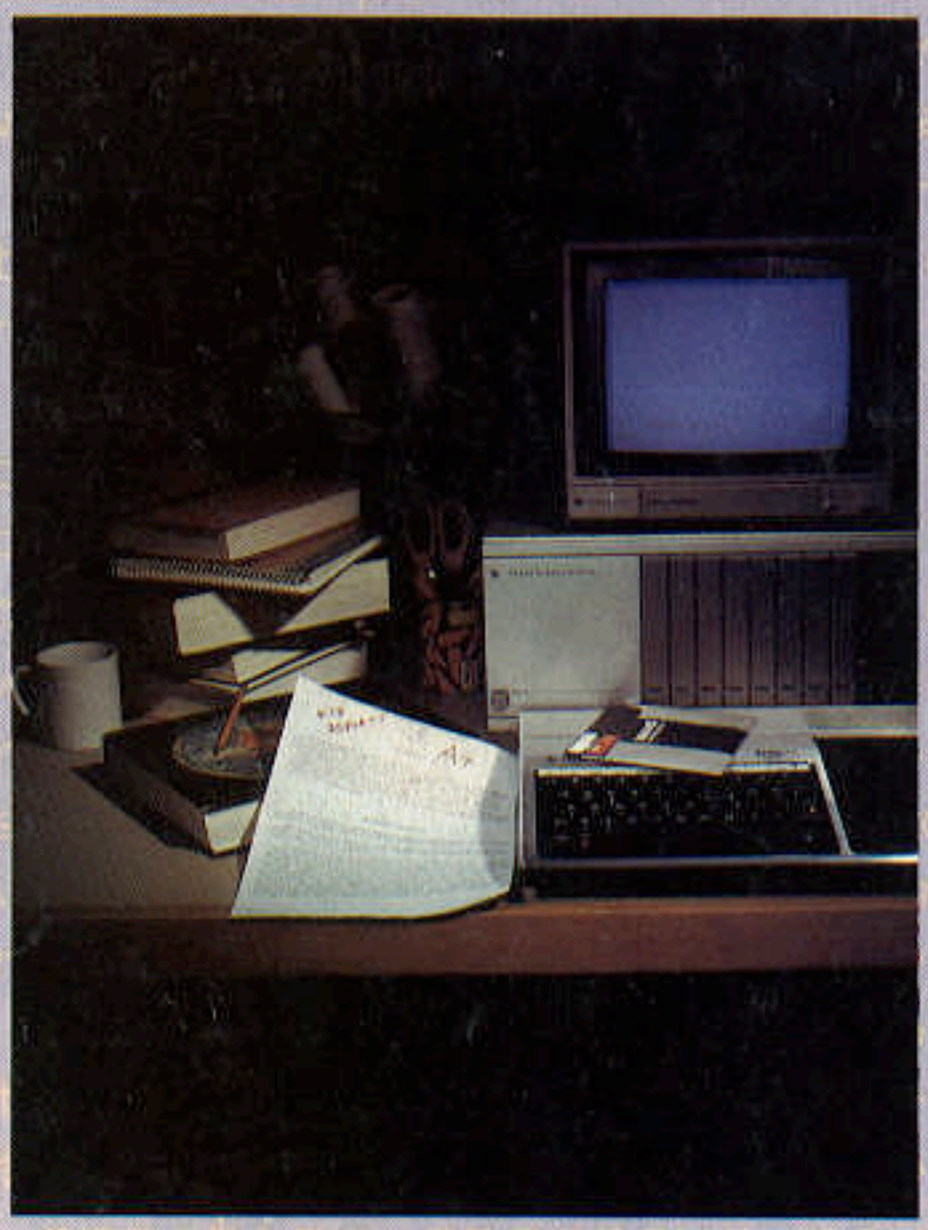
99'er
COVERING THE TEXAS INSTRUMENTS BRAND of HOME COMPUTERS
HCM™
HOME COMPUTER
magazine

May, 1983 $3.50 in U.S.A.



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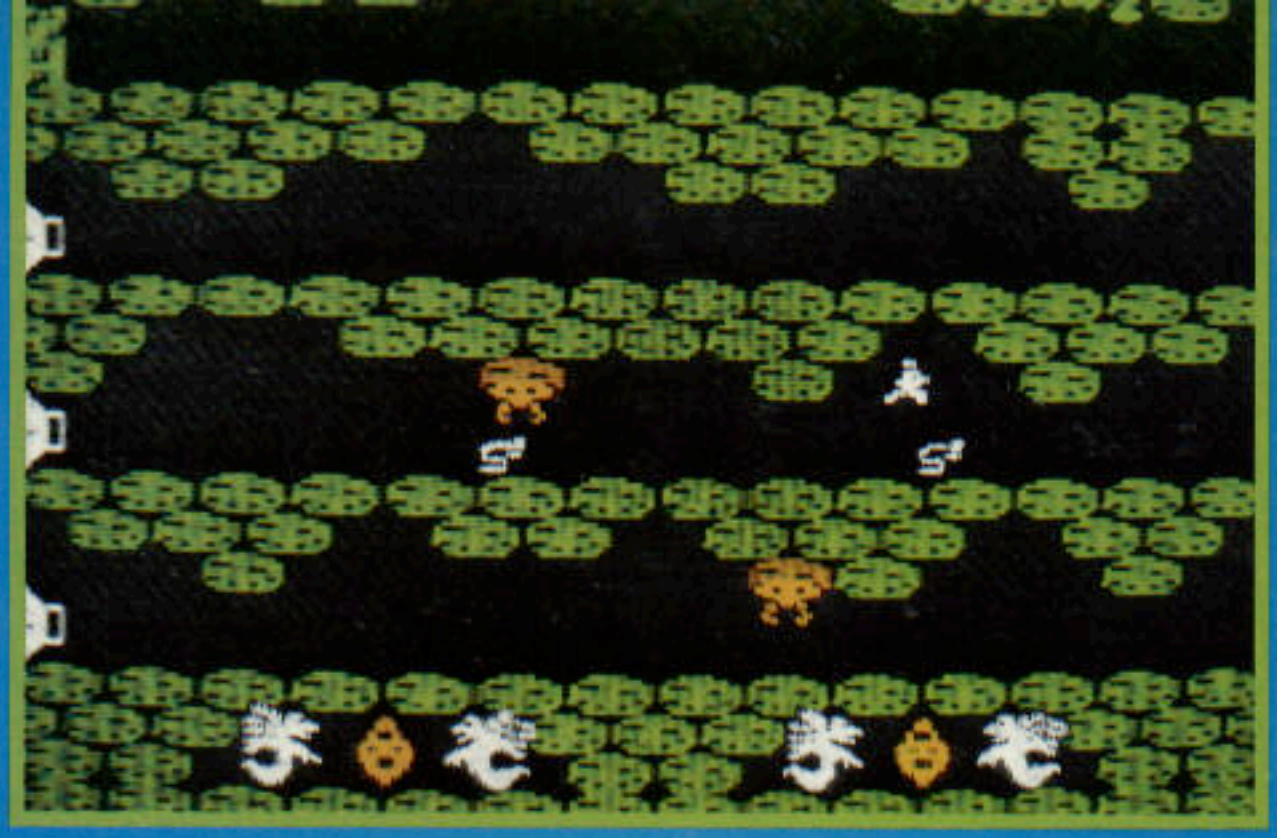

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ON SCREEN

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

"It is in the pages of this magazine that the state of the Home Computer world is mirrored . . . what we'll see within the next nine months will totally eclipse all advancements made over the last two years."

It's been quite an exciting two years. That's how long this magazine has been in print. During this time, I've been so busy that there has been little opportunity to reflect on events. As we celebrate our second anniversary, I think it's now appropriate to sit back and take stock. If, in fact, "the past is prologue," then an understanding of whence the home computer industry has come in the last two years will better enable us to envision whither it may go in the next two . . .

To say that there has been a great deal of change would be a gross understatement. I remember when the most exciting issue of the day was the demand for a better keyboard on the old 99/4 console. In the first issue of *99'er Magazine*, in fact, we ran an article on adding an external keyboard. The other "high tech" news item was that both we and Texas Instruments were making available a *dummy* "pinky key" for the right hand. On the old keyboard, touch-typists often couldn't find "home" because there was no place for their pinky; this led to the errors which the dummy key was to correct. One might say that this pinky key was the first word processor *peripheral* for the Texas Instruments Home Computer.

To put things into perspective: Disk drives had just been made available for the system, Extended BASIC was still a promise of "things to come," and of the very few people who had printers, 95 percent had only the TI thermal printer. Today, looking at the other end of this two-year sojourn, we can see that we've progressed from pinky keys to speech recognition, Winchester hard disk drives, spreadsheet software, a wafertape drive, CMOS memory cartridges . . . And who knows what other goodies are yet to come.

In that first issue I remember the articles about the *new* LOGO language that would eventually be available for TI Home Computer users. And there were the pieces I did on the UCSD Pascal language and software development system that was in the works. I remember too, talking with many callers who wondered whether TI would be introducing the FORTH language for the Home Computer. Well today, we not only have TI FORTH, but a couple of other implementations from third parties as well. And I think we've only just scratched the surface when it comes to languages for Home Computer users.

I can also recall the articles we did on language conversions—from TRS-80 and Apple BASICs to TI BASIC. In those early days, this was virtually a necessity due to the dearth of TI software. You don't have to take my word on that—just look at the quantity of software advertisers in *99'er Magazine*'s inaugural issue, and then count the advertisers in the copy you have in your hands. To quote our servicemark: "Once you compare, there's no comparison."

Computer-Assisted Instruction has also come a long way. Back in our third issue, we looked at the available software for the Home Computer and noted that Scott, Foresman was the only serious third-party supplier of educational software. We now have a prodigious quantity of educational programs for the 99/4A from a couple of dozen different vendors, and are about to welcome in an exciting new dimension with the extensive PLATO library.

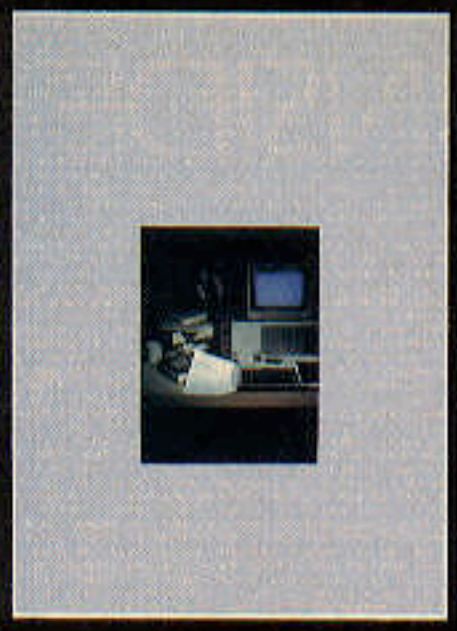
We are always excited when it comes to covering the Consumer Electronics Show: It is there that TI displays its new products. The first really big development came in June of 1981 when Texas Instruments unveiled the new version of the console—the TI-99/4A—and we finally had a *real* keyboard. Soon it became evident that the days of the "freight train" peripherals were numbered. And at the January, 1982 show, TI introduced the Peripheral Expansion System, whose possibilities impressed us enormously.

In the fall of 1982, things began to happen fast: TI started to ship the 99/4A in unprecedented quantity, and we launched TI-Fest—The (first) Home Computer Show™. The San Francisco event was very well received and suggested future events (soon to be announced) across the country. During this time, the magazine switched from a bi-monthly to a monthly publication schedule. TI rang in the new year this past January by introducing two new machines as well as a promising line of compact peripherals. And in February of 1983, we changed our name. Today you'll find us—as *99'er Home Computer Magazine*—on more and more newsstands with each passing month.

Yes, it's been a very exciting two years. If you have some time, thumb through the old issues and you'll appreciate what I mean. For it is in the pages of this magazine that the state of the entire Home Computer world is mirrored for you to see.

What will the next two years bring? Who can really say? One thing is certain however—the *rate* of change has increased. What we'll see in the next nine months will totally eclipse all the advancements made over the last two years. So stay with us—the revolution has only just begun.

99'er HOME COMPUTER magazine



Framed in carefully chosen words, this month's cover photo depicts the fruits of a successful venture into word processing: an A+ paper. Flanked by the traditional paraphenalia of student life is the new tool that contributed to that academic achievement: a Home Computer with word processing capabilities. Students, both present and former, know only too well the process that brings forth a superior paper: long hours of writing, constant editing, endless typing and retyping. With the stroke of a key, however, the word processor can instantly delete words, insert sentences, move paragraphs, adjust margins. . . . all before a single mark appears on paper. And so, another tradition of academe—the "all-nighter"—falls by the wayside.

