included with the Parent Questionnaires. This page, which may be duplicated for repeat use or for responses and scores for a different child, provides a place to record parents' answers to the questions in terms of "Yes, No, Don't Know," and the child's score in terms of the number of correct answers on the survey quiz. The page also shows the "suggested" scores for each quiz and provides a column in which to indicate whether or not the child, based on a comparison between his survey score and the suggested score, needs to work on the corresponding program package. In the following example (Figure 1), the parents have recorded their ideas of the child's capabilities, and then compared them with both the child's actual test performance and the score PLATO thinks that the child should attain. The parents have correctly marked that their child does not need to do this *Numbers 0-9 and Numbers 10-1000* package.

The information here is valuable now and will be even more so later on when the child has completed more surveys and teaching disks and may have reached his

Figure 1.

RESPONSE			SURVEY SCORES		PACKAGE NEEDED	
Yes	No	Don't Know	Your Child's Score	Suggested Score	Yes	No
	X					
X			6	6		X

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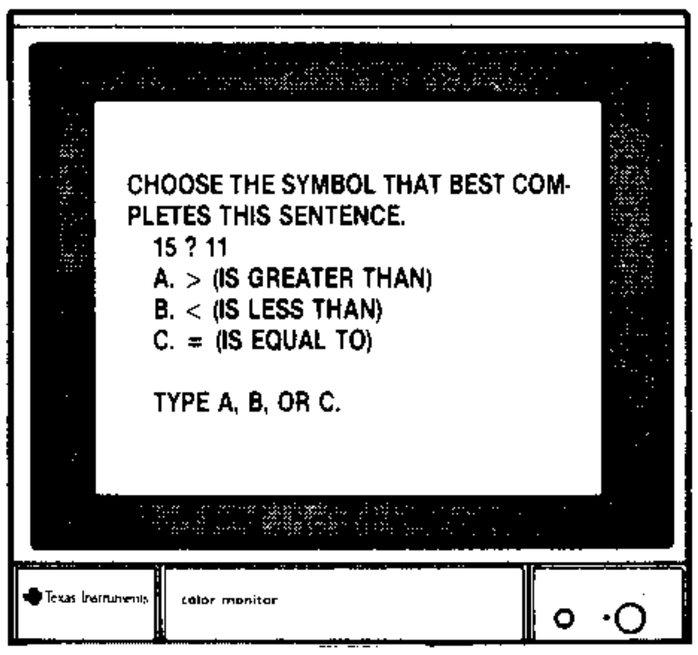
frustration level. At that point it could be helpful to take the child back through one of the programs which made him feel successful. Thumbing through the Survey Scores pages, a parent can quickly and easily pick out likely programs to review in order to replenish confidence and enthusiasm. In this way, the child doesn't lose faith in himself and his abilities.

Everything In Its Place

The Survey Disks and Parent Questionnaires reflect the tremendous amount of thought and research that PLATO's creators and developers have put into their learning program over the past twenty years. The concept presentation is carefully overlapped so that ideas are subtly reviewed throughout the Survey Disks and courseware. The questions build logically upon each other, adding one basic new detail to the concept at a time. The student who follows this progression moves gradually through one thought and on to the next.

The documentation is another strong point of the PLATO system. Everything from powering up your computer and loading the courseware to "Guidelines for Success" is easy to find and clearly presented—complete with diagrams and pictures of selected screens. A dedicated and capable sixth grader could conceivably follow the documentation independently and learn a bit about how the TI system works—while he is learning from the PLATO activities. The on-screen instructions are clear, in a contrasting color block to make sure the user will see, read, and follow them. Following the instructions may not, however, be so easy for young users or any user who is not a very good reader.

Although the Basic Skills program claims to be designed for third through eighth graders, fourth or fifth grade might be a better starting age. The reading proficiency needed to understand how to progress through the program and even how to answer individual questions is beyond what is currently considered third-grade level. The second screen in the *Basic Number Ideas Survey*, for example, looks like this:



Besides being able to read (sound out) the words, (some of which would be more than a challenge to many third graders), the user must understand the specific meanings intended here for words like "symbol" and "sentence." If the user has not been taught the concept of a number sentence and/or doesn't understand the use of the word symbol, he could very well answer the question incorrectly even if he knows the correct answer. The student could end up being placed in a course that would not challenge him because he didn't know the jargon used in the survey question. Perhaps that question could be modified to read:

CHOOSE THE ANSWER BELOW THAT BEST FITS IN THE BOX.

15 ▫ 11

The Math Survey Disk from which the example above was taken will assess the student's conceptual levels in nine general areas that appear on the menu: Basic Number Ideas; Addition; Subtraction; Multiplication; Division; Fractions; Decimals; Ratio, Proportion and Percent; and Geometry and Measurement. These nine headings represent over one hundred hours of teaching activities. However, it is inconvenient to go from the middle of a Survey Test in one area back to the Menu. Instead of being able to press [FCTN] [9] to go back to the Menu, you must press [FCTN] [=] and go all the way back to the master title screen. User beware.

The student is placed in a courseware area to work with a program disk when his score is less than the suggested score printed for that test on the Survey Scores Sheet. PLATO wisely leaves the handling of this delicate placement moment up to the parent or teacher. The computer *does*, however, play a part in setting the moment up. As soon as the computer realizes that the student cannot attain the suggested score, it interrupts the survey test with this non-threatening screen:

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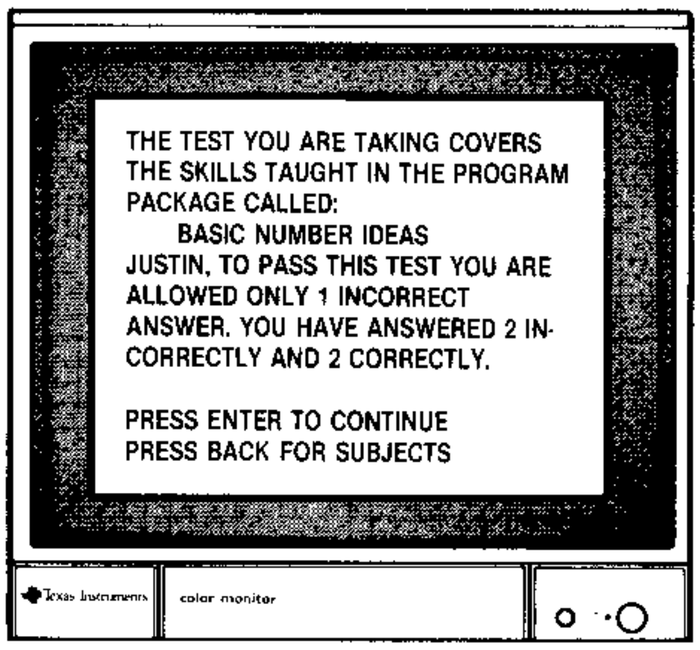

If, at this point, the student wants to go on with this test even though he cannot pass it, he may do so by pressing [ENTER]. Another screen will then prompt him to record his score when he finishes this test. If the student wants to escape the embarrassment of a low score, however, he may press [BACK] to go to the Menu and select another subject.

At the time of placement, the parent or teacher may need to explain to the student why he is going to work with a certain PLATO course. Rather than saying that it is because the student got too many answers wrong, the parent might say the same thing in a truer and more positive way. Actually, when a child picks out the subject areas himself and decides to complete the survey test, he is really deciding for himself what he is going to learn and when he will learn it instead of following someone else's curriculum plan. I think Plato would have liked the way the ideal of individualized education is alive and well in the learning system that bears his name.

With the placement phase completed, the student is now ready to explore a specific PLATO course. Next time we visit the Academy we will join a young scholar as he delves into some of the courses in the High School Mathematics series.

Educational Activity Review Criteria

Documentation—rates the printed matter that comes with the activity. It notes whether the instructions are clear, comprehensive and easy to use, and whether the machine configuration requirements are spelled out, and looks for such information as how to load the program, use the keyboard, and restart the activity.

Independence—focuses on how complicated it is for the user to understand the steps needed to progress through the learning activity. It measures to what degree the activity may be done by a user and the computer alone without parent/teacher guidance. Whether the actual reading level of the activity is appropriate for the suggested grade level is another major concern of this rating category.

Rewards—rates the audio-visual rewards as to their motivational effectiveness and appropriateness to the activity.

Graphics—rates the quality of the graphics and whether they enhance or detract from the educational purposes of the activity.

Concept Presentation—focuses on whether the concepts are presented clearly, in logical order and in enough depth for the learner to be able to apply learnings from the activity to other situations.

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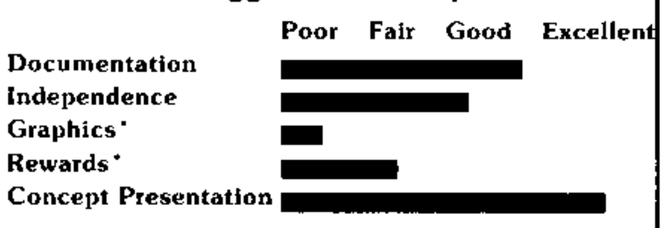
$49.95 suggested retail price



*These categories will be used primarily to evaluate the courseware. Whether or not they should be used to rate the Survey Diskettes is debatable.

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The manual contains 30 pages of text, a glossary, and seven full page figures. It introduces you to the art of flying and leads you, a step at a time, from novice to professional. Learn to take-off, land, navigate, fly instrument approaches, and more. If you get into trouble, you can freeze the action in case you need time to assess your situation. Sound effects add to realism.

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Starprobe . . . from p. 36

its way through one of two narrow openings and then through a geometrically regular maze of Xyolian construction. Along the way it will encounter fuel depots and ammo dumps, then in the lowest part of the cave defensive laser installations that must be destroyed before it can reach the bottom.

You have two types of weapons—QuasiThermite bombs and the SuperBeam. The QT bombs are effective against ammo dumps and fuel depots but have no effect on walls or laser machinery. The S Beam is much more powerful, destroying anything in its path, but uses a great deal of precious fuel and ammo—so use it only when absolutely necessary. Hovering and firing the S Beam use up your supplies, but you can replace your limited fuel and ammo by destroying the Xyolian fuel depots and ammo dumps with the QT bomber. The S Beam completely annihilates, so it can't be used to salvage fuel or ammo. A Pause key allows you to freeze play and also monitor your depth, fuel, and ammo.

Starprobe 99 opens impressively with three-dimensional monolithic title letters. Less impressive are the screen instructions which follow and the screen displays of running score and amounts of fuel and ammo left. These purple letters on a black screen are difficult to read at best. Perhaps this is not a problem on the author's color TV, but for use on a TI monitor, a different color combination would have been more appropriate.

This unpromising feature is more than offset, however, by the colorful renderings of cave and maze featured in the game's successively difficult levels of play. The game starts at an encouraging level for beginners, and the varied obstacles in succeeding levels of play prevent the game's becoming tedious.

The game makes excellent use of vertical scrolling to give the illusion of descent. The graphics and colors are eye-catching, although the self-generating maze close to the "bottom" of the Xyolian cave needs to be more sharply defined. The "play again" routine is swift, for almost continuous play.

We found though, that the starprobe is sometimes slow to respond to the keys. Although the rate of descent (scrolling) is easily controlled via the hover-thrust key, movements to the left or right can seem rather laborious, and at times the slow response results in what seems like an unfair explosion (you lose!) of your starprobe. This is the most frustrating aspect of the game. You find yourself frantically pushing a key while your oblivious probe continues to drift down to crash against a wall or into the path of a Xyolian laser.

And while we're quibbling, we might mention too that ammo dumps and fuel depots seem indistinguishable from one another. A player can't tell if he's restoring his fire capability or his ability to hover. The documentation is not too helpful on this point. At one point it offers the *caveat*, "Part of the enjoyment in a game of this type comes from the gradual discovery of the 'hidden' rules of the game." This may be true of some aspects of the game, but we would have appreciated documentation that explains how we might detect the difference between fuel depots and ammo dumps and some account of what that attractive, self-generating maze encountered at the nethermost depths of the cave might be. The objective, of course, is to go as deep as possible (5,000 M is a decent score), but the unexplained objects encountered along the way leave players feeling rather mystified, and it all seems rather inconclusive.

Despite the rather sketchy documentation and occasional lapses in performance, *Starprobe 99* is engrossing. The graphics are interesting, and the graduated levels of play keep the player at the keyboard. The game is a good example of the triumph of process over product; that is, players get so absorbed in the various levels of play that they don't really mind having only a vague idea of the scenario and ultimate objective.

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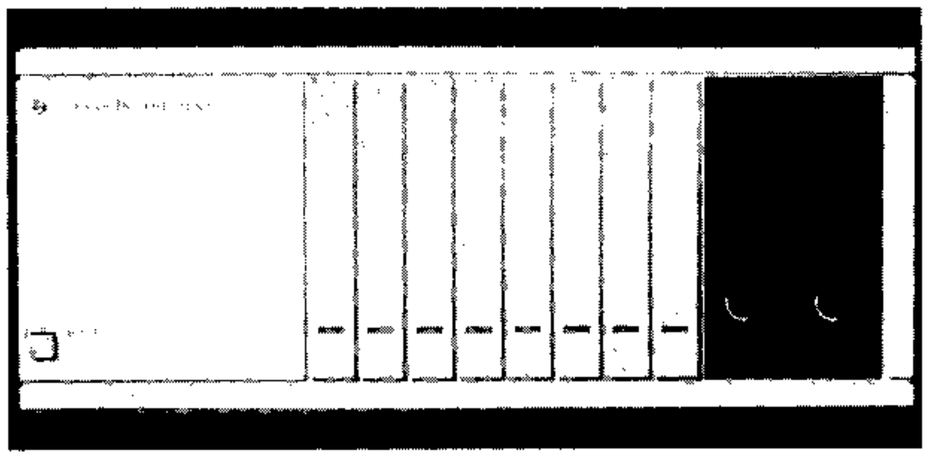

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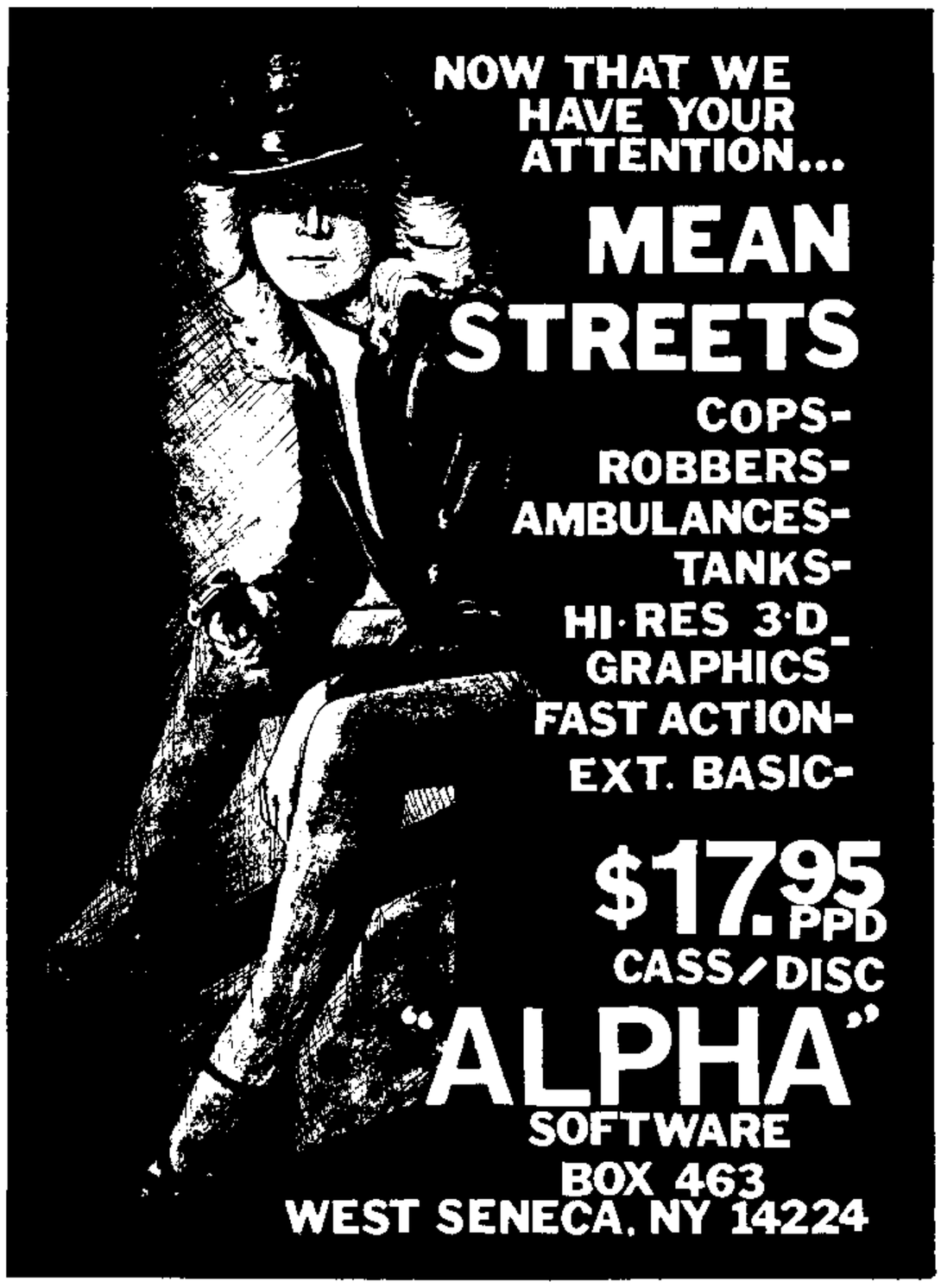

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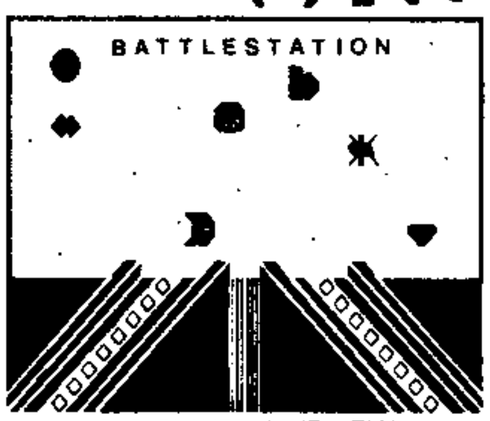

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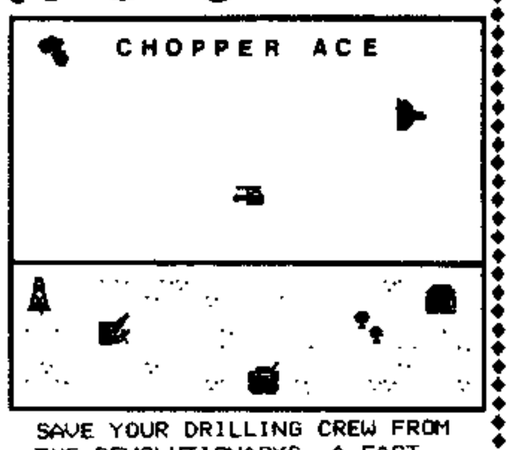

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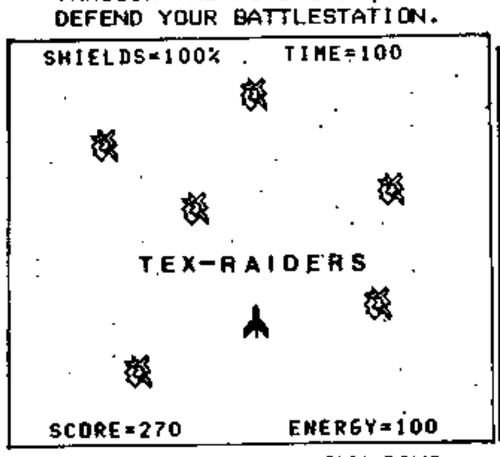

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8215 Clifton Farm Ct., Alexandria, VA 22306

Good day to all of you artists, latent and otherwise! Welcome to the dynascape studio.

A dynascape, as I am sure you are all aware, is a landscape or seascape or cityscape which grows or changes or contains some sort of movement. This month I am pleased to be able to present a short 50-statement dynakit by a renowned dynascape painter, Trompe l'Oeil, along with an explanation. All you will need to complete this kit is your TI-99/4A computer and a color TV or monitor.

Today we are going to create a sunrise, complete with morning twilight and the rising sun. I will present a series of TI BASIC program lines which you can enter as you read along. The sunrise develops a bit at a time, and we will be able to see some of the mechanisms at work after just a few lines. The places where you can run the program and check your progress are marked RUN following the program lines. I will explain the underlying gears and cogs as they are installed; if clockwork interests you, then follow along. Of course, you might enjoy customizing the kit as you go, but if you are simply interested in the panorama, then type in the lines as they appear.

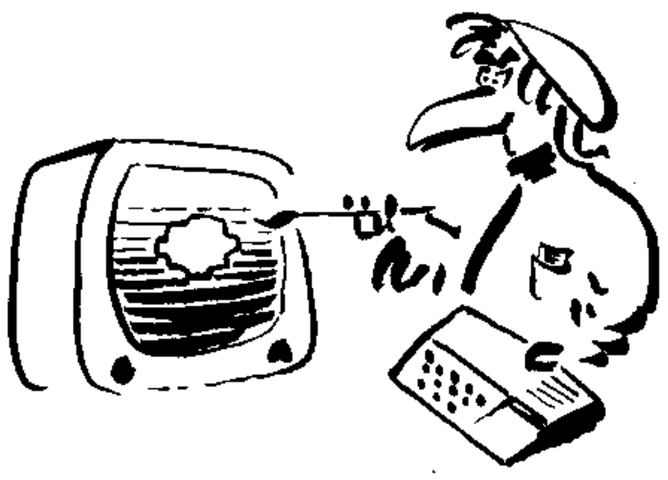
Starlight, Star Bright

We shall begin with the darkness before the dawn. Turn the computer on, select TI BASIC or Extended BASIC if you have that, and enter these lines:

```
150 DATA 32,42
160 READ SKY, STAR
170 CALL CLEAR
180 CALL SCREEN(2)
190 CALL COLOR(1,2,2)
200 CALL COLOR(2,16,2)
250 CALL HCHAR(23,1,SKY,32)
260 CALL HCHAR(23,RND*30+1,
    STAR,1)
270 PRINT :
290 GO TO 250
RUN
```

There you have the starry night scrolling up the screen. Not bad for a mere ten lines, is it? While the stars are rolling past, let us reflect a bit on what we have done and how we are going to proceed.

The dynascape painter's palette is his assignment of foreground and background colors to the 16 character sets; a CALL COLOR statement is the equivalent of squeezing a dab of paint from the tube. The brushstroke styles are the ASCII characters plus the characters reconfigured with the CALL CHAR command. Painting a brushstroke on the screen is done with CALL HCHAR and CALL VCHAR statements.



In the program segment we now have running, we have established color set 1 as all black (statement 190) and set 2 as white on black (statement 200). Lines 150 and 160 give the variable SKY a value in set 2. Conveniently, the * character, number 42, is in set 2. Line 250 paints a streak of black across the bottom of the screen and line 260 puts a star some random place in it. Line 270 scrolls the screen upward. By the bye: We will make lines 150 and 160 do quite a bit of additional work for us before we are through, so if you haven't mastered the EDIT mode for changing statements instead of having to retype them completely, then perhaps this is the time to read over that part of your BASIC manual.

Stop the program now with the CLEAR command [FCTN] [4]. To get the program to move on to the next stage after a modicum of night sky, convert that endless loop into a FOR loop with these statements:

```
240 FOR DARK=1 TO 50
290 NEXT DARK
```

The old line 290 disappears automatically when the new one is entered, and of course you can enter new lines in any order and the computer will ensure that they are placed in numerical order.

Calling All Colors

We would like the black sky to gradually fade to grey—color 15. We'll start with modifications of 150 and 160 and then add a few more lines:

```
150 DATA 32,42,2,3
160 READ SKY,STAR,FGC,CHSET
300 BGC=FGC
310 DATA 15
320 READ FGC
350 CHSET=CHSET+1
380 CALL COLOR(CHSET,FGC,BGC)
```

Line 380 actually adds the dab of color to the palette; in it, FGC and BGC are foreground and background color variables, and CHSET is the character set. We have added initial values of FGC and CHSET to the initial DATA and READ statements, and then we have arranged for the current foreground color to be transferred to the background (line 300) and for a new foreground color to be read (lines 310 and 320). Line 350 bumps the character set number up to the next one.

Now to plan our brushstrokes. We will strive for an Art Deco effect by introducing our next color as a series of horizontal lines across the bottom of the screen, each broader than the last. There are 64 dots, or 'pixels,' in each character the TI-99/4A displays. These picture elements are arranged in eight rows, and the pixels in a given character can be set to show either the foreground or background color by using the CALL CHAR routine. The details are in your language reference manual, but for the moment you only need to know that CALL CHAR(SKY,"00000000 00000000") specifies a solid square of background color and CALL CHAR(SKY, "FFFFFFFFFFFFFFFF") specifies a square of the foreground color. By mixing the F's and 0's we can mix the two. We will mix them two symbols at a time, since two of them correspond to one row of pixels. Here is the code:

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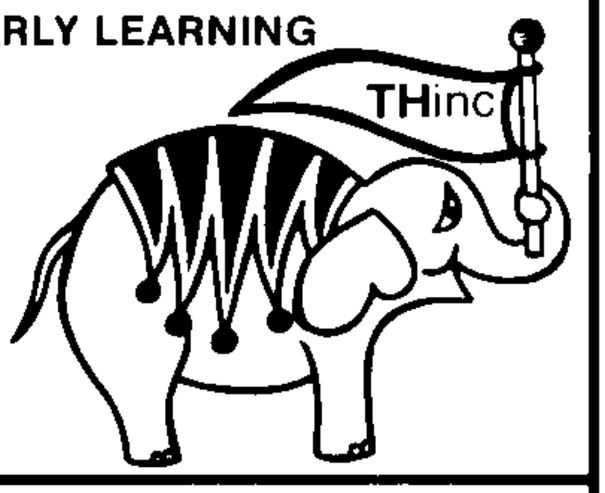

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```
220 FG$="FFFFFFFFFFFFFFFF"
230 BG$="0000000000000000"
410 FOR EIGHTH=1 TO 8
420 PATTERN$=SEG$(FG$,1,2*
    EIGHTH)&SEG$(BG$,1,2*(8-
    EIGHTH))
430 SKY=(CHSET+3)*8+EIGHTH-1
440 CALL CHAR(SKY,PATTERN$)
450 CALL HCHAR(23,1,SKY,32)
540 PRINT :
560 NEXT EIGHTH
RUN
```

That's the ticket, except that the dawn comes more slowly in my neighborhood. We'll fix that later on.

What colors come after grey? I think pink on grey gives a marvelous effect—then deep yellow perhaps, a delicate touch of green, and then the blues. Here are the corresponding color codes, followed by a zero, in our color data line:

```
310 DATA 15,9,11,4,5,6,6,6,6,0
```

The zero signals the end of the string of color codes provided. The following code will take advantage of that signal to become an endless loop on the last color:

```
330 IF FGC<>0 THEN 350
340 GO TO 340
```

Somewhere Over the Rainbow

We would like to be able to put an arbitrary number of colors in data line 310, so let's add a flourish which will enable us to reuse character sets:

```
360 IF CHSET<7 THEN 380
370 CHSET=2
```

And we will need this to complete the loop:

```
570 GO TO 300
RUN
```

You will, I am sure, want to run this several times, adjusting the colors in the data line until the sequence suits you.

Now, how about the sun? We will generate a yellow character set for that, using this dab of paint:

```
210 CALL COLOR(8,11,11)
```

We will also add a bit more to lines 150 and 160 to define the variable SUN as well as several more variables.We will need:

```
150 DATA 32,42,2,3,88,6,0,0,0
160 READ SKY,STAR,FGC,CHSET,
    SUN,SUNRISE,SUNHI,ONN,OFF
```

When the color of the sky first matches the color code in SUNRISE, the sun will begin to rise. Line 390 will make this check; if there is a match, the program sets ONN to 1 in line 400. The clockwork will operate until a sun of size SUNHI appears, and then the value of OFF will be changed from 0 to 1 also, providing the signal for the sunrise mechanism to be ignored thereafter. I have set the SUNRISE signal to be dark blue (6).