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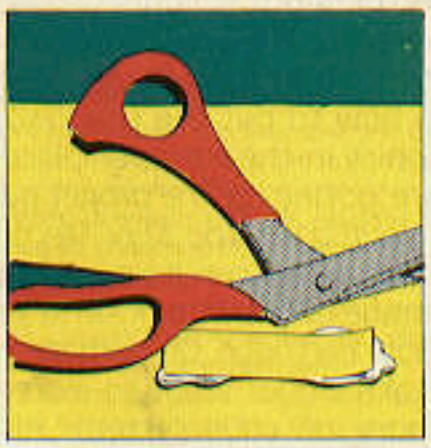

99'er HOME COMPUTER magazine™

99'er Home Computer Magazine (ISSN 0745-6913) is published monthly by Emerald Valley Publishing Co., P.O. Box 5537, Eugene, OR 97405. The editorial office is located at 1500 Valley River Drive, Suite 250, Eugene, OR 97401. (Tel. 503-485-8796). Subscription rates in U.S. and its possessions are $25 for one year, $45 for two years, and $63 for three years. In Canada and Mexico add $7 per year. Other foreign countries $43 for one year surface mail. Inquire for air delivery. Single copy price in U.S. and its possessions is $3.50, and $4.00 in Canada and Mexico. Foreign subscription payment should be in United States funds drawn on a U.S. bank. Second-class postage paid at Eugene, OR 97401. POSTMASTER: Send address changes to **99'er Home Computer Magazine**, P. O. Box 5537, Eugene, OR 97405. Subscribers should send all correspondence about subscriptions to above address.

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INSIDE 99'er

May is here! It's the month of picnics, bike rides, and sun-bathed baseball games. But, alas, it is also the time for term papers, journal articles, and all the paperwork needed to keep life organized. Wouldn't it be great to be done with these writing chores so that you could be outside dancing 'round the Maypole? Well, welcome to the world of word processing! Explore with us how to delegate some of your tedious writing tasks to your own friendly word processor.

Not sure if you should leave your scissors and glue behind to join the keystroke generation? *From Cut and Paste to Keystroke* explains what a word processor can do for you whether you are writing the Great American Novel or listing your summer chores.

Before you run for your wallet, check out *Word Processor Market Basket* for software purchasing particulars. You will find, at a glance, a sampling of what's available, cost comparisons, system requirements and all you need to make an informed decision.

Information for financial decisions is always welcome. In *Multiplan Medium* we feature this versatile software package in an application that will balance your checkbook and check your balances for a budget. While you're in the planning and organizing mode, you may want to update your filing system using our *Generalized Filing Program*. This program will be especially helpful for professionals who frequently must locate journal and magazine articles in their files.

Perhaps you're more the academic sort and would prefer the organizational aid of Professor Holl. This month, in *A Cure for the Listless*, he presents a pocket program that shows you how to use linked lists to insert and delete data with ease and panache.

Still within the hallowed halls of academia, we find the *School Secretary's Secretary*, a review of a software package to rescue the damsel in paperwork distress, thus giving her back the time and energy to provide quality extracurricular activities for our children.

Handicapped children and adults working with computers is the focus of *Fulfilling Untapped Potential*. Here, a software developer shares what he has discovered about computers and learning potential.

To explore the potential of the new CC-40, you can join us as we continue *Touring Compact Computer Country*. We'll explore the hills and valleys of using Enhanced BASIC with this promising little addition to the TI family.

And the little green emissary from the world of LOGO speaks up this month in *The BASIC Issue and the Tortoise's Retort*. You may be surprised at the depth of thought expressed in this computer-age discourse from the LOGO turtle. Not to be outdone, the sprites of Extended BASIC add their own special kind of depth. In *Sprites In Depth* you can explore the use of sprites to create 3-D illusions on your video screen and learn how to put the shadows of your graphics in their proper places.

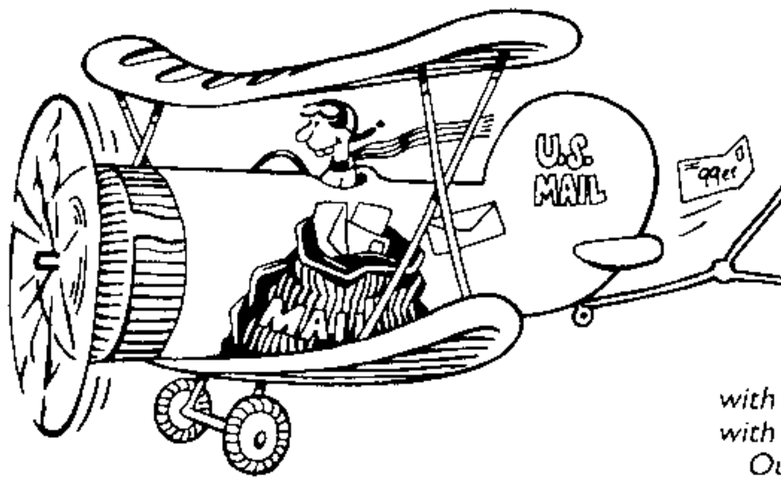
If you are looking for the proper place to store your data, the *Mini Memory Relocator* program can help you take full advantage of the 4K of RAM in your Mini Memory cartridge. Or, perhaps you want to take bigger steps to increase the memory of your system. After reading *The Drive for Diskettes*, about the care and feeding of floppy disks, you may decide to add a quick-loading disk drive to your present system.

Loading honey into a hive is your goal as the busy bee in the Extended BASIC game *Beeline*. While you are conscientiously gathering pollen from magical flowers, a nasty beekeeper is lurking about, ready to smoke you out of the hive. If you venture too far from the hive and get lost, do not despair. Make a beeline for the treasures in *Lost Ruins* instead! In this BASIC game you are projected into the future. Your mission: to guide your robot explorers as they seek out and recover the relics of lost civilizations. Although your digging is made easier with explosive charges, you must beware of cave-ins as you frolic about in the future trying to sort out the past.

What will the future *really* bring? Is anything certain in this ever-changing world of home computing? From what is reflected in this issue's special attractions, game reviews, and tutorial tips, we certainly can see the future promises an exciting kaleidoscope of possibilities. We'll be ready to share it all—you can be 99% sure of that!

Until next month, have fun reading, learning and RUNing!

99'er



LETTERS TO THE EDITOR

Dear Sir:

Have just finished filling out the questionnaire card, and I hate questionnaires because they never give me an opportuntiy to say all that I want to say, so I'll just sit down here and say it.

When I finally discovered your magazine last fall, it opened a new world to me. The other computer magazines seemed to be engaged in a conspiracy of silence regarding the TI computer and I had begun to think that I was the only person who had ever bought one. I hear that a couple of the other magazines have now realized that they had better recognize that the TI exists, but your magazine is certainly far better than any of those others that I used to search through.

I only hope that, in trying to cover the new TI computers and all the new developments in computing, that you do not spread yourself too thin and give each reader too little that is in line with his particular interest. The great majority of the people who pick up the *99'er* on a newsstand will be those who have bought a 99/4A, read the BASIC Manual, tried to understand the Reference Guide, and are wondering—where do I go from here? A very small percentage will ever go as far as Assembly Language, and a majority will never find the money or the need for many of the peripherals.

The first thing that I read in each issue of the *99'er*, even before I check out the game programs (well, almost) is the *Letters to the Editor*—not to read the praises for your magazine, but to read the programming tips, tricks, and short routines which your readers send in, and your replies to their problems.

Which brings me to why I started to write—I wanted to suggest that the most valuable feature that you could introduce would be a "Best of the Users Group Newsletters" column.

Jim Peterson
Columbus, OH 43213

Our first goal, Jim, is to please the majority of our readers with each issue. Our second goal is to give 99'er Home Computer Magazine *long term value by including articles that can be useful references as your knowledge grows. Someday, you may be ready to try your hand at Assembly Language with the Mini Memory or structured programming with LOGO.*

Our Group Grapevine *editor is on the lookout for good items to include from local users groups.*

We have said it before and we will say it again—"99'er Home Computer Magazine *is the least expensive peripheral you can buy for your TI-99/4A." Whatever you do, don't throw away these magazines—someday you may regret it . . .*

Dear Sir:

As a new owner of the 99/4A and a new subscriber to *99'er Magazine*, I must say that I am overwhelmingly pleased. The quality of TI hardware and software is only matched by the quality of your magazine. Now let me pose a question.

Perhaps I have missed an answer to this somewhere along the line, but I do not understand the bizarre behavior of the REMark statement in TI BASIC. You enter the word REM, space once, then follow it with your comment. It seems that when you go back later and list that statement, an extra space has been added between REM and your comment. Also, each time you make a change to the line using EDIT, it adds still another space. I think I have figured out what it is doing and when I should expect it, but I do not understand why it does this. It does not seem to serve any useful purpose and makes it difficult to get your comments left- and right-justified. There is, of course, nothing in the User's Reference Guide to explain this.

Don M. Chance
Blacksburg, VA 24060

You're right, Don, that is a characteristic of the TI BASIC REM statement. We don't have a good reason for you as to why it does it either, sorry.

Dear Sir:

I must ask you this question: The various programs that I have seen in the *99'er* (BASIC or Extended BASIC versions) written by your staff or subscribers are consistently designed so that the headings and instructions for the program are placed at the end of the program. Most of the subroutines are interspersed throughout the program. Why are they written in this format?

The reason I am asking is that I was trained to write programs (at the University of British Columbia) with a logical flow through—headings and instructions for operating the program are at the front of the program; subroutines at the end of the program. The whole program is broken into a block structure, following the format set up in the flowchart (using a top-down design).

I realize that there are many ways to design programs, I just wonder what advantages the "99'er" style has over the "institutional" style?

Rick Laktin
Alpha-Omega Computer Services
Duncan, BC V9C 2J3

Most BASIC programmers have not received training in structured programming, Rick. In some programs, those who know the rules do not follow them (in special cases) for the sake of execution speed.

Dear Sir:

Reference your article on "Matrix Muncher," March 1983 edition.

I entered this program, line by line, into my computer. I ran the program, using the sample data. However, the results were not the same. The solutions I received were:

First Example—
X(1) = 16
X(2) = −20
X(3) = 39

Second Example—
X(1) = 2.462
X(2) = 13.85
X(3) = 8.31

As you can see, the second example was correct for X(2) and X(3), whereas, in the first example none were correct.

I even modified the program to Extended BASIC and received the same results.

Since I have had some computer training (AAS Degree, Computer Science), I attempted to analyze the program to find an error. However, since I don't completely understand the logic of the matrix, I could not determine where I went wrong (assuming no errors existed in the program as published) or if there were an error in the program.

I enjoy the magazine very much and the articles have been very informative; however, some programs (and some articles) are hard to understand. For example, the Assembly Language on the TI

Continued

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 (i.e., 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

```
100 ABCDEFGHIJKLMNOPQRSTUVWXYZ+)(*
    &^%$#@!-/:;>.<,"'?_][~|{}\`@12
    3456789
```

99'er =End of Program or Article

compu-prestidigitation

(kóm·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

2 . 7 . 1 . XB AL MM EM

- volume no.
- issue no.
- version
- 1 = original program
- 2 . . . n = no. of update
- TI Extended BASIC
- Assembly Language
- Mini-Memory Required
- 32K Expansion Memory Required

GROUP GRAPEVINE

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

From Sidney, Australia, the active **T.I.S.H.U.G., TI Sidney Home Computer User Group** writes that they provide a Programmer's Crisis Line for members who become stumped in the middle of a program. In their exceptionally entertaining and informative newsletter, the group presents original software, cartoons, articles, and reviews of interest to TI users. Among the humorous pieces in their March issue is an interview with Ivan Computernutskov, a frustrated home computer user in the USSR who is unable to find peripherals or software for his Siberian Instruminski computer. TI users throughout the world will sympathize with Ivan's plight. The *Sidney News Digest* tells us also that Modem Communications was the topic of T.I.S.H.U.G.'s May meeting, and that they are currently soliciting ideas for their biannual, all-day tutorial workshop. T.I.S.H.U.G. is eager to exchange software and ideas with other users groups. Brian Lewis is the acting coordinator for the group, and their address is P.O. Box 149 Pennant Hills, N.S.W., Australia, tel. (02) 848-0956.

The president of the **TI Users Group in Jacksonville, FL** writes that those interested in joining the group can reach them by contacting W.K. Knight at 7266 Bunion Dr., Jacksonville, FL 32222, tel. (904) 778-4507.

MAGNETIC, the **Massachusettes Group of Ninety-Nine Equipped TI Computers** in Andover, MA holds its meetings on the first Sunday of each month at the Greater Lawrence Tech School, 57 River Road, Andover, MA. Those interested can write to its president, Robert W. Cashman at 692 Lowell St., Lawrence, MA 01841.

The **MSP99 Users Group in Minneapolis/St. Paul, MN** is forming special interest groups on such topics as Investment and Business, LOGO, Assembly Language, Beginning Home Computer Use, and Education. The *Multiplan* package was demonstrated at their April meeting. For information write MSP Users Group, P.O. Box 12351, St. Paul, MN 55112 or call its (newly elected) president, Diane Kavanaugh at (612) 644-5940.