```
390 FGC<>SUNRISE THEN 410
400 ONN=1
460 IF OFF+(1-ONN) THEN 540
470 SUNHI=SUNHI+1
480 SWIDE=SUNHI
490 IF SWIDE<5 THEN 510
500 SWIDE=9-SWIDE
510 CALL HCHAR(23,17-SWIDE,
    SUN,2*SWIDE)
520 IF SUNHI<8 THEN 540
530 OFF=1
RUN
```

Here Comes the Sun

There we are—a bit more cubist that I ordinarily prefer, but it'll do.

Now I promised we would adjust the speed a bit. Here is what we will use:

```
280 GOSUB 580
550 GOSUB 580
580 FOR TICK=1 TO 100
590 NEXT TICK
600 RETURN
RUN
```

Adjust the value of the upper limit to line 580 to vary the quickness of the day. Voila! The dynascape kit is complete. There is an entire listing following this article. Next time you visit the studio we'll see what dramatic additions we can make when we write this in Extended BASIC. Of course, no masterpiece (or program) is ever complete while the artist is still alive; you can continue to touch this up when the fancy strikes for as long as you live . . . So key in, and rise and shine. It's a good day for programming!

```
100 REM  **********************
110 REM  *  POCKET SUNRISE     *
120 REM  *     BY S.T.HOLL     *
130 REM  **********************
140 REM  99'ER VERSION 2.10.1
150 DATA 32,42,2,3,88,6,0,0,0
160 READ SKY,STAR,FGC,CHSET,SUN,SU
    NRISE,SUNHI,ONN,OFF
170 CALL CLEAR
180 CALL SCREEN(2)
190 CALL COLOR(1,2,2)
200 CALL COLOR(2,16,2)
210 CALL COLOR(8,11,11)
220 FG$="FFFFFFFFFFFFFFFF"
230 BG$="0000000000000000"
240 FOR DARK=1 TO 50
250 CALL HCHAR(23,1,SKY,32)
260 CALL HCHAR(23,RND*30+1,STAR,1)
270 PRINT :
280 GOSUB 580
290 NEXT DARK
300 BGC=FGC
310 DATA 15,9,11,4,5,6,6,6,6,0
320 READ FGC
330 IF FGC<>0 THEN 350
340 GO TO 340
350 CHSET=CHSET+1
360 IF CHSET<7 THEN 380
370 CHSET=2
380 CALL COLOR(CHSET,FGC,BGC)
390 IF FGC<>SUNRISE THEN 410
400 ONN=1
410 FOR EIGHTH=1 TO 8
420 PATTERN$=SEG$(FG$,1,2*EIGHTH)&
    SEG$(BG$,1,2*(8-EIGHTH))
430 SKY=(CHSET+3)*8+EIGHTH-1
440 CALL CHAR(SKY,PATTERN$)
450 CALL HCHAR(23,1,SKY,32)
460 IF OFF+(1-ONN)THEN 540
470 SUNHI=SUNHI+1
480 SWIDE=SUNHI
490 IF SWIDE<5 THEN 510
500 SWIDE=9-SWIDE
510 CALL HCHAR(23,17-SWIDE,SUN,2*S
    WIDE)
520 IF SUNHI<8 THEN 540
530 OFF=1
540 PRINT :
550 GOSUB 580
560 NEXT EIGHTH
570 GO TO 300
580 FOR TICK=1 TO 100
590 NEXT TICK
600 RETURN
```

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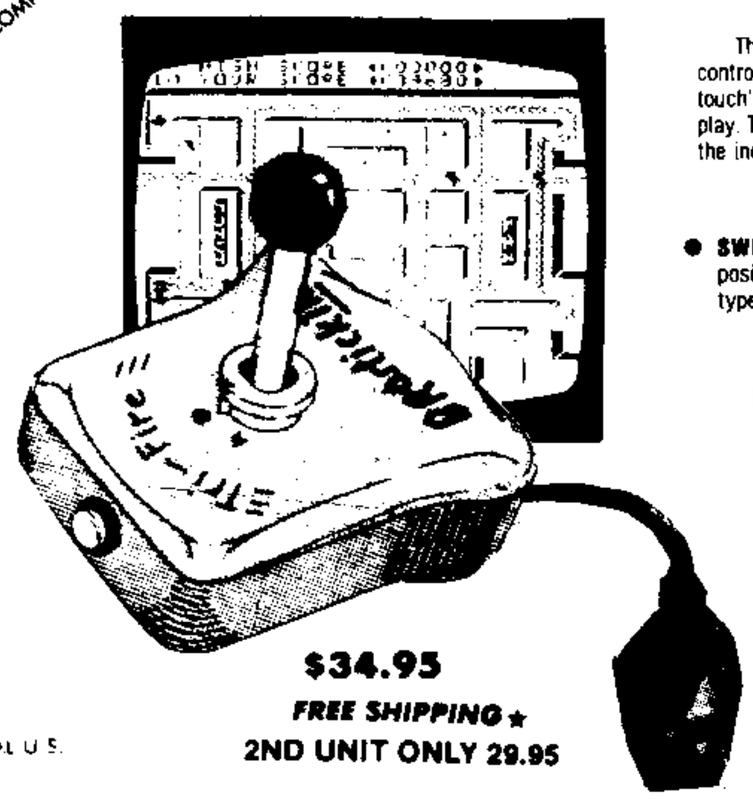

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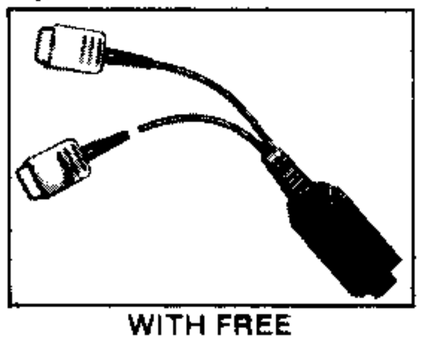

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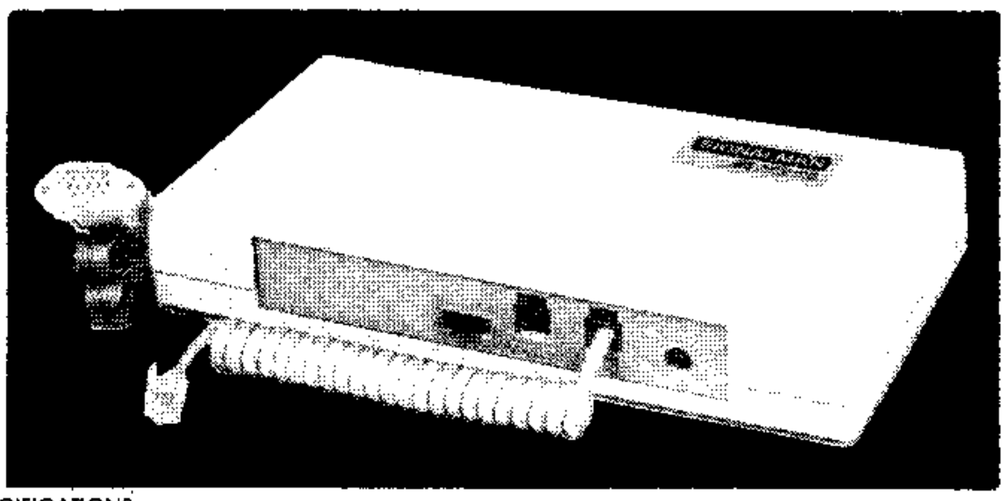

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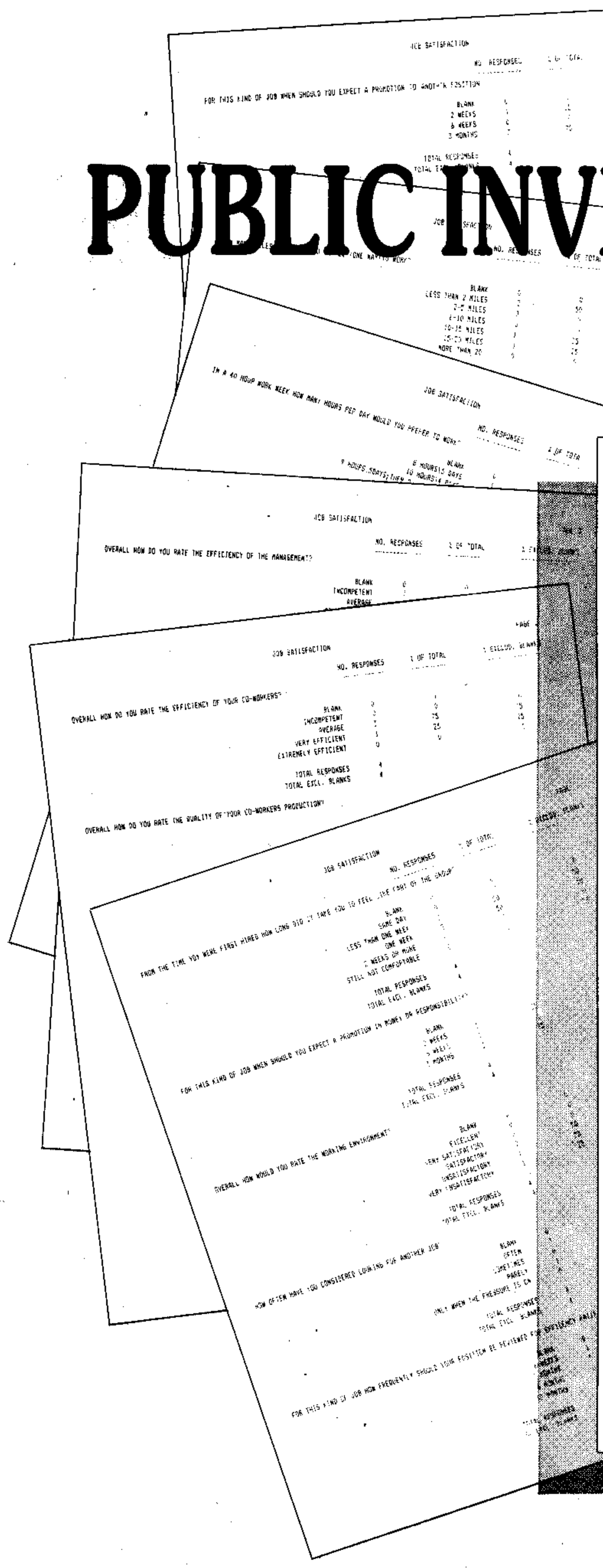

It can be difficult, if not impossible, for administrators of large institutions to keep in touch with the people they are trying to serve. The chancellor of a large university may never speak with an undergraduate. The police commissioner doesn't have time to chat with the cop on the beat. To remedy this situation, the large hospital where I work has taken steps to keep in touch with the needs of its patients. We use written questionnaires to routinely survey the attitudes of patients toward the quality of service they receive from the staff. In this article we will look at some strategies for developing these questionnaires and methods for tallying and evaluating the results.

The questionnaire in Figure 1 is similar to one used in the hospital's Optometry Department. Hand-tallying a set of 200 to 300 questions can be very tedious, so when we purchased a microcomputer, I developed the program listed here for computer tallying of questionnaires.

Because the questionnaires used in the hospital vary from one department to another, the format had to be fairly general. So it should be possible for almost any business or organization to use the listings as they are. The format is compatible with either disk- or cassette-based systems (I had a disk system at work, but most of the writing was done on my home system with cassette only). Considerable effort was made to make cassette storage as efficient as possible.

The first step was designing the questionnaire. This program permits only one answer per question. Answers should be indicated by checking a box, circling a number, or any other method that produces a single defined answer. Each answer is assigned a number, which is printed on the questionnaire form. When tallying the questionnaire on the computer, the operator enters the number of the answer indicated by the respondent.

Since people have a habit of not following directions, decide what you'll do if someone checks two or more answers to one question. One alternative is to assign priorities to the answers, arrange them in order of decreasing or increasing priority, and then enter either the first or the last one checked. Or you could choose to count that question as a blank answer (the option we used).

The program presents a menu with four options: setting up and storing the questionnaire, entering and storing the responses, printing the results, and exiting the program. The three activity options may be done all at the same time or separately, but they must be done in sequence.

Selecting the first option and following the input prompts, the operator enters the questionnaire title, questions and answers. (Note that if any of these contain commas, they must be enclosed in quotation marks to avoid an entry error message.)

The computer prompts the operator with each question, and the operator enters the number of the answer checked on the form. The computer checks to see if it's a valid answer number for that question and beeps if there is an error. If the answer was left blank when something should have been checked, or if the operator cannot tell which answer is indicated, he/she enters a zero (0). On the printed reports these will be tallied as BLANK answers. For some questions, such as question #8 in Figure 1, the answer is supposed to be left blank. For these the operator enters 111 to "skip" that question, and no answer will be tallied. If an answer is designed to terminate the questionnaire in the middle (such as a no response to question #5), the operator enters 999 for the answer to the next question, and the program will skip all the remaining questions for that form.

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1. From the time you first contacted us for this appointment how long did you have to wait for an appointment time?

Same Day	1 day	2 days	3 days	4 days	5 days	6 days	1 week
1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐	7 ☐	8 ☐

2 weeks	3 weeks	4 weeks	5 weeks	6 weeks	7 weeks	8 weeks	Over 8 weeks
9 ☐	10 ☐	11 ☐	12 ☐	13 ☐	14 ☐	15 ☐	16 ☐

2. For this kind of visit, what do you think is the longest time you should wait for an appointment?

Same Day	1 day	2 days	3 days	4 days	5 days	6 days	1 week
1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐	7 ☐	8 ☐

2 weeks	3 weeks	4 weeks	5 weeks	6 weeks	7 weeks	8 weeks	Over 8 weeks
9 ☐	10 ☐	11 ☐	12 ☐	13 ☐	14 ☐	15 ☐	16 ☐

OVERALL, how would you rate the service you received during the visit, by:

	Excellent	Very Satisfactory	Satisfactory	Unsatisfactory	Very Unsatisfactory
3. Receptionist	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
4. Optometrist	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐

5. Did you visit our Optical Dispensing Department?

1 ☐ No 2 ☐ Yes

Please answer the following questions only if you visited our Optical Dispensing Department.

6. The selection of frames was:

Very Good	Good	Fair	Poor	Very Poor
1 ☐	2 ☐	3 ☐	4 ☐	5 ☐

7. Did you feel the prices for frames were:

Very Reasonable	Reasonable	About Right	Somewhat High	Much Too High
1 ☐	2 ☐	3 ☐	4 ☐	5 ☐

8. If you purchased glasses, did the delivery time seem:

Very Fast	Fast	About Right	Slow	Very Slow
1 ☐	2 ☐	3 ☐	4 ☐	5 ☐

9. OVERALL, how would you rate the service you received from Optical Dispensing?

Excellent	Very Satisfactory	Satisfactory	Unsatisfactory	Very Unsatisfactory
1 ☐	2 ☐	3 ☐	4 ☐	5 ☐

Figure 1

Tallying Responses

Note that as the responses are entered, the program converts the numbers to letters (0 becomes A, 1 = B, etc., and skipped questions = @). This produces a compact string that can be stored efficiently even on cassette. For example, the questionnaire in Figure 1, with 9 questions, will be stored with 19 forms per record. After all the answers to a form are entered, the operator is given a chance to correct any entry errors. When the answers have been accepted, a prompt line asks if there are more forms to be tallied. Since 99% of the time the operator

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will want to accept the answers without correction and go on to tally more questionnaires, the program accepts a null entry (pressing the space bar only) as well as Y to indicate yes for these two prompts. Periodically, the computer stores the answers to disk or cassette; this reduces the load on RAM memory, and it is valuable to have the answers stored in case you want to do other types of analysis later on.

If you want to count multiple answers to one question, you can use the 999 and answer correction options. Tally one answer as usual. When the computer asks for answers to the next questionnaire, enter 999 as the answer to the first question. When asked to accept the answers, type N for no, and enter the number of the question with multiple answers. Then enter the number of the next multiple answer.

Last is the print section. If it has already been entered in a previous session, the questionnaire is loaded in from disk or cassette first. (If the questionnaire was loaded in during the response entry, it must be loaded again.) Then the response file is read and tallied, and finally the results are printed out. By adding one or two program lines, specific "profiles" can be printed. For example, to analyze how persons who responded "Unsatisfactory" or "Very Unsatisfatory" to question #9 answered other questions, add this line:

```
1365 IF SEG$(R$(J),9,1)<"E"THEN 1400
```

Now the printed tally will include only people who answered "Unsatisfactory" or "Very Unsatisfactory" to question #9.

After the tally summary is printed, the operator may select any two questions for a cross-tabulation. (This is one of the most tedious tasks in manual tallies.) For example, suppose you are interested in knowing how many people had to wait longer for an appointment than they considered reasonable. This can be determined by cross-tabulating questions 1 and 2. Any number of cross-tabulations may be done, but the computer will have to reread the response file each time. It took less than five minutes to read a total of 250 responses to the questionnaire in Figure 1 from cassette files.

How large a questionnaire the program can handle depends on how many questions and answers there are. The longest I've done with my 16K RAM questionnaire had 19 questions and 122 answers. Since the computer holds only a few responses in memory at a time, it can handle almost any number of responses.

The print format is designed for 132 columns (14 inches at 10 CPI, 8½ inches at 16.5 CPI), with 66 lines per page. You may reduce the width to 80 columns by changing the TAB ()'s in lines 1720 and 1750 to 60 and 65, respectively; abbreviating the column headings and/or eliminating one of the percentage columns, and changing the appropriate tabs set by variable Y.

Array DIMensions are set as follows:

- N(X) = number of answers per question; X equals number of questions
- Q$(X) = questions; X = number of questions
- A$(X) = answers; X = total number of answers in questionnaire + 3
- R$(X) = responses; X = integer of 190/(number of questions + 1)
- R(X,Y) = tally; X = larger value of number of questions or the largest number of answers to one question + 2; Y = largest number of answers to one question + 2 (the program adds two answers to each question for "skipped" and "blank" answers).

I discovered an interesting bug in TI BASIC. You cannot use a DEFined variable to assign subscripts to data read from files. The logical way to program lines 490 and 500 is:

```
490 FOR J=1 TO B STEP 3
500 INPUT #2:A$(V),A$(V+1),A$(V+2)
```

Defined variable V assigns the correct value, but the strings are all read as null.

The questionnaire can be modified to query customers and employees, to carry out scientific surveys, perform tests, or gather statistics in virtually any setting. It is the perfect vehicle for fast and efficient "mass feedback." And as the number of participants grows, your survey becomes more and more accurate. So the large business, institution, school, or hospital need no longer be synonymous with the impersonal one.

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Public Investigator
Explanation of the Program

Line Nos.	
100-210	Program header and initialize.
220-270	Menu.
280-730	Set up questionnaire.
290-430	Enter title, number of questions, questions, number of answers, answers.
440-620	Proof/correct entries
630-730	Store questionnaire to file
740-1280	Enter responses
740-780	Read questonnaire file if necessary
790-820	Open file to store responses
830-950	Enter responses and edit
960-990	Skip to end of questionnaire
970	Skip one question
980-990	Convert number to letter and add to string
1000-1130	Accept/correct entries
1140-1150	Store response string to pending print file
1160-1190	Check for more forms
1200-1210	Print resonses to file
1220-1280	Set end of file flag; return to menu
1290-2250	Print report
1300-1360	Read questionnaire file, if necessary
1370-1390	Read response file
1400-1480	Tally response
1490-1520	Initialize print section
1530-1890	Print tabular summary report
1900-1960	Print cross-tabulations
1970-2430	Sub-routines
2440-2510	Print page headings
2520-2600	Compute percentages, print numbers
2610-2670	Read questionnaire file
2680-2730	Read response file
2740-2800	Set array = 0
2810-2840	Entry error warning
2850-2870	Open print file
2880	End program

```
100 REM **********************
110 REM *  QUESTIONNAIRE     *
120 REM *         BY         *
130 REM * DAVID M. DOUGLAS *
140 REM **********************
150 REM 99'ER VERSION 2.10.1
160 REM 3/16/83
170 OPTION BASE 1
180 DIM N(20),Q$(20),A$(160),R$(70
    ),R(20,20)
190 DEF U=INT(190/(Q+1))
200 DEF V=A+J
210 CALL CLEAR
220 PRINT "*** QUESTIONNAIRE TALLY
     ***": :
230 PRINT "1 SETUP QUESTIONNAIRE":
     :"2 ENTER RESPONSES": :"3 PRI
    NT REPORT": :"4 EXIT": :
240 INPUT "ENTER CHOICE (1-4):":Z
250 IF Z>4 THEN 240
260 CALL CLEAR
270 ON Z GOTO 290,750,1300,2880
280 REM SETUP
290 PRINT "ENCLOSE QUESTIONS, ANSW
    ERS &TITLES WITH COMMAS IN QUO
    TES": :
300 INPUT "TITLE:":T$
310 INPUT "NO. OF QUESTIONS:":Q
320 A=0
330 FOR I=1 TO Q
340 PRINT :"ENTER QUEST. #";I
350 INPUT "":Q$(I)
360 INPUT "ENTER NO. ANSWERS: ":N(
    I)
370 PRINT "ENTER ANSWERS:"
380 FOR J=1 TO N(I)
390 INPUT A$(V)
400 IF LEN(A$(V))<64 THEN 430
410 PRINT :"LINE TOO LONG. REENTER
    .": :
420 GOTO 390
430 NEXT J
440 CALL CLEAR
450 PRINT Q$(I)
460 FOR J=1 TO N(I)
470 PRINT "#";J;A$(V)
480 NEXT J
490 INPUT "1=CHANGE QUESTION, 2=CH
    ANGE ANSWER, 3=CORRECT:":Z
500 IF Z>3 THEN 490
510 ON Z GOTO 580,520,610
520 INPUT "CHANGE ANSWER #:":J
530 IF J>N(I)THEN 520
540 INPUT "NEW ANSWER:":A$(V)
550 IF LEN(A$(V))<64 THEN 440
560 PRINT :"LINE TOO LONG. REENTER
    .": :
570 GOTO 540
580 PRINT :"REENTER QUESTION:"
590 INPUT "":Q$(I)
600 GOTO 440
610 A=A+N(I)
620 NEXT I
630 INPUT "ENTER FILENAME TO STORE
     QUESTIONNAIRE:":Z$
640 OPEN #1:Z$,INTERNAL,OUTPUT,FIX
    ED 192
650 PRINT #1:T$,Q,A
660 FOR I=1 TO Q
670 PRINT #1:Q$(I),N(I)
680 NEXT I
690 FOR I=1 TO A STEP 3
700 PRINT #1:A$(I),A$(I+1),A$(I+2)
710 NEXT I
720 CLOSE #1
730 GOTO 210
```

Continued on p. 90

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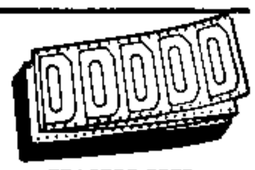

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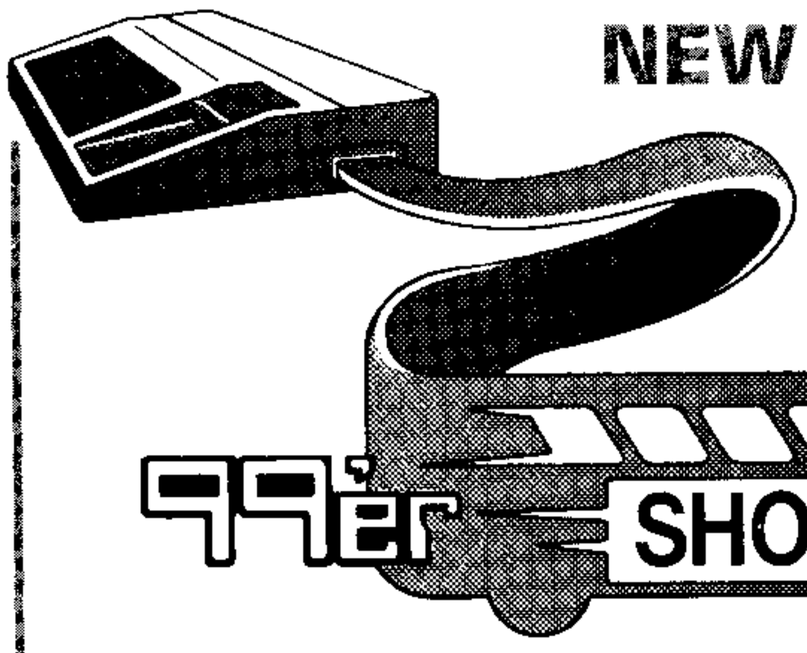
Investigator . . . from p. 89