The **9900 User's Group in Moorestown, NJ** provides a software exchange and group library for its members. Those interested in attending a group meeting should contact Michael J. Baker, vice-president. The 9900 User's Group, P.O. Box K, Moorestown, NJ 08057.

And finally, Northwest Florida TI users can now meet kindred spirits at monthly meetings of the **Northwest Florida 99'ers Group**. For more information, contact Jerry L. Carroll 1253 Holliday Dr., Gulf Breeze, FL 32561, tel. (904) 932-4522.

We know you're out there. We've heard rumblings of groups here and there (TI-HOME in the U.K., for instance) who have yet to contact us. If you would like your group's name heard 'round the world, send a note—or better yet, a group newsletter—to the **Users Group Editor, 99'er Home Computer Magazine, 1500 Valley River Drive, Suite 250, Eugene, OR 97401.**

99/4A I have yet to understand. I have the Owner's Manual for the Assembly Language and have the Mini Memory cartridge. To date, I have been unsuccessful in writing a program. Also, I have not been able to comprehend your articles concerning Assembly Language. Unfortunately, there is no material available to explain this subject (to my knowledge).

I might add, I learned Extended BASIC on a DEC PDP-11/34 system. I found the Extended BASIC for the TI 99/4A to be more powerful and easier to convert programs from other systems. In fact, it seems a program entered into the TI takes less memory. For example, I had one program which exceeded the memory of the PDP-11/34 (28K) but did not exceed the memory of the TI (16K). Therefore, it seems the TI utilizes its memory better than the PDP-11/34. Both programs performed the same number of functions. Probably the most significant differences are the functions DISPLAY and ACCEPT which the PDP-11/34 did not have. Instead a subroutine was required to position the cursor and to print the data on the screen at various positions.

Wayne Boody
Pueblo, CO 81001

Wayne, we have rechecked the Matrix Muncher *program listing in the magazine, retested it, and we still obtain the correct answers. We suggest you recheck each character of the program as you entered it against the listing in the March issue. Pay close attention to lines 510 through 890.*

Regarding 9900 Assembly Language: Assembly Language on any machine is difficult to grasp and very few people have the time and interest to become good Assembly Language programmers. The road to success is paved with much reading, but mostly trial and error. Some of the "Super Language" articles we present are tutorial, some are useful as finished software packages, and some describe "tools" that can be used in Assembly Language programming (such as the memory relocator utility in this issue).

Your comments regarding BASIC on the Home Computer versus the PDP 11/34 are very interesting . . .

Dear Sir:

First, I would like to commend you on your fine magazine.

As I am a "ham" radio operator, I am encouraged to see that other "hams" also own 99/4A's and are interested in related articles and software.

After some investigating, I have learned that Kantronics of Lawrence, Kansas is in the process of manufacturing an interface for the 99/4A which will allow direct hook-up to amateur radio gear permitting use of CW/RTTY/ASCII. This unit will be similar to units they now have for other computers. They told me the unit would be available in April and cost $99.95.

As a suggestion, it might be informative to carry an article on the compatability of various models of TV's when used with TI computers, as some sets lack enough width to display all the information. Perhaps there may be some suggestions on how to correct this.

One other suggestion is in the layout of your programs. I think it would be much easier for copying and correcting errors if they were printed on succeeding pages rather than having a program broken up throughout the magazine.

Clarence E. Schwartz
Fond du Lac, WI 54935

Thanks for the information on the Amateur Radio Interface from Kantronics; we will check it out. The problem of TV sets with "overscan" has been a hassle for many owners. Not only does this problem vary between set manufacturers, but also between different sets of the same model!

Our suggestion: If possible, try the TV set with the Home Computer before buying the TV, or purchase a color video monitor built for this purpose.

It may seem that we deliberately split up the program listings, but in truth, we do our best to keep them together.

73's, Clarence.

Dear Sir:

Congratulations for a great magazine! I especially like your articles on games and assembly language programming.

I've picked up some good ideas from short programs sent in by readers and printed in *Letters to the Editor*. Have you considered a regular column devoted to programming special effects?

Do you have any word on the availability of a compiled version of TI Extended BASIC? The increased speed would certainly be appreciated by game and scientific programmers alike.

Keep up the good work.

Bob Clunn
Richardson, TX 75080

Bob, rather than a regular column for special effects, we print special articles such as Sprites in Depth *in this issue.*

We have not heard of any compilers for Extended BASIC yet . . . Now there *is a challenge for some really great programmer!*

Dear Sir:

I have owned my 99/4A for about 9 months. May I just say that your magazine is just what I've been looking for in a world I thought was biased against TI computers.

I (like so many other 99/4A owners) own the terrific new space game: *Parsec*. So, when I saw Bob Gagle's *Strategy Corner* article on helpful hints for *Parsec*, I read it with great interest. However, I found a different approach to destroying the Dramites. Here it is:

First, on the earlier levels (not past level three), I find it easier to switch to lift 2 and move to the lower part of the screen. Then, when the Dramites appear, simply move upward and keep the fire key depressed. Since the Dramites follow you wherever you go, they just walk into your fire! Don't do this past level three, however, for you cannot keep the fire button depressed for very long and keep from overheating.

I commend Bob Gagle on a great article that gives beginners and advanced players alike great playing tips. Thanks!

Patrick Bodayle
South Orange, NJ 07079

Patrick, it sounds like you are being unfair to those Dramites! Be a sport, give 'em a chance. Seriously, glad you enjoyed Mr. Gagle's Strategy Corner.

Dear Sir:

I am writing to tell you how much I enjoy your magazine, although I wish you would print more TI BASIC programs instead of Extended BASIC and LOGO. And not just game programs, maybe some short ones.

My name is Andy Browning and I am 11 years old and in the 6th grade. And I would like to know a little bit more about the disk drive. Your magazine is funny, informing, and nice. And I'm very glad I subscribed.

Andy Browning
Middleton, OH 45402

We try and balance each issue, Andy, so there is something for everyone. We are always on the lookout for good, short BASIC programs to publish.

To learn about disk drives, read the article entitled The Drive for Diskettes *in this issue. It is the first of a two part tutorial.*

99'er

Send in Your Photos and Anecdotes

Do you have a favorite photograph (color or black and white) featuring an unusual application of your Home Computer? Would you like to share your unusual or amusing anecdotes relevant to Home Computing? *99'er Home Computer Magazine* will pay $25 for items it publishes. Material chosen will be subject to the same copyright treatment as "Letters to the Editor" as set forth on the Masthead page. No submissions can be returned. Send anecdotes and copies of photos to: Potpourri Editor, 99'er Home Computer Magazine, 1500 Valley River Drive, Suite 250, Eugene, Oregon 97401.

PLEASE HELP — THANK YOU

IF YOU HAVE ALREADY ANSWERED OUR QUESTIONNAIRE . . . Please check here ☐ and simply return your B.A.R.C. BACK selection.

Detach, fold and mail. See other side for instructions.

Think of it—

This 4-minute Questionnaire can *actually* impact the Home Computer revolution!!!

FOR ALL READERS

1. **Are you presently a subscriber?** ☐Yes ☐No
2. **If not, do you intend to become one within the next 3 months?** ☐Yes ☐No
3. **If not a subscriber, where did you get your copy?** ☐Newsstand ☐Supermarket ☐Bookstore ☐Airport ☐Users group ☐Computer store ☐Chain/department store ☐Borrowed from friend ☐Other place
4. **What category of articles do you enjoy the most?** ☐BASIC programming tutorials ☐System tutorials ☐Photo features & news items ☐Game programs ☐Education programs ☐Utility programs ☐Product reviews ☐LOGO articles
5. **How much total time do you spend with each issue?** ☐Less than 2 hours ☐2-4 hours ☐5-7 hours ☐8-10 hours ☐11-13 hours ☐over 14 hours
6. **How many other computer-related magazines do you currently read?** ☐None ☐1 ☐2-4 ☐5 or more
7. **Are you** ☐Male ☐Female ☐Under 16 years of age ☐16-20 ☐21-25 ☐26-30 ☐31-35 ☐36-40 ☐41-50 ☐over 50
8. **Are you a student?** ☐Yes ☐No
9. **What is your annual household income?** ☐Under $5000 ☐$5000-$9999 ☐$10,000-$14,999 ☐$15,000-$19,999 ☐$20,000-$24,999 ☐$25,000-$30,000 ☐over $30,000
10. **What is your ZIP code?** ☐☐☐☐☐

FOR READERS WHO DON'T YET HAVE A TI COMPUTER

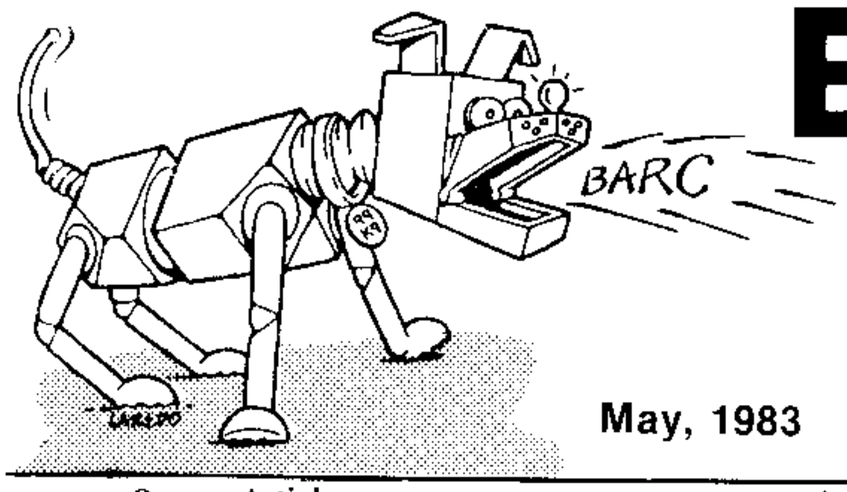
1. **Do you intend to buy a TI computer?** ☐No ☐Yes (within 3 months) ☐Yes (within 3-6 months) ☐Yes (within 6-12 months)
2. **Which do you think you'll purchase?** ☐TI-99/4A Home Computer ☐TI-99/2 Basic Computer ☐Compact Computer 40
3. **What do you anticipate your primary use of a TI computer will be?** ☐Entertainment ☐Education ☐Computer literacy ☐Household management ☐Job-related homework ☐Business ☐Professional use

FOR PRESENT TEXAS INSTRUMENTS COMPUTER USERS

1. **Which system(s) do you currently own?** ☐99/4 ☐99/4A ☐99/2 ☐CC-40
2. **What was your primary reason for buying it?** ☐Entertainment ☐Education ☐Computer literacy ☐Household management ☐Job-related homework ☐Business ☐Professional use
3. **What was your primary reason for buying the Texas Instruments brand?** ☐Company name/reputation ☐Features for the money ☐16-bit microprocessor ☐Convinced by friends/relatives ☐Ease of use ☐Prior use in course or "Advantage Club"
4. **Which additional TI computer are you likely to purchase within the next 6 months?** ☐None ☐99/4A ☐99/2 ☐CC-40
5. **What peripherals do you currently use?** ☐Cassette recorder ☐Disk controller & drive(s) ☐Peripheral Expansion Box ☐RS232 ☐32K Memory Expansion ☐TV ☐B/W monitor ☐Color Monitor ☐Speech Synthesizer ☐Joysticks ☐Printer ☐Modem ☐p-Code Card ☐Hex-bus Adapter ☐Wafertape Drive
6. **Put a CIRCLE around the above peripheral you are most likely to buy within the next 6 months.**
7. **Mark all TI language software you own or plan to buy within 6 months.** ☐Extended BASIC ☐99/4A Editor/Assembler ☐UCSD Pascal ☐LOGO ☐Forth ☐Mini Memory ☐Pilot ☐CC-40 Editor/Assembler
8. **How much money do you expect to spend within the next 12 months on your computer system?**

Software	☐None	☐less than $30	☐$30-50	☐$51-100	☐$101-250 ☐over $250
Peripherals	☐None	☐less than $50	☐$50-100	☐$101-250	☐$251-500 ☐over $500
Books	☐None	☐less than $10	☐$10-25	☐$26-50	☐over $50
Blank tapes & disks	☐None	☐less than $15	☐$15-35	☐$36-75	☐over $75
Furniture, dust covers, & accessories	☐None	☐less than $25	☐$25-100	☐over $100	