```
 740 REM ENTER RESPONSES
 750 INPUT "ENTER QUESTIONNAIRE FIL
     ENAME(IF ALREADY IN MEMORY PRE
     SS ENTER ONLY):":F$
 760 IF F$="" THEN 790
 770 GOSUB 2620
 780 CLOSE #1
 790 INPUT "ENTER FILENAME TO STORE
      RE- SPONSES:":F$
 800 OPEN #4:F$,INTERNAL,OUTPUT,FIX
     ED 192
 810 CALL CLEAR
 820 PRINT T$: :
 830 FOR J=1 TO U
 840 PRINT "ENTER RESPONSES:"
 850 FOR I=1 TO Q
 860 PRINT :Q$(I);
 870 INPUT "":Z
 880 IF Z=999 THEN 930
 890 IF Z=111 THEN 970
 900 IF Z<=N(I)THEN 980
 910 GOSUB 2820
 920 GOTO 860
 930 FOR I=1 TO Q
 940 P$=P$&"@"
 950 NEXT J
 960 GOTO 1000
 970 Z=-1
 980 P$=P$&CHR$(Z+65)
 990 NEXT I
1000 INPUT "ACCEPT ANSWERS (Y/N)?":
     Z$
1010 IF (Z$="")+(Z$="Y")THEN 1140
1020 IF Z$<>"N" THEN 1000
1030 INPUT "CHANGE ANSWER TO QUEST.
      #:":Z
1040 IF Z>Q THEN 1030
1050 PRINT :Q$(Z);
1060 INPUT "":Y
1070 IF Y=111 THEN 1110
1080 IF Y<=N(Z)THEN 1120
1090 GOSUB 2820
1100 GOTO 1050
1110 Y=-1
1120 P$=SEG$(P$,1,Z-1)&CHR$(Y+65)&S
     EG$(P$,Z+1,Q)
1130 GOTO 1000
1140 PRINT #4:P$,
1150 P$=""
1160 INPUT "MORE QUESTIONNAIRES (Y
     /N)?":Z$
1170 IF Z$="N" THEN 1230
1180 IF (Z$<>"")*(Z$<>"Y")THEN 1160
1190 NEXT J
1200 PRINT #4:""
1210 GOTO 830
1220 J=0
1230 IF J=U THEN 1220
1240 FOR J=J+1 TO U
1250 PRINT #4:"9",
1260 NEXT J
1270 CLOSE #4
1280 GOTO 210
1290 REM PRINT REPORT
1300 INPUT "ENTER QUESTIONNAIRE FIL
     ENAME(IF ALREADY IN MEMORY PRE
     SS ENTER ONLY):":F$
1310 IF F$="" THEN 1370
1320 GOSUB 2620
1330 FOR I=1 TO A STEP 3
1340 INPUT #1:A$(I),A$(I+1),A$(I+2)
1350 NEXT I
1360 CLOSE #1
1370 INPUT "ENTER FILENAME OF RESPO
     NSES:":F$
1380 OPEN #2:F$,INTERNAL,INPUT ,FIX
     ED 192
1390 GOSUB 2690
1400 FOR J=1 TO U
1410 IF R$(J)="9" THEN 1480
1420 FOR I=1 TO Q
1430 X=ASC(SEG$(R$(J),I,1))-63
1440 R(I,X)=R(I,X)+1
1450 NEXT I
1460 NEXT J
1470 GOTO 1390
1480 CLOSE #2
1490 GOSUB 2860
1500 L=66
1510 P=0
1520 A=0
1530 FOR I=1 TO Q
1540 IF L+N(I)+6<65 THEN 1570
1550 GOSUB 2450
1560 GOSUB 2480
1570 S=0
1580 FOR J=3 TO N(I)+2
1590 S=S+R(I,J)
1600 NEXT J
1610 T=S+R(I,2)
1620 PRINT #7: :Q$(I): :TAB(70);"BL
     ANK";
1630 FOR J=0 TO N(I)
1640 IF J=0 THEN 1660
1650 PRINT #7:TAB(75-LEN(A$(V)));A$
     (V);
1660 Z=R(I,J+2)
1670 Y=84
1680 GOSUB 2560
1690 X=T
1700 Y=101
1710 GOSUB 2540
1720 IF J=0 THEN 1760
1730 X=S
1740 Y=124
1750 GOSUB 2540
1760 PRINT #7
1770 NEXT J
1780 PRINT #7: :TAB(60);"TOTAL RESP
     ONSES";
1790 Y=84
1800 Z=T
1810 GOSUB 2560
1820 PRINT #7: :TAB(57);"TOTAL EXCL
     . BLANKS";
1830 Z=S
1840 GOSUB 2560
1850 PRINT #7: :
1860 L=L+N(I)+8
1870 A=A+N(I)
1880 NEXT I
1890 CLOSE #7
1900 GOSUB 2750
1910 INPUT "CROSS-TAB 2 QUESTIONS (
     Y/N)?":Z$
1920 IF Z$="N" THEN 210
1930 IF Z$<>"Y" THEN 1910
```

Continued on p. 92



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ALPHACOM SLASHES PRICES

Alphacom has reduced the price of the Alphacom 42--its 40-column thermal printer with graphics capabilities--from $179.95 to a suggested retail price of $119.95, a decrease of $60.00.

Alphacom has also introduced for September shipment a new 80-column printer with graphics capabilities, the Alphacom 81. It carries a suggested retail price of $169.95. Like the Alphacom 42, the Alphacom 81 features upper and lower case letters, a wrap-around facility (for text longer than 80 columns), and an ability to recognize standard ASCII control or "action" codes for changing the printing modes. Codes include carriage return, line and multi-line feed, right justification, form feed, and graphics control.

For further information, contact the Consumer Sales Department, Alphacom, Inc., 2323 South Bascom Avenue, Campbell, CA 95008. (408) 559-8000.

CP/M PROCESSOR

A new CP/M processor from Morning Star Software will open up many CP/M-based applications possibilities for TI-99/4A users. The CP/M processor contains a 5 MHz 8085 CPU and works with the 99/4A 16-bit TI 9900 CPU. No alterations are needed; the CP/M processor slips into the expansion box. The processor comes with 64K RAM built-in, plus an 8K operating system. For more information contact Morning Star Software, 4325 109th Avenue, Beaverton, OR 97005. (503) 646-4695 or 1-800-824-2412.

X-BASIC BOOSTER

Computertronics has announced the realease of a series of new programs for the 99/4A. A program called E-Z-DO XBASE will be the flagship offering.

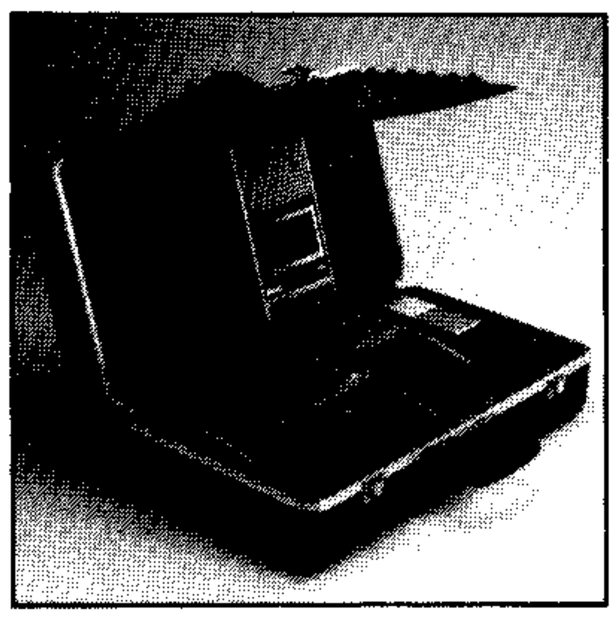
This program allows for the easy use of Extended BASIC for graphics displays, animations, slow-paced games and other programs. E Z-DO XBASE uses 26 statements and 10 commands that are easy to understand. A statement is entered with an auto numbering feature, then all data is screen prompted with no required punctuation syntax. The data is then stored in a compiled listing to stretch the user memory. The program boasts prudent use of defined variables, 8 defined shape designs (3 can be redefined by user), 8 user-designed sprites, and full use of color. Three Demo programs accompany the package.

Users need only the TI-99/4A console, Extended BASIC Cartridge, cassette recorder and joysticks. The program is available on cassette for $19.95 from Computertronics, P.O. Box 15823, Plantation, FL 33318.

CARRYING CASE FOR THE TI-99/4A

H/S Enterprises has designed a hard carrying case for the TI-99/4A that fits easily under an airline seat, yet carries everything most users need when away from home or office. The only items not accommodated are the CRT monitor and memory expansion accessories.

Space utilization is optimal in both the upper and lower compartments of the case, yet all equipment is well-cushioned and readily available. The lower compartment stores the console, speech synthesizer and A/C adapter. The upper case nicely handles a TV modulator, two joysticks, either 14 Command Cartridges/cassette tapes, or a cassette recorder and 7 Command Cartridges/cassette tapes. Cables and books are not forgotten either - they fit nicely in the custom well beneath the console.



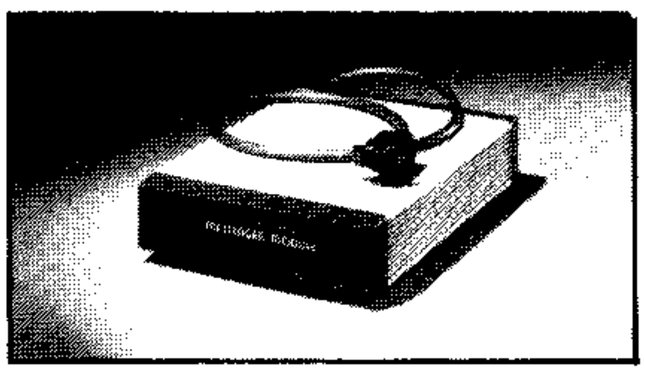
The price, $59.95, includes shipping and handling charges inside the continental U.S. (Add $10.00 for foreign shipping and handling.) For more information contact H/S Enterprises, P.O. Box 128, Suffern, New York 10901, (914) 368-1374.

SCOTT, FORESMAN RELEASES *PROBE*

Scott, Foresman and Company, has announced a new *PROBE* series of educational programs in BASIC. Each *PROBE* package contains a student workbook, instructor's edition, diskettes, wall charts, and screen grids. The *PROBE* series for the TI-99/4A will include packages for Primary, Intermediate, and Junior High levels of study. They will cover a wide range of topics in reading and mathematics and will use tutorial, gaming, drill, and practice and simulation modes of computer-assisted instruction. These programs will use the computer fully--incorporating color, graphics, music, sound, and animation. For those who prefer a complete game format, the Scott, Foresman *Mathematics Action Game Series* is available. For further information contact Scott, Foresman and Company, 1900 East Lake Avenue, Glenview, IL 60025, (312) 729-3000.

FOLLK OFFERS SERVICES

FOLLK (Friends of LISP/LOGO & Kids) a non-profit membership organization promoting the use of microcomputers as independent educational alternatives, is dedicated to bringing "languages for learning" such as LOGO and LISP (and other powerful ideas developed in the Artificial Intelligence field) to people of all ages, interests, and levels of computer expertise. Their projects and services include the FOLLK-Lore newsletter, monthly FOLLK-Meets, curriculum advising for educators, the FOLLK-Net Bulletin Board system, group and individual workshops in LISP and LOGO, and the FOLLK-Flash Hotline Service. For more information, contact FOLLK at 254 Laguna Honda Boulevard, San Francisco CA 94116, (415) 753-6555.

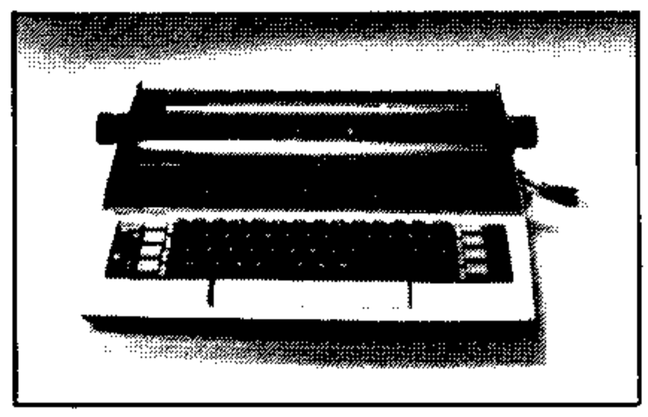


TYPEWRITER-PRINTERS

The Smith-Corona Group of SCM Corporation has introduced electronic portable typewriters that can double as computer printers with the simple plug-in addition of their optional Messenger Module, or which can be mechanically adapted by authorized Smith-Corona dealers (Memory Correct III). The Memory Correct III Messenger retails for $599; the Citation III Messenger's suggested retail price is $575. The suggested retail cost for the optional Messenger Module (to be available this fall) is $170. The Memory Correct III bears a suggested retail price of $499.

Additionally, Smith-Corona has introduced a printer compatible with most home and small business computers. The TP-II features RS232 Serial and Centronics Parallel interface ports and can print out computer program listings with an ASCII 10/12 pitch printwheel. The suggested retail price for the TP-II is $895.

For more information contact Smith-Corona, 65 Locust Avenue, New Canaan, CT 06840, (203) 972-1471.



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Investigator . . . from p. 90