9. **How many software CARTRIDGES do you expect to purchase within the next 12 months?** ☐None ☐1-3 ☐4-7 ☐8-12 ☐over 12
10. **What % of the above CARTRIDGES will be for entertainment?** ☐0% ☐less than 25% ☐25-50% ☐51-75% ☐76-100%
11. **Circle above what % of the CARTRIDGES will be for education.**
12. **Have you purchased from any of our advertisers in the magazine within the last 6 months?** ☐No ☐Yes, Software ☐Yes, Peripherals ☐Yes, Books ☐Yes, Blank tapes & disks ☐Yes, Furniture, dust covers & accessories
13. **About how much money have you spent on the above purchases?** ☐less than $25 ☐$25-50 ☐$51-100 ☐$101-250 ☐$251-500 ☐$501-1000 ☐over $1000
14. **On the average, about how many program listings in each issue do you key into your computer and use?** ☐None ☐1 ☐2 or 3 ☐4 or more



May, 1983

B.A.R.C.* BACK

*(Best Article—Reader's Choice)

Let us know what you like by voting for your favorite article or program in this issue. The winning author will receive a bonus of $100.00

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☐	12	Word Processor Market Basket	Brader
☐	16	Generalized Filing Program	Cromley
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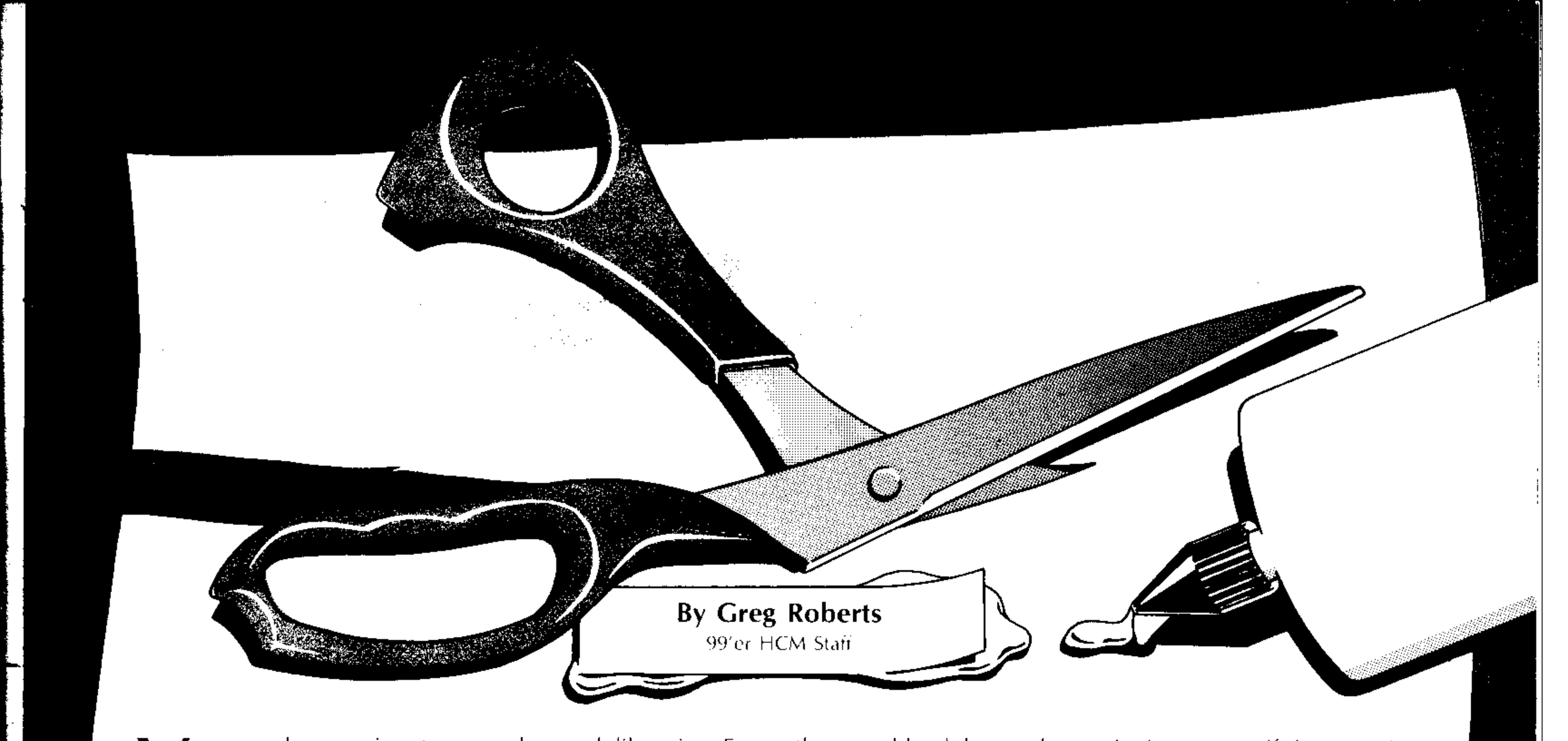


By Greg Roberts
99'er HCM Staff

Your word processing story may be much like mine: For many years I used a "word processor" that could fit in my shirt pocket; it consisted of an X-Acto knife and a small flask of Elmer's glue. With this primitive kit I could doctor my manuscripts endlessly by slapping down layer upon layer of corrections. The final version, ready for photocopying, looked like a topographic map of the Grand Tetons—intricately landscaped with smudge-slides, ink-bleeds, and fuzzballs grabbed by the glue.

So, when the first word processors came into being, you can imagine how excited I must have been. Well I wasn't. To be shackled to a blinking cathode-ray tube would, I thought, pull a white sheet over the creative process; after all, some of my best stuff came to me while I was pacing the back porch, sitting in a laundromat, or even riding a bus saturated with punk-rock music.

But let me spare you the scenario of my coming around to the blessings of word processing. A hundred such stories have already been scribbled and spit out at the public like a barrage of disaster leaflets dropped from a B-1. Besides, the writer's drama is supposed to take place in a New York apartment, a place this backwoods Oregonian could never tell of convincingly—so let's get down to the facts.

First off, why is there such dread of the green screen? You spend little time at the screen, much less so than at a typewriter, and you can get the same paper copy—that security blanket to cling to. As it turns out, using the computer is so much faster than reworking all those versions on a typewriter, few people still argue whether or not word processing is a good thing—except, perhaps, in remote areas where the few who can write must bag their own goose quills with a flintlock. In other words, anyone who has use for a typewriter would be better off with a word processor.

We are left, therefore, with one major consideration: expense. Does our writing justify buying the computer system? That question will take some analysis.

Who Needs it?

Certain professions have long been able to justify word processors, even with equipment costing thousands of dollars per year to operate. Journalists, lawyers, and mail-order houses produce a flood of forms and letters which can be "personalized" with word processing equipment, creating enormous savings in secretarial work. This kind of word processing, however, has little to do with most home computer users.

The average person's writing may be limited to a few business letters, some school papers, a recipe file, or perhaps the monthly club newsletter. And yet, even if the quantity of the writing is not large, there is much to encourage the home computer owner to consider word processing. Your computer system may already be very nearly ready for word processing. Those owners who have bought, for one reason or another, the peripheral expansion box, RS232 card, disk drive and printer are extremely close to owning a word processor. Depending upon the components in your TI-99/4A system, you could spend anywhere from $50 to $1000 to bring it up to word processing status. Your decision to pick up these other peripherals must be based on the quantity and importance of your writing—not to mention the value of a full system for other purposes such as entertainment and home management. In any case, once the system has been brought to such completion, the main concern is software.

" . . . anyone who has use for a typewriter would be better off with a word processor."

The differences among various software packages are considerable, and it pays to study them in detail. Start by keeping in mind two factors: editing capabilities and user friendliness.

You may run across software that promises to do everything for the writer except brew a midnight cappucino—but if the program isn't accessible, it will soon be gathering dust with your old 45 RPM records. On the other hand, the program which even a child can use may not permit writing on a level higher than the works of Dr. Seuss. Continued on p. 10

Be Wary

How will you know when a software designer has cooked up the right recipe for your *particular* needs? You can start by reading the various company brochures (with wallet firmly buttoned down, I would advise)—but the real truth will come out in the user's manual. It should show a program that will let you start writing with just a few simple commands—with a complexity that grows, chapter by chapter, until you can compose text under any kind of format. We can compare the ideal word processor to the book, Huckleberry Finn: Anyone can appreciate it immediately, yet it has additional circuitry for those who choose a path through denser thickets.

Workspace

A major concern is the accessibility of the page for editing. The TI monitor cannot display an eighty-character line in the same way a large, stand-alone word processor can. If you are used to typing lines of this length, you can view your work under several formats. Some programs scroll up just one line at a time for reworking, while others let you fly all over the page with your cursor. The TI system, using its *TI-Writer* Command Cartridge, lets you view your text on "screens" that shift back and forth horizontally at the touch of a key. It offers easy access to the text. For example, what if you forget to write in an important line, and don't realize it until many pages later? This program, with just a couple of key presses, lets you open up the text, change it, and close it right back again, like sneaking a tomato slice into a grilled cheese sandwich before the whole thing melts into a blob.

Similarly, you might wish to find and change a word you know you wrote a few pages or a few days ago—say the word *thermos* which you find you must go back and capitalize. In such a case, you'd like a word processor command capable of *searching* for that word. Or you may wish to change a certain word in many locations throughout the text. For example, our game designers here at *99'er Home Computer Magazine* sometimes write a complete description of their latest effort, and then decide—late in the game—to

change its name. No matter; they can punch *Blobs* for *Bombs*, and the program will automatically make that change throughout the text. In fact, whole paragraphs can be interchanged or repeated at different locations.

A similar substitution technique is the mainstay of form letters—the kind you get from politicians and from some busy relatives at Christmas. If you want to pay them back in the same friendly way, make sure your software is up to the job.

"... compare the ideal word processor to the book, Huckleberry Finn: Anyone can appreciate it immediately, yet it has additional circuitry for those who choose a path through denser thickets."

Forms and Norms

A good program will let you choose from a wide variety of formating options, after your text has been entered and edited.

Some first-rate designs will not only offer great leeway in formating, they automatically adjust the right margin (*right justification*), just like the typesetting machines used in newspaper or magazine production.

A great convenience is a program that will *wrap* ends of lines, so that they form a new line without breaking words. Too, you may be interested in a *center text* feature that lets certain items, such as tables or poems, center automatically in the text, regardless of margin justification.

Continued on p. 39

WORD PROCESSOR

MARKET BASKET

By David G. Brader

After playing exciting video games on their Home Computers for a few weeks, many owners seek out more meaningful uses for the TI-99/4A. Word processing is often the choice—and so the search for a program begins. If you are such a person and you are not sure which way to turn, scanning the data in this article and deciding what factors are important to you will make your shopping trip more satisfying.

So, what are the factors you should consider? First, give some thought to the types of applications you are likely to have for a word processor (simple letter writing and note keeping, or major tasks such as writing a novel). Knowing this will help you decide the speed and capacity that your system should provide. This, in turn, will affect the amount of money that you are likely to spend.

No matter what you plan to write with the word processor, a prime consideration is its *ease of use*. This generalized quality may be broken down into three other areas, which we rate in Figure 1: *Documentation*, *Human Engineering*, and *Usefulness*. To judge the *Documentation* of the software package, we looked for clarity, completeness, meaningful examples, and organization. *Human Engineering* refers to how easy it is to access the features of the software. Systems that required you to consult the manual or memorize key sequences in order to perform common procedures (tabulate, set margins or modify text) received a low score in this area. *Usefulness* addresses the features of the software and the frequency with which they may be used. Some fancy features are only useful to a select few while others may be used by every one.

Figure 1

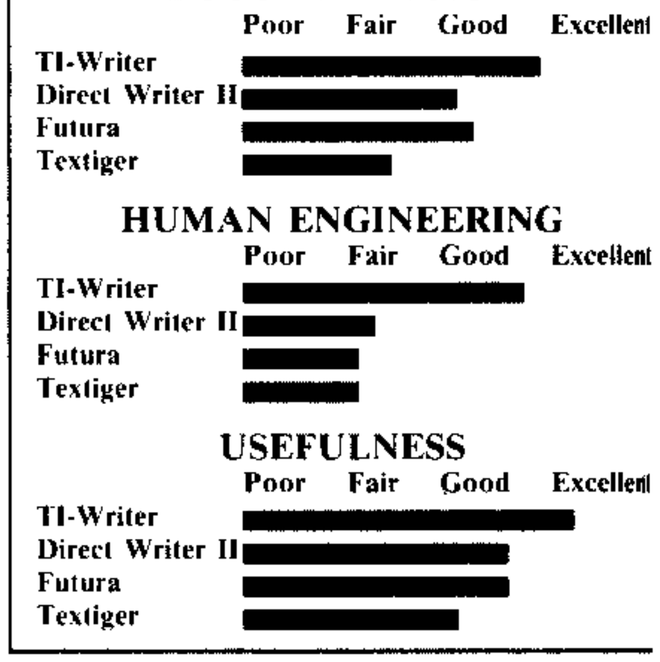


Figure 2 simply shows what equipmen is needed to utilize the software. Note tha the Textiger software package can be use on a minimal system. This is nice for jus "getting your feet wet," but it probabl would not be acceptable to those user who plan to do a lot of writing. Also, not the TI-Writer package comes with special Command Cartridge and doesn require the Extended BASIC cartridge.

The last illustration (Figure 3) lists severa features and shows which of the fou packages offer them. This list does no represent *every* feature the program offer—we are focusing on only the mo

Figure 2
Minimum Equipment Required to Support Software

	TI-WRITER	DIRECT WRITER II	FUTURA	TEXTIGER
TI-99/4A	X	X	X	X
MONITOR	X	X	X	X
EXTENDED BASIC		X	X	X
DISK CONTROLLER	X	X	X	
DISK DRIVE(S)	X	X	X	
32K MEMORY EXPANSION	X	X	X	
RS232 INTERFACE	X	X	X	
PRINTER	X	X	X	X

Figure 3
Features

	TI-WRITER	DIRECT WRITER II	FUTURA	TEXTIGER
FULL SCREEN EDITING	X			
AUTOMATIC WORD WRAP	X			
RIGHT JUSTIFICATION	X	X	X	X
AUTOMATIC LINE CENTERING	X	X	X	X
FIND STRING FUNCTION	X	X	X	X
TEXT BLOCK HANDLING	X	X		
TEXT LINE HANDLING	X	X	X	X
TEXT CHARACTER HANDLING	X	X	X	X
LINKING FILES TO PRINT	X	X		X
TEXT FORMATING	X	X	X	X
SCREEN FORMATED AS ON PAPER	X	X		
MAILING LIST INTERFACE	X		X	
LOST DATA RECOVERY ("OOPS KEY")	X			

sought-after functions. Neither is this an exhaustive survey of the word processing marketplace. Time and space limit us to what we feel is a representative cross-section.

TI-Writer—The TI-Writer package, (PHM3111) which includes the TI-Writer Command Cartridge, program diskette and manual, comes in a large, notebook style binder. The suggested retail price is $99.95 (It is available from Texas Instruments dealers).

Direct Writer II—This Extended BASIC software package is on diskette and comes with a manual of instructions. It has a suggested retail price of $66.00 and is available from Dynamic Data & Devices, P.O. Box 912, Stafford, Texas 77477.

Futura—The Futura Word Processor, another Extended BASIC package, is offered by Ehninger Associates, Inc., P.O. Box 5581, Fort Worth, Texas 76108. It also comes on diskette with a manual of instructions. Suggested retail price is $149.95.

Textiger—Offered for a suggested retail price of $59.95, this Extended BASIC word processor is designed for use with or without the 32K memory expansion and disk drives. Available from Textiger, 24433 Hawthorne Blvd., Torrance, California 90505, it can be purchased on disk or cassette and comes with a brief manual of instructions.

FOUNDATION PRESENTS . . .

THE 128K MEMORY CARD

To make a great memory card, begin with a quality design by our MIT-trained engineering team. Then add the finest components—prime integrated circuits from the top manufacturers.

Assemble each board with meticulous attention to detail and crafting. Then subject the board to intense testing. Only after this does a memory card qualify for the Foundation name.

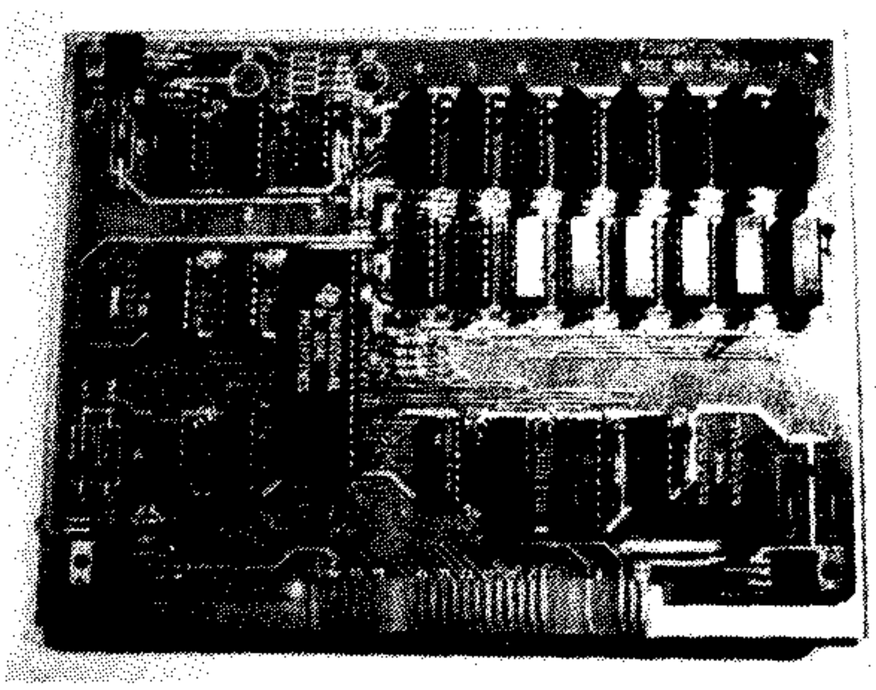
We've been shipping our 32K Memory Card in volume, and customers across the country have been calling to praise our product. As with TI's 32K card, the Foundation Memory Card comes in its own metal case and it plugs into your Peripheral Expansion Box. It runs the same programs as the TI card, including Logo, Pascal, Extended Basic, and Assembler.

If the 32K Memory Card does not meet your needs, our **128K Memory Card** is now available.

And finally, we take pleasure in announcing our **32K Stand Alone Memory Card.** The 32K Stand Alone Memory Card plugs directly into your TI computer. You do not need a Peripheral Expansion Box for its use. Otherwise, it works just like our better-known 32K product. It is also now available for shipment.

Please note that a letter or a phone call will reserve a card for you even if you can't take immediate delivery.

3 month warranty.
Prepaid/C.O.D. Add 3% shipping.
Calif. residents add 6% sales tax.
Add 2-3 weeks for delivery.



So now you have a choice* —

- The 32K Memory Card at $150
- The 128K Memory Card at $220
- The 32K Stand Alone Card at $160

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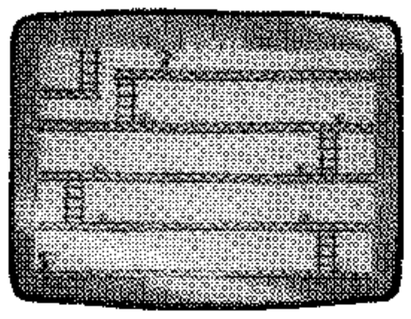
* Introductory Price — Order Now!

SOFTWARE FOR THE 99/4(A)

EXTENDED

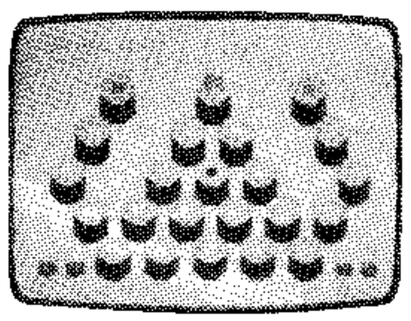
GAMES PAK/III



KONG

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

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, each more difficult than the last. Uniquely coordinated sprites, graphics and sounds make BOUNCER so like a real arcade game, you will wonder why we did't provide a slot for the quarters. Joysticks required.

Cassette or Diskette $15.00

ROMEO

ROMEO has a goal. But he must traverse the blazing desert dunes, swim a stream infested with alligators and sharks, and bolt through treacherous terrain for his just reward. This is enough action to wear out a good set of joysticks!

Cassette or Diskette $15.00

GAMES PAK/II

ARTILLERY

The opposing force must be destroyed by determining angle and force of each shot. An ever changing wind complicates matters. Play is between two players or one player against the computer. Simulates actual ballistic trajectories.

Cassette or Diskette $9.95

DE-CYPHER

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 or more can be added.

Cassette or Diskette $9.95

PUZZLE 15

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.

Cassette or Diskette $9.95

FLIP CHECKERS

Outsmart the computer or an opponent by getting all checkers flipped to your color. Computer determines its moves pleasingly fast. A board game with no pieces to lose. Joysticks required.

Cassette or Diskette $9.95

GAMES PAK/I

FROGGY

Jump FROGGY across 10 lanes of traffic then across 6 logs; keyboard or joysticks. Fabulous sprite action!

Works Like A Real Arcade Game

Cassette or Diskette $9.95

EXTENDED BASEBALL

Joystick control of the pitcher and the batter, and individual batting averages that specifically effect the batting algorithm. Multi-base and multi-runner plays. Joysticks required.

Cassette or Diskette $9.95

GORFIA PESTULITIS

Joystick control of a laser sight or inertia influenced space mines to shoot down the invading Gorfians. Joysticks required.

Cassette or Diskette $9.95

EXTENDED HANGMAN

Quick graphics, music, color, speech (optional) and sound are added to keep the players entertained. Includes 580 words of 4 to 9 letters in length in easy, medium, and difficult groups.

Cassette or Diskette $9.95

TIC-TAC-TOE

Quick set-up and quick decision making at four levels of difficulty. The levels avoid the frustration of the novice never having a chance to win, while the most difficult level will challenge the pros.)

Cassette or Diskette $9.95

TYPWRITER*

a complete WORD PROCESSOR

Now With Right Justify

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

Complete text *Editing* — by cursor control; including insert & delete lines, partial print, printer halt or abort without text loss, page FWD & BKWD, and more.

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

No Special Equipment — monitor, console. Extended Basic module, C or D, printer.

Comes with a 20 page instruction booklet.

Cassette $32.00 Diskette $35.00

NAME-IT*

DATA BASE for: *Mail Lists, Labels, Files*

Records: 250 records per diskette consisting of up to nine 28-character items per record.

Prompts: user designated prompts.

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

Search; Pre-set; print labels & lists.

Includes a FORM LETTER program that uses NAME-IT data in TYPWRITER generated form letters.

Cassette version differs from disk version.

Cassette $32.00 Diskette $35.00

*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.

SCREEN/DUMP

Print the screen on a dot-matrix printer. Does not require extra memory! Disk version is simple to use. Cassette version requires mild programming knowledge.

Cassette or Diskette.....$12.00

MASTER CATALOG

A master index of your disks and programs. Being readied at press time.

Should include: Up to 100 disks can be catalogued with up to 100 programs each — a total of *1000 programs*. Look-up time from a cold start: under one minute! Look-up time from a running program: 15 to 25 seconds! Sort time: none.

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

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Program

A Generalized Filing System

By Brent R. Cromley
235 Parkhill Drive
Billings, MT 59101

Most lawyers keep up to date by reading current publications and taking note of important cases for future reference. These notes can be hard to keep track of, especially as they accumulate over the years. The original purpose of the program presented here, *Findex*, was to provide a filing system for summaries of cases that are of particular interest to lawyers, but it can easily be modified for a variety of information-filing uses. For example, with minor changes (see Figure 1), the program is suitable for summaries of magazine articles. In fact, any professional who must read journals to keep up to date with new developments could benefit from an adaptation of this program.

Case in Point

The program is, for the most part, self-explanatory. You must first establish a file by using option 3. Then you can enter and index law cases under one, two, or three 4-letter categories. If a case requires more than three categories, it can be entered twice. The computer asks for a brief explanation of each new category, then files it immediately, with up to thirty in any one file. If more than thirty categories are required, they should be stored on several disks, each confined to a limited area of law. Figure 2 includes a sample of ten categories such as might be used in a trial practice.

Using option 2 (retrieval), the operator can review cases filed under any category. Option 4 (edit) displays all cases on the screen, one by one, and lets you either delete or retain the case in the file. Option 5 shows all categories in a file, allowing deletion of unwanted ones. The Category subroutine (lines 2720 to 2860) is also available during the entry and retrieval of cases, but without the edit function.

Definite Articles

Adapting the program to other uses is fairly simple: You merely change the lines which display words on the screen. For example, to create a file of magazine article summaries, the word "case" should be replaced by "article." The only substantive change would be to take out lines 1050 to 1080 which input the state of the law case. This allows a description of up to thirteen characters instead of ten (Line 1120). Line 1140 should then be modified by replacing the numeral 10 with 13 so that the number of characters in the top line stays at 28.

Findex will run in either TI BASIC or Extended BASIC. The original disk program was written in Extended BASIC with liberal use of the DISPLAY AT and the ACCEPT statements. LINPUT can also be used in Extended BASIC on line 1110 and 1200, thereby allowing the use of commas.

Figures 1 and 2 are examples of printouts from the *Findex* program.