```
1940 INPUT "WHICH QUESTIONS (E.G. 5
     ,9): ";C,B
1950 IF (C>Q)+(B>Q)+(C>=B)THEN 1940
1960 OPEN #2:F$,INTERNAL,INPUT ,FIX
     ED 192
1970 GOSUB 2690
1980 FOR J=1 TO U
1990 IF R$(J)="9" THEN 2050
2000 Y=ASC(SEG$(R$(J),C,1))-63
2010 X=ASC(SEG$(R$(J),B,1))-63
2020 R(X,Y)=R(X,Y)+1
2030 NEXT J
2040 GOTO 1970
2050 CLOSE #2
2060 GOSUB 2860
2070 GOSUB 2450
2080 PRINT #7:"CROSS-TABULATION FOR
     :";TAB(5);Q$(C):TAB(5);Q$(B):
     :
2090 FOR I=1 TO N(C)+1
2100 PRINT #7:TAB(6*I);CHR$(64+I);
2110 NEXT I
2120 PRINT #7
2130 FOR I=2 TO N(B)+2
2140 Z=I-1
2150 Y=3
2160 GOSUB 2560
2170 FOR J=2 TO N(C)+2
2180 Y=6*(J-1)+2
2190 Z=R(I,J)
2200 GOSUB 2560
2210 NEXT J
2220 PRINT #7
2230 NEXT I
2240 GOSUB 2750
2250 A=0
2260 FOR I=1 TO C-1
2270 A=A+N(I)
2280 NEXT I
2290 PRINT #7: :"KEY:": :Q$(C):"
      A = BLANK"
2300 FOR J=1 TO N(C)
2310 PRINT #7:TAB(5);CHR$(65+J);" =
     ";A$(V)
2320 NEXT J
2330 FOR I=C TO B-1
2340 A=A+N(I)
2350 NEXT I
2360 PRINT #7: :Q$(B):"     1 = BLAN
     K"
2370 FOR J=1 TO N(B)
2380 Y=6
2390 Z=J+1
2400 GOSUB 2560
2410 PRINT #7:" = ";A$(V)
2420 NEXT J
2430 GOTO 1890
2440 REM PAGE HEAD
2450 P=P+1
2460 PRINT #7:CHR$(12):TAB((132-LEN
     (T$))/2);T$;TAB(125);"PAGE";P:
      :
2470 RETURN
2480 PRINT #7:TAB(75);"NO. RESPONSE
     S";TAB(95);"% OF TOTAL";TAB(11
     5);"% EXCLUD. BLANKS"
2490 PRINT #7:TAB(75);"----------
     -";TAB(95);"----------";TAB(11
     5);"----------";
2500 L=4
2510 RETURN
2520 REM COMPUTE %
2530 X=1
2540 IF X=0 THEN 2530
2550 Z=INT(R(I,J+2)*1000/X+.5)/10
2560 IF POS(STR$(Z),".",1)THEN 2590
2570 PRINT #7:TAB(Y-LEN(STR$(Z)));S
     TR$(Z);
2580 RETURN
2590 PRINT #7:TAB(Y+1-POS(STR$(Z),"
     .",1));STR$(Z);
2600 RETURN
2610 REM READ Q FILE
2620 OPEN #1:F$,INTERNAL,INPUT ,FIX
     ED 192
2630 INPUT #1:T$,Q,A
2640 FOR I=1 TO Q
2650 INPUT #1:Q$(I),N(I)
2660 NEXT I
2670 RETURN
2680 REM READ RESPONSE FILE
2690 FOR J=1 TO U
2700 INPUT #2:R$(J),
2710 NEXT J
2720 INPUT #2:Z$
2730 RETURN
2740 REM ARRAY=0
2750 FOR I=1 TO 20
2760 FOR J=1 TO 20
2770 R(I,J)=0
2780 NEXT J
2790 NEXT I
2800 RETURN
2810 REM ERROR
2820 CALL SOUND(200,110,0)
2830 PRINT :"INVALID ENTRY. REENTER
     .": :
2840 RETURN
2850 REM OPEN PRINTER
2860 OPEN #7:"RS232.BA=1200",VARIAB
     LE 132
2870 RETURN
2880 END
```

Purl Two . . . from p. 11

strongly as the program sales. Keil is currently planning a line of children's patterns to be on the market by this summer. Her only problem, she says, is finding more hours in the day to adapt her present programs to all home computers so that she can be free to produce new patterns.

The women agree that the meeting of their respective businesses has been an inspiring and creative experience for them. They look forward to continued success in the knitting pattern market, for they both agree that their only limit is the time that it takes to produce each inventive computer knitting program.

Continued on p. 94

Paneled Skirt Pattern A-Line
Explanation of the Program

Line Nos.	
100-190	Rems.
200-300	Title screen.
310-420	Print special information.
430-440	Input measurements and initialize variables.
450-570	Stitch summary.
580-690	Row summary.
700-960	Skirt shaping.
970-1110	Finishing.
1120-1270	Waist band.
1280-1400	Option to run again.
1410-1550	Error message.
1560	End.
1570-1600	Spacing lines
1610-1820	Finishing.
1830-1930	Hem.
1940-2180	Routine to initialize variables.
2190-2230	Variables for drape.
2240-2280	Variables for hem to hip decreases.
2290-2330	Variables for hip to waist decreases.
2340-2400	Special note for no decreases.
2410-2560	Parallelogram shape.
2570-2770	Routine for part row knitting.
2780-3030	Fashion drape for back.
3040-3360	Input measurements.
3370-3420	Clear screen and print header.
3430-3450	End the screen.
3460-3500	Pause and wait for key to be pressed.

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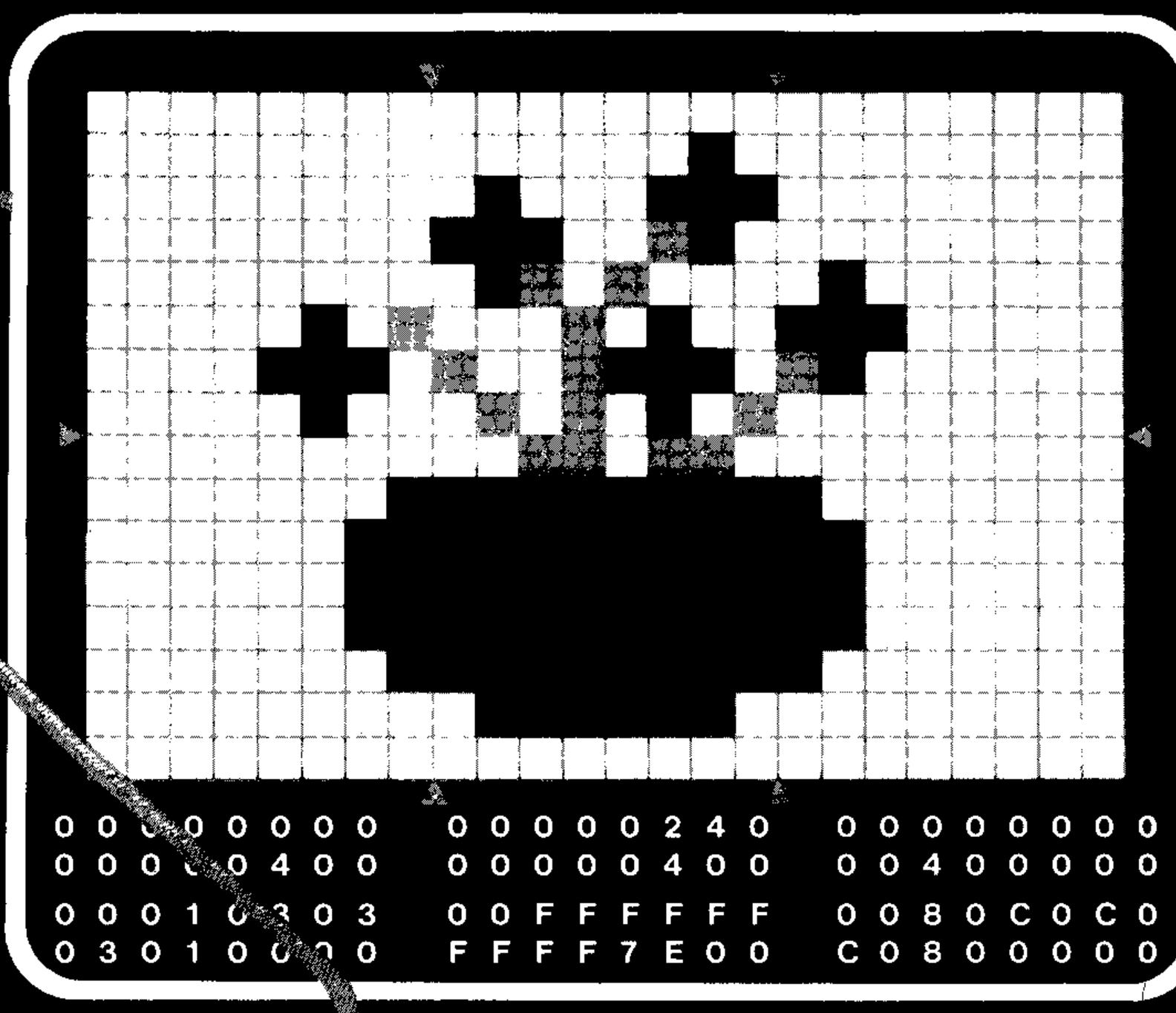

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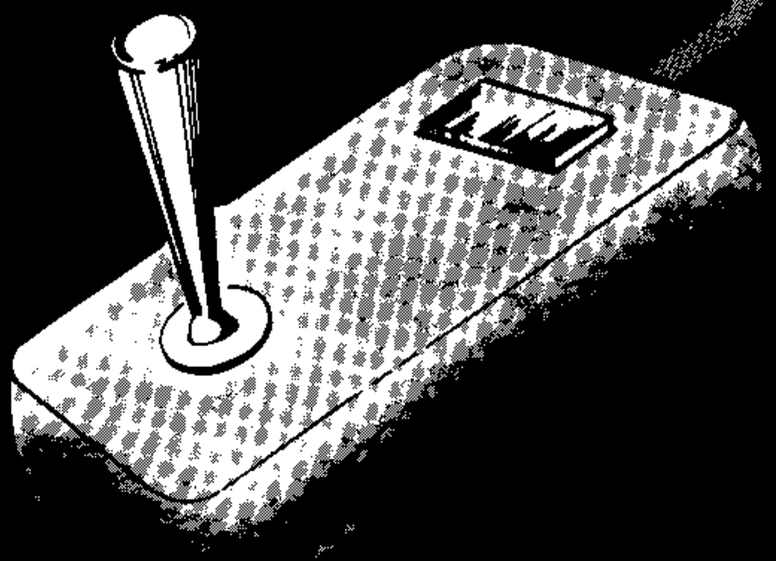
0 0 0 0 0 0 0 0   0 0 0 0 0 2 4 0   0 0 0 0 0 0 0 0
0 0 0 0 0 4 0 0   0 0 0 0 0 4 0 0   0 0 4 0 0 0 0 0
0 0 0 1 0 3 0 3   0 0 F F F F F F   0 0 8 0 C 0 C 0
0 3 0 1 0 0 0 0   F F F F 7 E 0 0   C 0 8 0 0 0 0 0
```



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Purl Two . . . from p. 92

```
100 REM **********************
110 REM *    BASIC PANELED     *
120 REM *    SKIRT PATTERN     *
130 REM * A FASHION FACTORY   *
140 REM *        DESIGN        *
150 REM *    PROGRAMMED BY     *
160 REM *      CUSTOMIZED      *
170 REM * COMPUTER CONCEPTS   *
180 REM **********************
190 REM 99'ER VERSION 2.10.1
200 S$="
    "
210 GOSUB 3370
220 PRINT TAB(11);"LADIES"
230 PRINT
240 PRINT TAB(9);"PANEL SKIRT"
250 PRINT
260 PRINT TAB(11);"PATTERN"
270 PRINT
280 GOSUB 3430
290 GOSUB 1590
300 GOSUB 3460
310 S$="          PLEASE NOTE!"
320 GOSUB 3370
330 PRINT
340 PRINT "ALL MEASUREMENTS SHOULD
    BE"
350 PRINT "TAKEN IN INCHES, NOT ME
    TRIC."
360 PRINT : :
370 PRINT "INFORMATION LISTED IS F
    OR"
380 PRINT "ONE PANEL ONLY!"
390 PRINT
400 GOSUB 3430
410 GOSUB 1570
420 GOSUB 3460
430 GOSUB 3040
440 GOSUB 1940
450 S$="  STITCHES POINT TO POINT"
460 GOSUB 3370
470 PRINT : :
480 PRINT "NO STS AT FLARE:";CO
490 PRINT : :
500 PRINT "NO STS AT HIP:";HP1
510 PRINT : :
520 PRINT "NO STS AT WAIST:";WA1
530 PRINT : :
540 PRINT "NO STS TO DECREASE:";DE
    1+DE2
550 GOSUB 3430
560 GOSUB 1590
570 GOSUB 3460
580 S$="    ROWS POINT TO POINT"
590 GOSUB 3370
600 PRINT "TOTAL ROWS TO KNIT:";LN
    1
610 PRINT : :
620 PRINT "NO ROWS BOTTOM TO HIP:"
    ;BH1
630 PRINT : :
640 PRINT "NO ROWS HIP TO WAIST:";
    HL1
650 PRINT : :
660 PRINT "NO ROWS IN WAIST BAND:"
    ;BA1
670 GOSUB 3430
680 GOSUB 1570
690 GOSUB 3460
700 S$="          SHAPING HEM"
710 GOSUB 3370
720 GOSUB 1830
730 GOSUB 2190
740 GOSUB 2780
750 PRINT
760 GOSUB 3430
770 GOSUB 1570
780 GOSUB 3460
790 GOSUB 2240
800 S$="  SHAPING HEM TO HIPLINE"
810 GOSUB 3370
820 GOSUB 2410
830 GOSUB 3430
840 GOSUB 1570
850 GOSUB 3460
860 S$="   SHAPING HIP TO WAIST"
870 GOSUB 3370
880 GOSUB 2290
890 IF DE2=0 THEN 900 ELSE 920
900 GOSUB 2340
910 GOTO 930
920 GOSUB 2410
930 GOSUB 3430
940 GOSUB 1570
950 PRINT
960 GOSUB 3460
970 GOSUB 1700
980 S$="       FINISHING!"
990 GOSUB 3370
1000 PRINT
1010 PRINT "SEAM TO FORM A FRONT AN
     D"
1020 PRINT
1030 PRINT "BACK SECTION OF SKIRT."
1040 PRINT
1050 PRINT "HANG WAIST OF SKIRT FRO
     NT"
1060 PRINT
1070 PRINT "TO";WA2;"STS."
1080 PRINT
1090 GOSUB 3430
1100 GOSUB 1570
1110 GOSUB 3460
1120 GOSUB 3370
1130 PRINT
1140 PRINT "KNIT";BA1;"ROWS OF BAND
     "
1150 PRINT
1160 PRINT "MARKING FIRST ROW."
1170 PRINT
1180 PRINT "KNIT ONE ROW LOOSE TENS
     ION."
1190 PRINT
```

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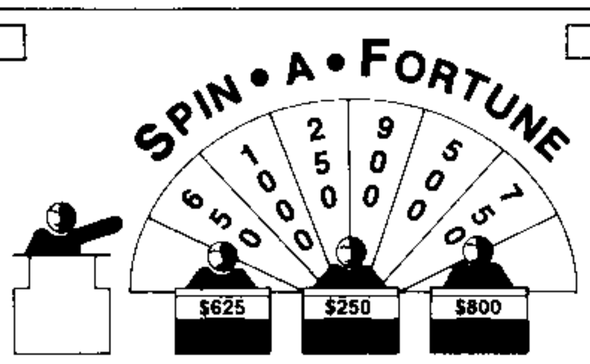

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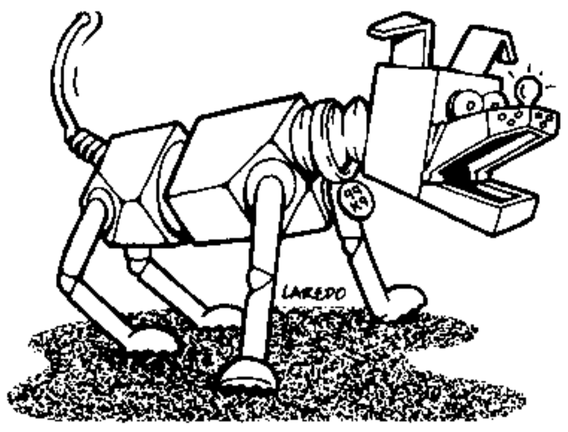