99'er BASIC

Listing begins on p. 60

Figure 1—Magazine Article File

```
LOGO-PROG-NONE-1:5 99'er 58-"AVOIDING TURTLE
TRAPS"; HENRY GORMAN. TIPS ON EFFICIENT LOGO
PROGRAMS. EXAMPLES OF STUDENT PROGRAMS.

The article named appears on page 58 of Volume 1,
Number 5, of 99'er Magazine.

GAME-XBAS-GRFX-1:3  99'er  25-DOGFIGHT;
W.K.BALTHROP. AIRPLANE FIGHT GAME FOR TWO
PLAYERS. EXCELLENT GRAPHICS ON PLANES.
This game, entitled Dogfight, is found on page 25 of the
third issue of 99'er Magazine.
Category explanations for the above examples (for articles
from computer magazines):
   LOGO—LOGO language
   PROG—programming aids
   GAME—game programs
   XBAS—Extended BASIC
   GRFX—examples of graphics
```

Figure 2—Law Case Retrieval File

```
SLIM-WRTY-PLIA-MT-511FS 224-
SCHLENZ V DEERE (1981) P.I. ACTION BASED ON U.C.C.
WARRANTIES CARRIES U.C.C. STAT/LIM, NOT TORT.

This tells you the following: The case, entitled Schlenz v.
Deere, is found in volume 511 of the Federal Supplement,
page 224. The holding summarized is that a personal in-
jury action based upon warranties under the Uniform Com-
mercial Code, has a statute of limitations as provided for
in the Uniform Code, as opposed to the limitation period
normally associated with personal injury actions.

PLIA-CNEG-SLIA-OR-642P2 624-
SANFORD V CHEVROLET (1932).
PL'S MISCONDUCT & CON/NEG
BARS RECOVERY IF GREATER
THAN D'S FAULT.
This case is entitled Sanford v. Chevrolet and is reported
in volume 642 of Pacific Reporter Second, at page 624. The
holding is that misconduct by a plaintiff in strict liability ac-
tion may prevent his recovery if it is found to be greater
than any fault on the part of the defendant.

Examples of law case categories:
   NEGL—negligence
   SLIA—strict liability
   PLIA—products liability
   SLIM—statutes of limitation
   WRTY—warranty
   INST—jury instructions
   DISC—discovery
   SUMJ—summary judgment
   CNEG—comparative negligence
   CFLT—comparative fault
   DEAD—wrongful death
```

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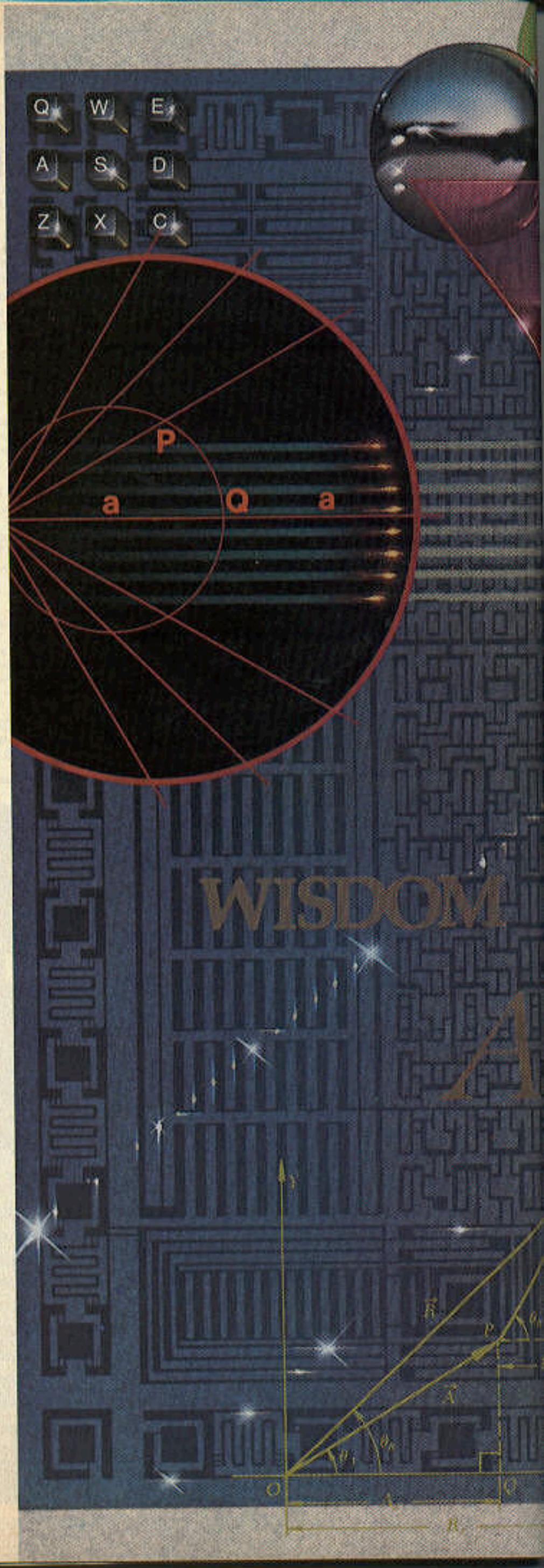

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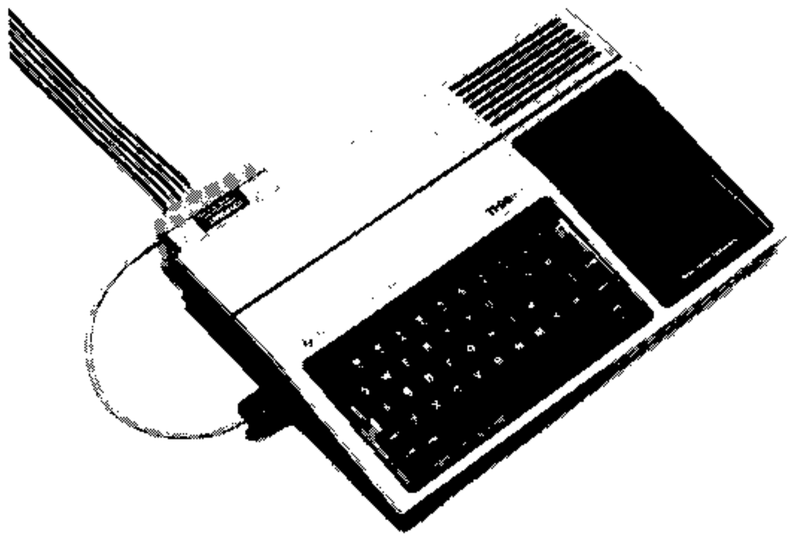

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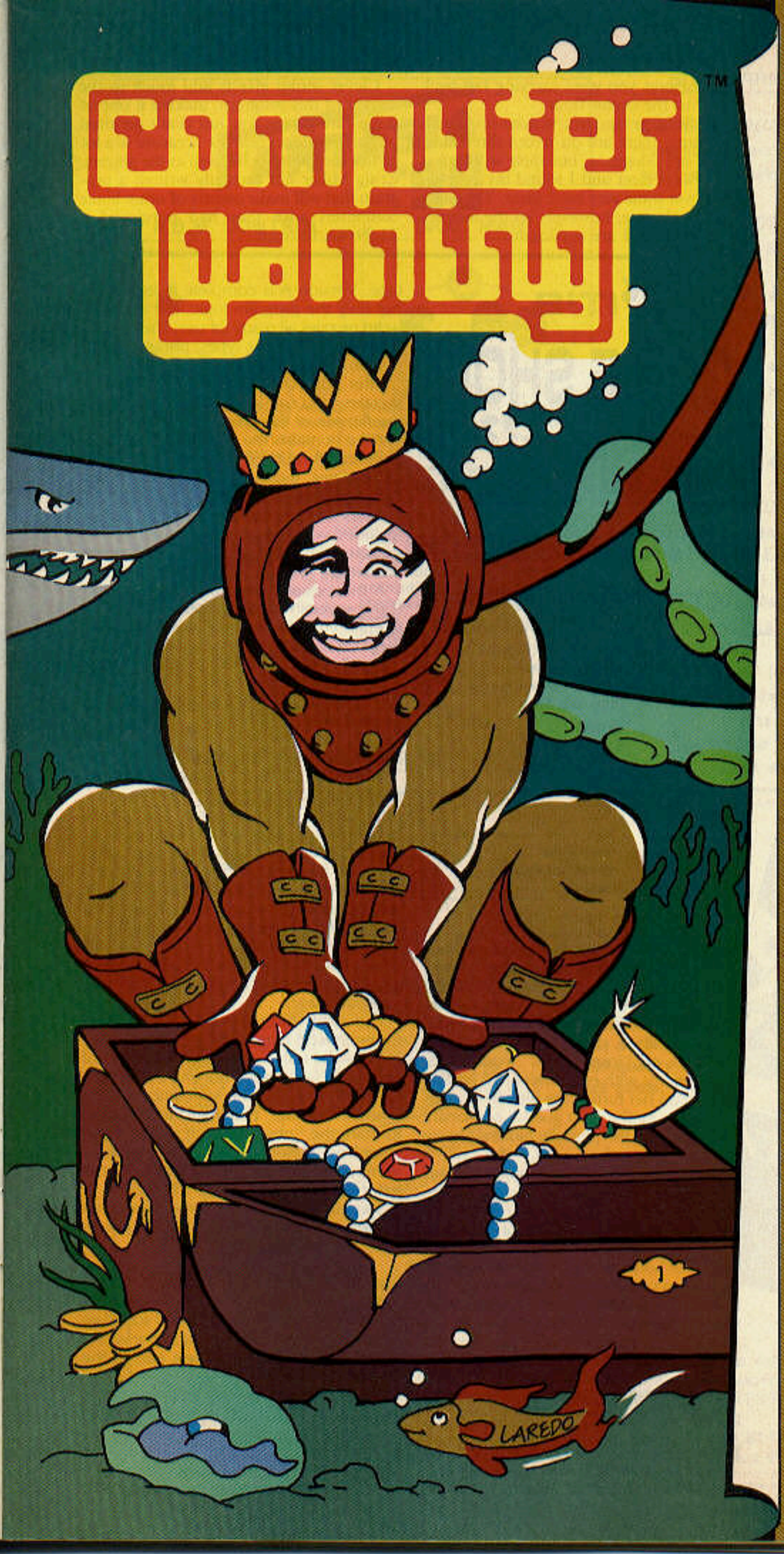


DIVING FOR DOUBLOONS

A Review of Blackbeard's Treasure

By Steve Schwartz

Author:	Craig Miller
Program Type:	Arcade "Treasure Diving" Game
Language:	Extended BASIC
Distributor:	Millers Graphics 1475 W. Cypress Ave. San Dimas, CA 91773
Price:	$14.95 cassette, $17.95 disk

System Requirements:
Extended BASIC cartridge

	Poor	Fair	Good	Excellent
Performance				
Engrossment				
Documentation				

If you like the "chicken crossing the road" and "frog crossing the river" games, you're gonna love this new game from Millers Graphics!

Everything about this Extended BASIC program is professional—from the opening music and graphics display to the game itself. Even the instructions are unique: While they are running, you have the opportunity to practice moving the diver (with the arrow keys or joystick) before he is submerged into shark infested waters.

When the program does begin, you take the role of a diver sitting in a boat near the top of the screen. Below you are four menacing sharks swimming in different directions and at different speeds across the screen. At the bottom of the screen is the ocean floor, where two ugly octopuses creep along. The various treasures are strewn about the ocean floor. Your job is to retrieve them—one, two, or three at a time—and bring them to your boat. You must dodge the sharks going down, elude the octopuses while picking up the treasures, and avoid the sharks once again on your way up to the surface. Because the sharks and octopuses are moving slowly in the beginning, you should have no serious trouble accomplishing your mission. Once you gather 10 treasures, your job does become harder. You guessed it—more sharks and greater speeds. With each 10 treasures you retrieve, you progress to a more difficult level—until the water is literally swarming with sharks! The author has added some realistic touches: You'll rise to the surface at a slower rate of speed depending on how many treasures you're carrying, so don't be too greedy! Also if you get eaten by a shark on the way up,

GAMEWARE BUFFET

LOST RUINS

BASIC

By B. J. Bruns
1417 B. Friendship Lane
Rantoul, IL 61866

The year is 9900 A.D.. For nearly 8000 years, human beings have been roaming and conquering the galaxies. Many civilizations have risen and fallen over the millenia; among them, those of the planet Earth. The interplanetary records were destroyed 6000 years ago by a super nova, and now no one in the galaxy can say where human beings had their beginnings. Consequently, there is a massive archaeological effort under way to locate the lost planet where mankind originated. You are in charge of a robot ship sent to seek out and recover the ruins of those ancient, 20th century civilizations. Your motivation goes beyond mere intellectual curiosity: Enormous rewards are being offered for any evidence that may lead to the discovery of Earth.