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```
1200 PRINT "KNIT";BA1;"ROWS FOR FAC
     ING."
1210 PRINT : :
1220 PRINT "LACE OFF TO MARKED ROW.
     "
1230 PRINT
1240 PRINT "REPEAT INST. FOR BACK."
1250 GOSUB 3430
1260 PRINT : :
1270 GOSUB 3460
1280 S$="
      "
1290 GOSUB 3370
1300 PRINT
1310 PRINT "       SKIRT COMPLETE"
1320 PRINT "       END OF PROGRAM"
1330 PRINT : :
1340 GOSUB 3430
1350 GOSUB 1570
1360 PRINT
1370 PRINT "RUN AGAIN? (Y/N) "
1380 CALL KEY(3,KEY,STATUS)
1390 IF STATUS=0 THEN 1380
1400 IF KEY=78 THEN 1560 ELSE 200
1410 S$="      PROGRAM ABORTED"
1420 GOSUB 3370
1430 GOSUB 1590
1440 PRINT TAB(8);"PLEASE NOTE!"
1450 PRINT
1460 PRINT "A MEASUREMENT HAS BEEN"
1470 PRINT "ENTERED THAT IS INCOMPA
     TIBLE"
1480 PRINT "WITH PROGRAM."
1490 PRINT
1500 PRINT "REFER TO INSTRUCTION BO
     OK-"
1510 PRINT "LET FOR ERROR DETAILS."
1520 GOSUB 3430
1530 GOSUB 1570
1540 GOSUB 3460
1550 GOTO 1280
1560 STOP
1570 PRINT : : : :
1580 RETURN
1590 PRINT : : :
1600 RETURN
1610 S$="      PLEASE NOTE!"
1620 GOSUB 1590
1630 PRINT "    REFER TO INSTRUCTIO
     N"
1640 PRINT "     BOOKLET FOR SKIRT"
1650 PRINT "         FINISHING"
1660 GOSUB 1590
1670 GOSUB 3430
1680 GOSUB 3460
1690 RETURN
1700 S$="      PLEASE NOTE!"
1710 GOSUB 3370
1720 GOSUB 1570
1730 PRINT "TAKE PANEL OFF ON WASTE
     "
1740 PRINT "YARN."
1750 PRINT
1760 PRINT "REPEAT ALL INSTRUCTIONS
     "
1770 PRINT "FOR";PA-1;"MORE PANELS.
     "
1780 GOSUB 1570
1790 GOSUB 3430
1800 GOSUB 1590
1810 GOSUB 3460
1820 RETURN
1830 PRINT "CAST ON";CO;"STITCHES"
1840 PRINT
1850 PRINT "KNIT";HM1;"ROWS FOR HEM
      FACING"
1860 PRINT
1870 PRINT "SET RC000"
1880 PRINT
1890 PRINT "KNIT ONE ROW LOOSE TENS
     ION"
1900 PRINT
1910 PRINT "HANG HEM ON ROW";HM1+1
1920 PRINT
1930 RETURN
1940 CO=INT(((HP+FL)*SG)/PA)+.5)
1950 IF CO/2<>INT(CO/2)THEN 1960 EL
     SE 1970
1960 CO=CO+1
1970 HP1=INT(((HP*SG)/PA)+.5)
1980 IF HP1/2<>INT(HP1/2)THEN 1990
     ELSE 2000
1990 HP1=HP1+1
2000 WA1=INT(((WA*SG)/PA)+.5)
2010 IF WA1/2<>INT(WA1/2)THEN 2020
     ELSE 2030
2020 WA1=WA1+1
2030 LN1=INT(LN*RG)
2040 HM1=INT(HM*RG)
2050 HL1=INT(HL*RG)
2060 BA1=INT(BA*RG)
2070 DE1=INT(CO-HP1)
2080 IF DE1/2<>INT(DE1/2)THEN 2090
     ELSE 2100
2090 DE1=DE1+1
2100 DE2=(HP1-WA1)
2110 IF DE2<2 THEN 2120 ELSE 2140
2120 DE2=0
2130 GOTO 2160
2140 IF DE2/2<>INT(DE2/2)THEN 2150
     ELSE 2160
2150 DE2=DE2+1
2160 BH1=LN1-HL1
2170 WA2=INT((WA1*PA)/2)
2180 RETURN
2190 BR=HM1+2
2200 RW=4
2210 SW=INT(CO/4)
2220 E$="DRAPE"
2230 RETURN
2240 BR=HM1+2
2250 SW=INT(DE1/2)
2260 RW1=BH1
2270 RW=BH1-BR
2280 RETURN
2290 BR=INT(BH1+1)
2300 SW=INT(DE2/2)
2310 RW1=HL1
2320 RW=HL1-1
2330 RETURN
2340 PRINT "       PLEASE NOTE!"
2350 PRINT
2360 PRINT "THERE WILL BE NO DECREA
     SES"
2370 PRINT "FROM THE HIP TO THE WAI
     ST."
2380 PRINT : :
2390 PRINT "KNIT EVEN TO ROW";LN1
2400 RETURN
2410 ST1=INT(RW/SW)
2420 RE=INT(RW-(ST1*SW))
2430 IF RE=0 THEN 2440 ELSE 2460
2440 RE1=SW
2450 GOTO 2480
2460 RE1=SW-RE
2470 PRINT
2480 PRINT "STS TO DEC EACH SIDE";S
     W
2490 PRINT : :
2500 PRINT "DEC 1 ST/";ST1;"RS/";RE
     1;"TIMES"
2510 IF RE<>0 THEN 2520 ELSE 2540
2520 PRINT : :
2530 PRINT "DEC 1 ST/";ST1+1;"RS/";
     RE;"TIMES"
2540 PRINT : :
2550 PRINT "BEGIN DEC ROW";BR+ST1
2560 RETURN
2570 RW=INT(RW/2)
2580 ST1=INT(SW/RW)
2590 RE=INT(SW-(ST1*RW))
2600 IF RE=0 THEN 2610 ELSE 2630
2610 RE1=RW
2620 GOTO 2640
2630 RE1=RW-RE
2640 PRINT "BEGIN SHORT ROW ON ROW"
     ;BR
2650 PRINT "FOR ";E$;" SR ARE NOT"
2660 PRINT "COUNTED IN TOTAL ROWS."
2670 IF ST1<=0 THEN 2680 ELSE 2700
2680 RE=RE1+RE
2690 GOTO 2740
2700 PRINT
2710 PRINT "PLACE";ST1;"STS INTO M/
     P";RE1
2720 PRINT "TIMES"
2730 IF RE<>0 THEN 2750 ELSE 2770
2740 PRINT
2750 PRINT "PLACE";ST1+1;"STS INTO
     M/P";RE
```

Continued on p. 98

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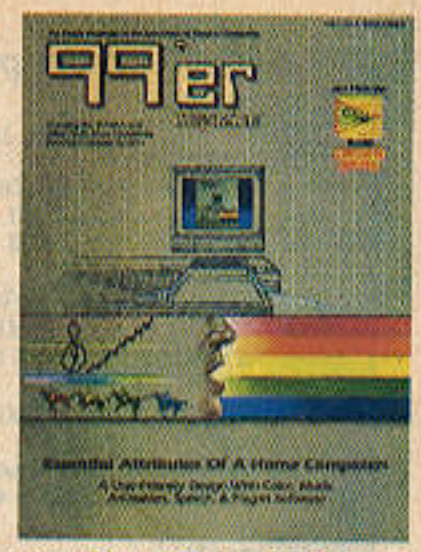

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Persuasion . . . from p. 63

```
1310 RESTORE
1320 FOR BAR=1 TO 4
1330 CLMN=7*BAR
1340 READ VOTE,PERCENT
1350 REM RESERVED TO READ FILES
1360 REM RESERVED TO MANIPULATE DAT
     A
1370 BARHEIGHT=VOTE/SCALE
1380 YY=INT(BARHEIGHT)
1390 REMAINDER=BARHEIGHT-INT(BARHEI
     GHT)
1400 TOPPATTERN=1+INT((REMAINDER*8)
     +.5)
1410 IF YY=0 THEN 1660
1420 IF YY>19 THEN 1430 ELSE 1550
1430 Z=YY-20
1440 YY=21
1450 GOSUB 2520
1460 YY=Z
1470 LABEL$="SCALE"
1480 ROW=2
1490 GOSUB 2480
1500 LABEL$="OFF"
1510 ROW=1
1520 CLMN=CLMN+1
1530 GOSUB 2480
1540 IF Z>1 THEN 1550 ELSE 1560
1550 GOSUB 2520
1560 POSITION=2*TOPPATTERN+19
1570 BARHEAD$=SEG$(MASTER1$,POSITIO
     N,16)
1580 CALL CHAR(107+BAR*8,BARHEAD$)
1590 BARHEAD$=SEG$(MASTER2$,POSITIO
     N,16)
1600 CALL CHAR(10B+BAR*8,BARHEAD$)
1610 BARHEAD$=SEG$(MASTER3$,POSITIO
     N,16)
1620 CALL CHAR(109+BAR*8,BARHEAD$)
1630 CALL HCHAR(21-YY,CLMN-1,107+BA
     R*8)
1640 CALL HCHAR(21-YY,CLMN,10B+BAR*
     8)
1650 CALL HCHAR(21-YY,CLMN+1,109+BA
     R*8)
1660 POSITION=2*TOPPATTERN-1
1670 BARCAP$=SEG$(MASTER1$,POSITION
     ,16)
1680 CALL CHAR(107+BAR,BARCAP$)
1690 CALL HCHAR(20-YY,CLMN-1,107+BA
     R,3)
1700 IF TOPPATTERN<>8 THEN 1750
1710 CALL CHAR(107+BAR*8,"FFFFFFFFF
     FFFFFC0")
1720 CALL CHAR(10B+BAR*8,"FFFFFFFFF
     FFFFF00")
1730 CALL CHAR(109+BAR*8,"FFFFFFFFF
     FFFFF03")
1740 GOTO 1810
1750 IF TOPPATTERN<>9 THEN 1870
1760 IF YY=19 THEN 1870
1770 CALL HCHAR(19-YY,CLMN-1,107,3)
1780 CALL CHAR(107+BAR*8,"FFFFFFFFF
     FFFC0C0")
1790 CALL CHAR(10B+BAR*8,"FFFFFFFFF
     FFF0000")
1800 CALL CHAR(109+BAR*8,"FFFFFFFFF
     FFF0303")
1810 CALL HCHAR(20-YY,CLMN-1,107+BA
     R*8)
1820 CALL HCHAR(20-YY,CLMN,10B+BAR*
     8)
1830 CALL HCHAR(20-YY,CLMN+1,109+BA
     R*8)
1840 CALL HCHAR(21-YY,CLMN-1,104+BA
     R*8)
1850 CALL HCHAR(21-YY,CLMN,105+BAR*
     8)
1860 CALL HCHAR(21-YY,CLMN+1,106+BA
     R*8)
1870 CALL HCHAR(21,CLMN-1,97)
1880 CALL HCHAR(21,CLMN,98)
1890 CALL HCHAR(21,CLMN+1,99)
1900 LABEL$=STR$(PERCENT)&"%"
1910 IF YY<5 THEN 1920 ELSE 1940
1920 ROW=17-YY
1930 GOTO 1950
1940 ROW=19-YY/2
1950 GOSUB 2420
1960 LABEL$=STR$(VOTE)
1970 ROW=24
1980 CLMN=CLMN-2
1990 GOSUB 2470
2000 NEXT BAR
2010 LABEL$=VERTICAL1$
2020 ROW=3
2030 CLMN=3
2040 GOSUB 2470
2050 LABEL$=VERTICAL2$
2060 ROW=ROW+1
2070 CLMN=CLMN-1
2080 GOSUB 2470
2090 REM *------- TITLE BOX ------*
2100 L1=LEN(TITLELINE1$)
2110 L2=LEN(TITLELINE2$)
2120 IF L1<L2 THEN 2130 ELSE 2140
2130 L1=L2
2140 CALL VCHAR(RO,CL+L1,150,2)
2150 CALL HCHAR(RO-1,CL+L1,151)
2160 CALL HCHAR(RO-1,CL,144,L1)
2170 CALL HCHAR(RO-1,CL-1,145)
2180 CALL VCHAR(RO,CL-1,146,2)
2190 CALL HCHAR(RO,CL,32,L1)
2200 LABEL$=TITLELINE1$
2210 ROW=RO
2220 CLMN=CL
2230 GOSUB 2470
2240 REM *- IS THERE A 2ND LINE? -*
2250 IF TITLELINE2$="" THEN 2260 EL
     SE 2300
2260 CALL HCHAR(RO+1,CL-1,147)
2270 CALL HCHAR(RO+1,CL,148,L1)
2280 CALL HCHAR(RO+1,CL+L1,149)
2290 GOTO 2370
2300 CALL HCHAR(RO+1,CL,32,L1)
2310 LABEL$=TITLELINE2$
2320 ROW=RO+1
2330 GOSUB 2470
2340 CALL HCHAR(RO+2,CL-1,147)
2350 CALL HCHAR(RO+2,CL,148,L1)
2360 CALL HCHAR(RO+2,CL+L1,149)
2370 CALL KEY(0,K,S)
2380 IF S=0 THEN 2370
2390 REM RESERVED TO CLOSE FILES
2400 END
2410 REM ***END***END***END***END**
2420 REM *-- SUBROUTINE FOR
     VERTICAL LABELS --*
2430 FOR P=1 TO LEN(LABEL$)
2440 CALL HCHAR(ROW+P-1,CLMN,ASC(SE
     G$(LABEL$,P,1)))
2450 NEXT P
2460 RETURN
2470 REM *- SUBROUTINE FOR
     HORIZONTAL LABELS -*
2480 FOR P=1 TO LEN(LABEL$)
2490 CALL HCHAR(ROW,CLMN-1+P,ASC(SE
     G$(LABEL$,P,1)))
2500 NEXT P
2510 RETURN
2520 REM *----- SUBROUTINE FOR BAR
     STEMS -----*
2530 CALL VCHAR(22-YY,CLMN-1,104+BA
     R*8,YY-1)
2540 CALL VCHAR(22-YY,CLMN,105+BAR*
     8,YY-1)
2550 CALL VCHAR(22-YY,CLMN+1,106+BA
     R*8,YY-1)
2560 RETURN
```

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Purl Two . . . from p. 95

```
2760 PRINT "TIMES"
2770 RETURN
2780 PRINT "INSERT FASHION DRAPE ON
     "
2790 PRINT "ROW";BR
2800 GOSUB 3430
2810 GOSUB 1570
2820 GOSUB 3460
2830 S$="        PLEASE NOTE!"
2840 GOSUB 3370
2850 PRINT
2860 PRINT "S/R INSTRUCTIONS USE BO
     TH"
2870 PRINT
2880 PRINT "SIDES WHEN WORKING FASH
     ION"
2890 PRINT
2900 PRINT "DRAPE."
2910 PRINT
2920 PRINT "INSTRUCTIONS FOR H/P SH
     OULD"
2930 PRINT
2940 PRINT "BE APPLIED TO EACH SIDE
      ON"
2950 PRINT
2960 PRINT "ALTERNATING ROWS."
2970 GOSUB 3430
2980 GOSUB 1590
2990 GOSUB 3460
3000 S$="   SHAPING FASHION DRAPE"
3010 GOSUB 3370
3020 GOSUB 2570
3030 RETURN
3040 S$="    INPUT MEASUREMENTS"
3050 GOSUB 3370
3060 PRINT
3070 INPUT "TENSION? ":T
3080 PRINT
3090 INPUT "YARN USED? ":U$
3100 PRINT
3110 INPUT "MACHINE USED? ":M$
3120 PRINT
3130 INPUT "ROW GAUGE? ":RG
3140 PRINT
3150 INPUT "STITCH GAUGE? ":SG
3160 PRINT
3170 INPUT "WAIST + EASE? ":WA
3180 PRINT
3190 INPUT "HIP + EASE? ":HP
3200 PRINT
3210 INPUT "FLARE? ":FL
3220 PRINT
3230 INPUT "LENGTH? ":LN
3240 PRINT
3250 INPUT "HIP LOCATION? ":HL
3260 PRINT
3270 INPUT "DEPTH OF HEM? ":HM
3280 PRINT
3290 INPUT "DEPTH OF BAND? ":BA
3300 PRINT
3310 INPUT "NO OF PANELS DESIRED? "
     :PA
3320 IF FL<1 THEN 3350
3330 IF PA<2 THEN 3350
3340 IF WA>HP THEN 3350 ELSE 3360
3350 GOTO 1410
3360 RETURN
3370 CALL CLEAR
3380 PRINT TAB(6);"* * * * * * * * *
     *"
3390 PRINT
3400 PRINT S$
3410 PRINT
3420 RETURN
3430 PRINT TAB(6);"* * * * * * * * *
     *"
3440 RETURN
3450 PRINT "CONTINUE?"
3460 CALL KEY(3,KEY,STATUS)
3470 IF STATUS=0 THEN 3460
3480 IF KEY=78 THEN 1280
3490 RETURN
```

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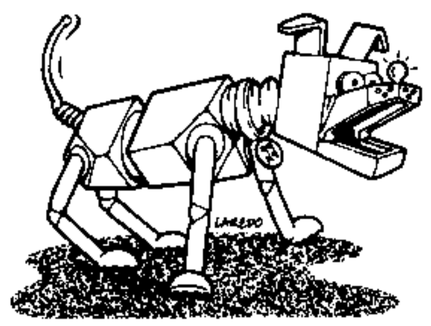
June's Choice



Our readers have spoken. The winner of the June B.A.R.C. Back competition is Samuel Pincus for his article, *Drive for Diskettes, Part 2*. Our hearty congratulations and a $100 prize go to Mr. Pincus.

Index to Advertisers

A/D Electronics 11
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Bit Byte Bit Software 39
Bizware, Inc 78
Brosis 42
C.A.Root Associates 26
C. P. R. 28
Casas Adobes Software 46
Challenger Software International 15
Cintronics 88
Complete Software 94
CompuTech Distributing 24, 25
Computer Connection I 39
Computer-Ed 17
Computer Peripherals Unlimited 17
Computertronics 48
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Data/Ware Development, Inc 53
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Dollard, Walter J. 77
Doryt Systems, Inc 89
Dow, John T. 38, 80
Dr. Mom's Kidware 63
Dynamic Data & Devices 60
Easyware 63
Eckhaus, M.K. 79
Elek-Tek, Inc 54
Extended Software Co. 23
Formorall 81
Fosco Systems Inc 94
Foundation 51
Fox Valley Software 13
Futura Software 87
Gem Software 42
Gilkes, Lolita Walker 38
Gold Coast Avionics 54
Gyles, C. 95
HSK 45
Harvey, James 47
Henderson, Charles S. 71
Homecare Software 79
Instrumental Software Systems, Inc 71
Intellestar 61
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Shenango Enterprises 50
SOFT-TEX 71
Software Carousel 93
Software Support 82
Specialty Services 50
Spectrum Software 66
Star Design Systems 42
Star Micronics 103
Sunrise Software 95
Tachyon Systems 38
TENEX 43
Texas Instruments, Inc. 12, 102, 104
Texas Software Design 55
Tex-Comp Users Supply Division 85
Textiger 45
TEXware Associates 44, 63
THinc 84
TImagination 28, 31
Titan Software 84
Tracksmith 48
Ultracomp Systems 3
Unisource Electronics, Inc. 46
Upper Room, The 57
VID-COM 57
W.O.R.D. 47
Welcom Software 56
Western Micro Systems 81
Wycove Systems Limited 62
York 10 Computerware 90
99/4(A) Program Exchange 20
99'er Bookstore 52
99'er Home Computer Magazine 96, 97
99'er-ware 36, 100, 101

99'er Buyers Guide*

Bach Company, The 52-G, 52-H
Canadian Micro Works 52-B
Compro Systems 52-B
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Dhein's True Value 52-E
Elek-Tek, Inc. 52-C
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Luv-Tronics 52-H
Microcomputers Corp. 52-G
S.A.V.E. 52-G
Tex-Comp Users Supply Division 52-D
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Success Formula . . . from p. 50

```
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    ,S$(19),S$(20),S$(21)
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    P,FINALS,BEAUTY CONTEST,STRAIT
     A'S
420 DATA NEWSPAPER INTERVEIW,MAKE
    THE TEAM,HONOR SOCIETY,FOOTBAL
    L DRAFT,JOB OFFER
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    QA MANAGER,SELL INVENTION,WRIT
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    MAKE "CONTACTS"
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    IDE
520 DATA SPRING TRAINING,GOLF TOUR
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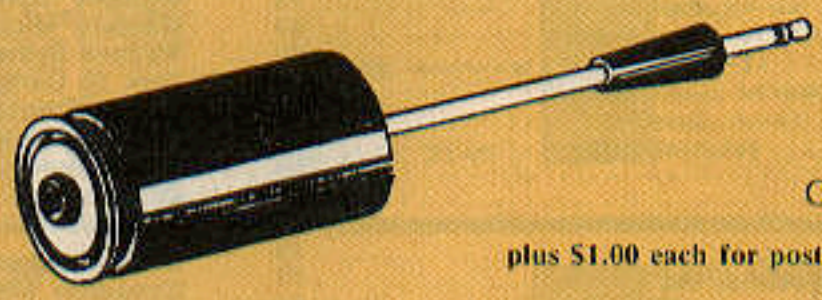

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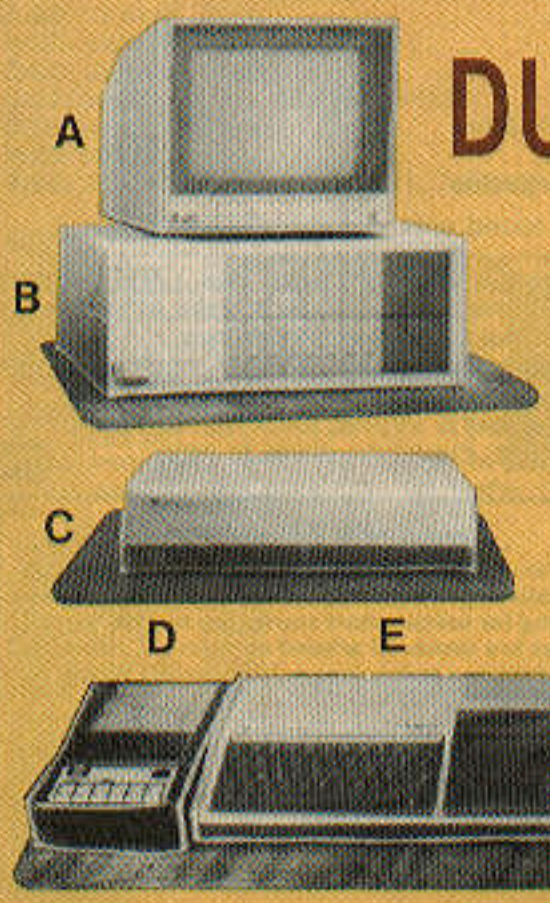

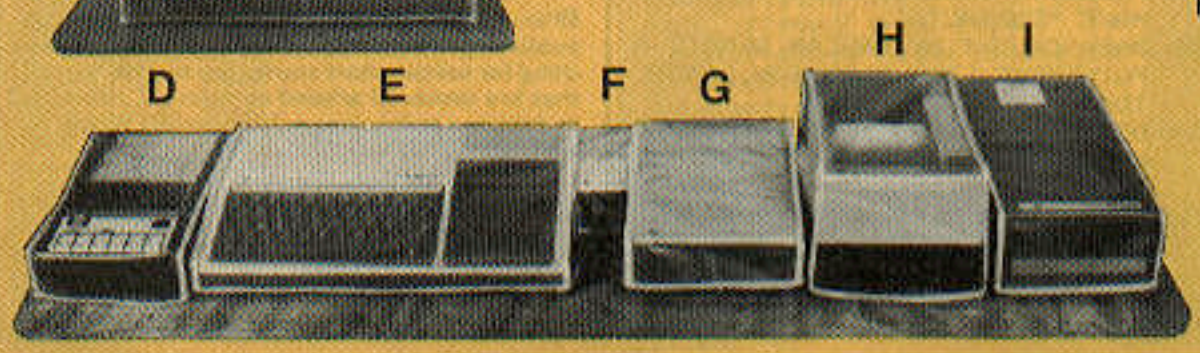

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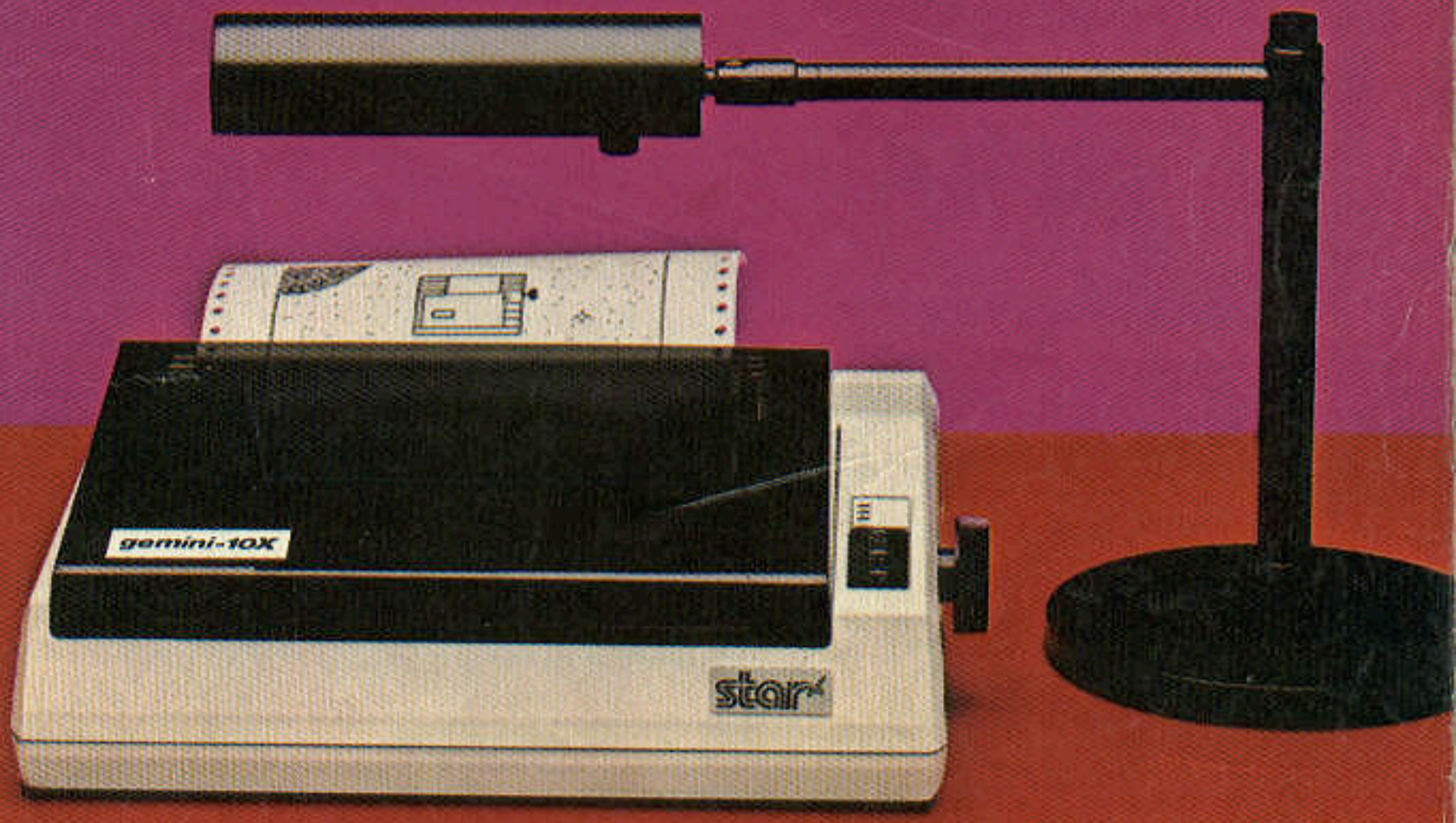

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