Your robot ship lands on a lush, green planet that fits the descriptions passed down by the storytellers. This may actually be the ancient planet Earth! But you must find sufficient evidence to back up your hypothesis. You have three robots to do the dirty work. Before landing, the ship blasts a hole 20 feet deep into the soil to take samples. Your first robot will descend into that hole and continue the search, detonating charges and collecting ancient relics—1952 Chevrolet bodies, old bowling trophies—as it tunnels beneath the earth's surface. The others wait patiently, ready to take over should the tunnel cave in and crush their comrade.

The Game

You can control the robot through either the joystick or the keyboard. With the joystick, use the fire button to detonate the blaster. On the keyboard, use the arrow keys to maneuver your robot and the Y key to fire the blasters. The blaster will clear 5 squares of earth. Each robot can carry a maximum charge of ten blasts. The blaster will detonate in whichever direction the robot is pointed. If you are working too close to the edge of the screen, the blaster may not detonate. (Perhaps as a safeguard to keep you from blasting out the side of your monitor or TV set?)

You must take extreme care in using the explosives or you will face the possibility of a cave-in. Extensive blasting will result in more frequent cave-ins. The robot can move freely through the tunnels already excavated, or through areas where artifacts are buried. The blaster is the only means of excavating anywhere else. To pick up an artifact, you merely make contact with it. But to get *points* for it, you must carry it up to the surface. If you use up all your blasters, you can return to the ship for more.

Once your supply of blaster charges reaches zero, you have only a short time to reach the surface or the robot's circuits will overheat and melt! If your robot is trapped by a cave-in after expending the last blaster charge, there is nothing it can do but wait until its battery dies. If you still have a back-up robot, you can recover any artifacts the dead robot was carrying by simply entering that area.

There are three types of artifacts. The most valuable are skeletal remains. (These are the best way to identify the planet's inhabitants.) The next-best artifacts are technological remains which are designated by shapes resembling cars. Even the third type—miscellaneous garbage piles—are useful in proving the identity of this planet's inhabitants.

After successfully retrieving all of the artifacts from the screen, your robots will move on to explore a new area of the planet—while you ponder the strange remnants of this bygone civilization.

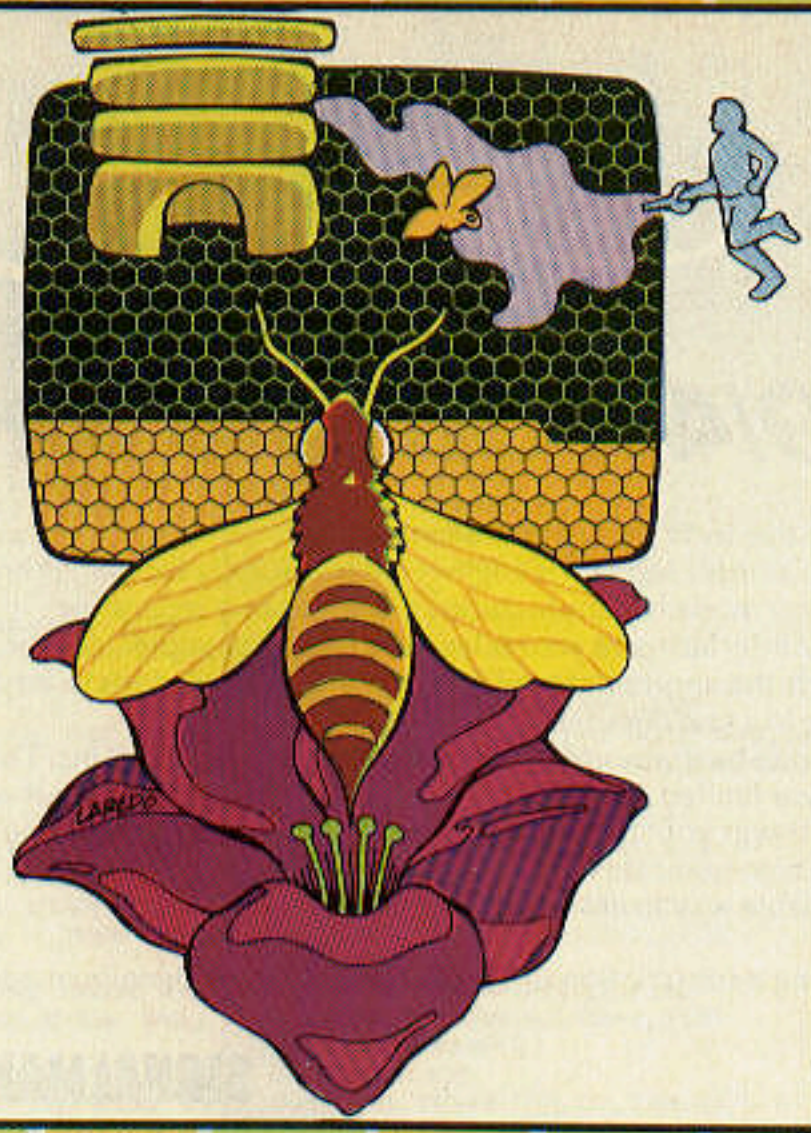
99'er

EXPLANATION OF THE PROGRAM
Lost Ruins

Line Nos.	
100-160	Header and REMs.
170-200	Clear screen, and branch to set up game.
210-460	Place excavation site and artifacts on screen.
470-850	Routines for robot's landing.
860-980	Routine to read joystick and keyboard.
990-1540	Move robot and check for artifacts.
1550-1880	Control blaster explosion.
1890-2070	Check for distribution of artifacts.
2080-2180	Cave-ins.
2190-2380	Robot killed in cave-in.
2390-2560	Calculate robot's charges.
2570-2630	Routine to display strings anywhere on screen.
2640-2710	Replay option. End of game.
2720-3290	Routine for zero charge on robot. Time delay to get out.
3300-3360	Print title screen.
3370-3450	Print introduction.
3460-3840	Set character patterns and colors.
3850-3900	Scroll up robot's ships.
3910-3980	Initialize variables.
3990-4020	Print playing screen text.

Continued on p. 27

BEE-LINE



EXTENDED BASIC

By David W. F. Welcker
261 South Street
W. Bridgewater, MA 02379

You are a dedicated worker bee trying to fill ten honeycombs before the onslaught of winter. Your foes are formidable—a beekeeper who is trying to smoke you out, and the constant threat of flight fatigue. To find pollen-rich flowers, you must follow the signals of your fellow drones. The louder the buzzing, the closer you are. Finally, you locate the flower patch. You dive and swerve—chasing the flowers as they reveal themselves in short flashes. Your wings feel heavy as you head back to the hive, loaded down with pollen. You must fly efficiently—your strength is waning. Hooray, you made it back to the hive! Now enter and unload the pollen. Oops! Smoked out by the beekeeper. After him! HA! YOU GOT HIM! Now to the blue hive to steal some more pollen. Hmmm this is too easy to be true . . . Uh-oh—smoke! Rats! You got caught and lost your pollen. If you can sting the beekeeper's thumb, you will preserve the pollen supply. Got him! Now back to finish this level.

And then on to the next level, fighting greater fatigue and constant peril. As proven before in these pages, the life of an insect is not easy. Doesn't that maniacal beekeeper do anything all day but steal pollen?

Performance in this game is measured by the number of levels completed. Points, which indicate the strength of the bee, are awarded for depositing pollen in the home hive, stinging the beekeeper, and filling a level of the hive. The game ends when your store of points (strength) is depleted to zero, or when level ten is filled with pollen. If you are caught in smoke inside the hive, you must sting the beekeeper's thumb or risk losing rows of pollen according to the level of play. Note that a level is completed by filling the hive with pollen (every other row) and then leaving it safely.

Programming Notes:

In the first version of this program, the honeycomb filled the screen and the bee filled each cell of the comb. Though that was pleasing graphically, the present version permits quicker operation and play on more than one level. Note that the level variable G is used liberally throughout the program to increase difficulty—more frequent smoke-outs with less predictable direction of smoke, quicker magic flowers, faster beekeeper response and greater penalties and rewards.

A few features were sacrificed in this program because they would have slowed down the action or made it less realistic. For instance, attempts to make the beekeeper move evasively (through use of a CALL MOTION statement) would have required the use of a separate routine. This would not permit checking for immediate hive re-entry without a great loss of speed and missed beekeeper hits.

Beeline was written for joysticks, but to accommodate those without them, performance was compromised a bit to make them optional. A pause feature is essential to this type of game and is activated by pressing P while inside either hive. A quiet buzzing signals activation of the pause . . . the calm before the swarm!

99'er

EXPLANATION OF THE PROGRAM
Beeline

Line Nos.	
100-150	REMs, and header.
160-410	Initialize variables. Display title screen.
420-470	Input options.
480-650	Control bee's hunt for pollen.
660-770	Control bee in the hive.
780-800	Start of the game.
810-900	Control smoke and beekeeper.
910-930	Display collected pollen.
940-1020	Display outcome of game.
1030-1050	Read keyboard, and joystick.
1060-1290	Display instructions.
1300	Subroutine to scan the keyboard.

```
100 REM ******************
110 REM *    BEELINE     *
120 REM ******************
130 REM BY DAVID WELCKER
140 REM 99'ER VERSION 2.7.1XB
150 REM
160 RANDOMIZE
170 CALL CLEAR
180 DISPLAY AT(2,12):"BEELINE"
190 CALL SCREEN(11)
200 M$=RPT$(CHR$(124),28)
210 OPTION BASE 1
220 DIM V$(2),Q$(2,18)
230 V$(2)=RPT$(CHR$(117)&CHR$(116)
    ,7):: V$(1)=RPT$(CHR$(119)&CHR
    $(118),7)
240 CALL CHAR(96,"0000102B10000000
    ",97,"",98,"",99,"")!REM OPEN
    FIELD BEE
250 CALL CHAR(104,"0101010100303C43E
    3",105,"0303030303030300",106,
    "B0C0C0C0803DE4E0",107,"E0E060
    6060206030")
260 CALL CHAR(108,"0103030301303C230
    3",109,"0707030302030306",110,
    "B0C0C0C0803DE2E0",111,"E0E060
    6060606000")
270 CALL CHAR(112,"000000000000B1C0
    B")!REM FLOWER BEE
280 CALL CHAR(116,"F00804020102040
    8",117,"0102040BF0080402",118,
    "F0FBFCFEFFFEFCFB",119,"010307
    0FFF0F0703")
290 CALL COLOR(11,2,11)
300 FOR L=4 TO 20 :: DISPLAY AT(L,
    1):V$(1-(L/2=INT(L/2)))&V$(2+(
    L/2=INT(L/2))):: NEXT L
310 CALL CHAR(114,"442838382838281
    0")! REM HIVE BEE
320 CALL CHAR(120,"FF00FFFF00FFFFE
    7")!REM HIVE
330 CALL CHAR(124,"CC33CC33CC33CC3
    3")! REM SMOKE
340 CALL CHAR(126,"3F4985858585493
    F",127,"FC92A1A1A1A192FC")! RE
    M THUMB
350 CALL CHAR(129,"6EFFFF7EFFFFFF7
    6")! REM MYSTERY FLOWER
360 CALL CHAR(130,"183C7EFF7E3C1800
    ")!REM POLLEN
370 CALL CHAR(136,"FF00FFFF00FFFFE
    7")!REM BLUE HIVE
380 DISPLAY AT(23,5):"INSTRUCTIONS
    ? (Y/N)"
390 CALL MAGNIFY(2):: CALL SPRITE(
    #1,114,2,210,210,-4,-4)
400 CALL KEY(0,K,S):: IF K=89 OR K
    =121 THEN 1060 :: IF K<>78 AND
     K<>110 THEN 400
410 CALL COLOR(10,11,1,13,14,1,12,
    16,15,13,11,1,14,5,15)
420 DISPLAY AT(6,5)ERASE ALL BEEP:
    "START LEVEL? (1-9)"
430 CALL KEY(0,K,S):: G=K-49 :: IF
     G>8 OR G<0 THEN 430 ELSE DISP
    LAY AT(6,25):STR$(G+1):: G1=G+
    1
```

Continued on p. 26

Beeline

```
440 DISPLAY AT(12,5)BEEP:"JOYSTICK
    S? (Y/N)"
450 CALL KEY(0,K,S):: IF K=78 OR K
    =110 THEN 470
460 IF K<>89 AND K<>121 THEN 450 E
    LSE JS=-1 :: DISPLAY AT(22,5):
    "CHECK ALPHA LOCK" :: GOTO 480
470 JS=0
480 CALL DELSPRITE(ALL):: R=40 ::
    C=125 :: Z=0 :: GOTO 780
490 FOR L=1 TO 18 :: Q$(1,L)=V$(2)
    :: Q$(2,L)=V$(1):: NEXT L :: I
    F G>10 THEN 990
500 CALL HCHAR(3,1,32,704):: CALL
    SCREEN(4):: C9=0
510 CALL VCHAR(4,24,120):: CALL VC
    HAR(4,8,136):: CALL MAGNIFY(1)
520 CALL SPRITE(#5,96,2,R,C):: IF
    J>4 AND J<23 THEN 860
530 CALL DELSPRITE(#9):: F1=60+INT
    (RND*130):: F2=25+INT(RND*215)
    :: J=4 :: L=0
540 GOSUB 1030 :: CALL MOTION(#5,-
    Y,X)
550 CALL POSITION(#5,B1,B2):: S=IN
    T((ABS(F1-B1)+ABS(F2-B2))/17.2
    ):: CALL SOUND(-500,RND*6+110,
    S)
560 IF ABS(B1-32)<6 AND((ABS(B2-18
    7)<6)+(ABS(B2-60)<6))THEN 660
570 IF L>0 THEN 880 :: SC=SC-S ::
    GOSUB 910 :: IF S>0 OR Z=25 TH
    EN 540
580 CALL DELSPRITE(ALL)
590 CALL MAGNIFY(2):: CALL SPRITE(
    #10,129,7,122+RND*62,RND*230+1
    ):: CALL SPRITE(#6,112,11,100,
    120)
600 GOSUB 1030 :: CALL MOTION(#6,-
    2*Y,2*X)
610 CALL COINC(ALL,N):: SC=SC-G-N*
    G*4 :: CALL POSITION(#6,R,C)::
     IF R<60 THEN 650 :: IF N THEN
    640
620 GOSUB 910 :: CALL SOUND(-500,R
    ND*8+110,3):: IF RND<.90-G*.01
    5 THEN 600
630 CALL LOCATE(#10,90+RND*70,10+R
    ND*230):: GOTO 600
640 Z=Z+1 :: CALL SOUND(-300,120+Z
    ,5):: IF Z<21 THEN 620
650 CALL POSITION(#6,R,C):: CALL D
    ELSPRITE(ALL):: GOTO 510
660 C9=(ABS(B2-187)<6):: H=2+C9 ::
     CALL DELSPRITE(ALL)
670 CALL MAGNIFY(2):: CALL SCREEN(
    2):: CALL HCHAR(3,1,32,704)::
    IF J>4 THEN 690
680 R=165 :: C=124
690 CALL COLOR(11,2,2):: FOR L=1 T
    O 18 :: DISPLAY AT(L+4,8):Q$(H
    ,L):: NEXT L :: CALL COLOR(11,
    11,16)
700 J=4-(RND<.1+G/25)*19 :: P=1+2*
    (J=23):: CALL SCREEN(6-C9*9)::
     CALL SPRITE(#7,114,2,R,C)
710 GOSUB 1030 :: CALL MOTION(#7,-
    Y,X)
720 CALL POSITION(#7,R,C):: IF ABS
    (99-R)>75 THEN 760 :: IF RND>.
    99-G*.01 OR(J>4)*(J<23)THEN 80
    0
730 CALL KEY(2,K,S):: IF K=18 THEN
     740 ELSE IF K=11 THEN 1300 EL
    SE 710
740 R=INT(R/8-2+(R>167)):: IF Q$(H
    ,R)=V$(H)OR C9*(Z<7)OR H*Z>=42
     THEN 710
750 Q$(H,R)=V$(H):: DISPLAY AT(R+4
    ,8):Q$(H,R):: Z=Z+7+C9*14 :: S
    C=SC-7*G*C9 :: GOSUB 910 :: GO
    TO 710
760 CALL DELSPRITE(ALL):: R=40 ::
    C=56-C9*128 :: L=0
770 L=L+1 :: IF C9=0 OR Q$(H,L)=V$
    (2)THEN 500 :: IF L<>18 THEN 7
    70
780 G=G+1 :: DISPLAY AT(1,4)SIZE(9
    ):"LEVEL: "&STR$(G):: CALL SOU
    ND(200,660,4)
790 CALL SOUND(400,990,2):: SC=SC+
    G*150 :: GOSUB 910 :: GOTO 490
800 J=J+P :: DISPLAY AT(J,1):M$
810 IF SGN(J-INT(1.5+R/8))<>SGN(P)
    THEN 710 ELSE CALL MOTION(#7,0
    ,0):: CALL HCHAR(5,1,124,576):
    : L,Z=0
820 GOSUB 910 :: U=41+RND*8*(16-G)
    :: R1=RND>.5 :: CALL SPRITE(#1
    8,126-R1,10,U,235+R1*225):: U=
    INT(1+U/8)
830 GOSUB 1030 :: CALL MOTION(#7,-
    2*Y,2*X):: CALL COINC(ALL,N)::
     L=L+1 :: IF N THEN 850 ELSE I
    F L<50-G*2 THEN 830
840 FOR L=U TO U+G-1 :: Q$(H,L-4)=
    V$(2):: NEXT L :: CALL POSITIO
    N(#7,R,C):: GOTO 660
850 CALL SOUND(200,115,3):: SC=SC+
    5*G :: GOSUB 910 :: CALL POSIT
    ION(#7,R,C):: GOTO 660
860 CALL MAGNIFY(3)
870 CALL SPRITE(#9,108,7,24+G,C+SG
    N(90-C)*15,2-INT(RND*3+1)*(RND
    <G/10),SGN(90-C)*3):: J=4 :: L
    =0
880 CALL COINC(ALL,N)
890 IF N THEN 900 :: L=L+3 :: CALL
     PATTERN(#9,104-4*(INT(L/2)=L/
    2)):: IF L<100-G*2 THEN 540 EL
    SE 530
900 CALL SOUND(300,990,3):: SC=SC+
    20*G :: GOTO 530
910 DISPLAY AT(1,22):SC :: IF Z=0
    THEN 920 :: DISPLAY AT(2,4):RP
    T$(CHR$(130),Z):: GOTO 930
920 CALL HCHAR(2,5,32,28)
930 IF SC<=0 THEN 940 :: RETURN
940 CALL DELSPRITE(ALL):: CALL CLE
    AR
950 CALL SOUND(500,140,2):: CALL S
    OUND(1000,110,3):: DISPLAY AT(
    10,6):"LEVELS COMPLETED: "&STR
    $(G-G1)
960 DISPLAY AT(4,5):"OOPS - BEE EX
    HAUSTED!"
```

Beeline

```
 970 DISPLAY AT(15,5):"REPLAY?  PRE
     SS REDO" :: DISPLAY AT(17,5):"
     TO END PRESS CLEAR"
 980 CALL KEY(0,K,S):: IF K=6 THEN
     420 ELSE 980
 990 CALL DELSPRITE(ALL):: CALL CLE
     AR :: CALL SOUND(300,466,2)::
     CALL SOUND(300,587,2):: CALL S
     OUND(800,784,1)
1000 DISPLAY AT(13,1):"YOU HAVE EAR
     NED YOUR WINGS"
1010 DISPLAY AT(16,7):"AND A LONG R
     EST!" :: DISPLAY AT(20,7):"SCO
     RE: "&STR$(SC)
1020 DISPLAY AT(23,6):"LEVELS COMPL
     ETED: "&STR$(G-G1):: STOP
1030 IF NOT JS THEN 1040 ELSE CALL
     JOYST(2,X,Y):: RETURN
1040 CALL KEY(1,K,S)
1050 X=4*((K=4)+(K=2)+(K=15)-(K=6)-
     (K=3)-(K=14)):: Y=4*((K=15)+(K
     +1=1)+(K=14)+(K>3)*(K<7)):: RE
     TURN
1060 DISPLAY AT(4,1):"USE THE ARROW
      KEYS AND THE"
1070 DISPLAY AT(5,1):"W,R,Z AND C K
     EYS TO FLY THE" :: DISPLAY AT(
     6,1):"BEE. TO COLLECT POLLEN"
1080 DISPLAY AT(7,1):"FOLLOW THE BU
     ZZING UNTIL IT" :: DISPLAY AT(
     8,1):"GETS LOUDEST - THEN TOUC
     H"
1090 DISPLAY AT(9,1):"THE MAGIC FLO
     WER. YOU MAY":"ALSO STEAL POLL
     EN BY ENTER-"
1100 DISPLAY AT(11,1):"ING THE BLUE
      HIVE AND PRESS-":"ING FIRE (Y
     ) TO PICK IT UP."
1110 DISPLAY AT(13,1):""
1120 DISPLAY AT(14,1):"   POLLEN IS
      PUT INTO THE":"WHITE HIVE THE
      SAME WAY.  THE"
1130 DISPLAY AT(16,1):"GOAL IS TO F
     ILL ALL TEN HIVE":"LEVELS BEFO
     RE EXHAUSTING THE"
1140 DISPLAY AT(18,1):"BEE.  YOU MUS
     T WATCH FOR THE":"BEEKEEPER AS
      HE WILL PUFF"
1150 DISPLAY AT(20,1):"SMOKE THROUG
     H THE HIVE AND":"TRY TO TAKE T
     HE POLLEN OUT."
1160 DISPLAY AT(23,5):"PRESS ANY KE
     Y"
1170 CALL KEY(0,K,S):: IF S=0 THEN
     1170
1180 CALL CLEAR :: DISPLAY AT(2,1):
     "WHEN YOU SEE THE SMOKE, GET":
     "OUT THE HIVE'S TOP OR BOTTOM"
1190 DISPLAY AT(4,1):"AND STING THE
      BEEKEEPER FOR":"BONUS POINTS.
      IF YOU ARE"
1200 DISPLAY AT(6,1):"CAUGHT IN THE
      SMOKE YOU LOSE":"ANY POLLEN Y
     OU HAVE AND MUST"
1210 DISPLAY AT(8,1):"TRY TO BITE T
     HE BEEKEEPER'S":"THUMB OR RISK
      LOSING POLLEN":"FROM THE HIVE
     ."
1220 DISPLAY AT(11,4):"THE OBJECT I
     S TO FILL THE":"TEN LEVELS OF
     THE HIVE WITH-"
1230 DISPLAY AT(13,1):"OUT EXHAUSTI
     NG THE BEE.":"A ZERO SCORE EXH
     AUSTS THE ":"BEE."
1240 DISPLAY AT(17,1):"THE BEE IS M
     ORE EASILY TIRED":"AND INVIGOR
     ATED AT HIGHER ":"LEVELS."
1250 DISPLAY AT(20,1):"ENTER HIVES
     AT THEIR BOTTOM."
1260 DISPLAY AT(21,1):"THE BEE HOLD
     S 3 POLLEN ROWS.":"PRESS P IN
     HIVE TO PAUSE."
1270 DISPLAY AT(24,9):"PRESS ANY KE
     Y "
1280 CALL KEY(0,K,S):: IF S=0 THEN
     1280
1290 GOTO 410
1300 CALL KEY(2,K,S):: CALL SOUND(-
     99,INT(RND*8+110),10):: IF S<>
     1 THEN 1300 ELSE 710
```

Lost Ruins . . . from p. 25

```
 100 REM  **************
 110 REM  * LOST RUINS *
 120 REM  **************
 130 REM  BY B J BRUNS
 140 REM  99'ER VERSION 2.7.1
 150 REM
 160 REM
 170 RANDOMIZE
 180 CALL SCREEN(8)
 190 CALL CLEAR
 200 GOTO 3300
 210 REM  DRAW SCREEN
 220 CALL HCHAR(3,1,125,32)
 230 CALL HCHAR(3,14,120,5)
 240 CALL HCHAR(4,1,120,32)
 250 CALL HCHAR(22,1,125,32)
 260 CALL VCHAR(5,1,125,17)
 270 CALL VCHAR(5,32,125,17)
 280 SNUG=0
 290 FOR R2=5 TO 21
 300 FOR C2=2 TO 30 STEP 2
 310 T=INT(RND*3)+1
 320 ON T GOTO 440,440,330
 330 ON INT(RND*10)+1 GOTO 340,340,
     340,340,340,370,370,370,400,40
     0
 340 CALL HCHAR(R2,C2,116)
 350 CALL HCHAR(R2,C2+1,117)
 360 GOTO 420
 370 CALL HCHAR(R2,C2,112)
 380 CALL HCHAR(R2,C2+1,113)
 390 GOTO 420
 400 CALL HCHAR(R2,C2,114)
 410 CALL HCHAR(R2,C2+1,115)
 420 SNUG=SNUG+2
 430 GOTO 450
 440 CALL HCHAR(R2,C2,120,2)
 450 NEXT C2
 460 NEXT R2
 470 R1=1
 480 C1=19
 490 A$=SH1$
 500 GOSUB 2570
 510 R1=2
 520 A$=SH2$
 530 GOSUB 2570
 540 FOR LD=1 TO 4
 550 CALL SOUND(-4000,220*LD,30/(LD
     ^2*2))
 560 CALL HCHAR(2,21,135+LD)
 570 CALL HCHAR(2,22,139+LD)
 580 FOR TD=1 TO 50
 590 NEXT TD
 600 NEXT LD
 610 CALL SOUND(3000,110,0,220,0,44
     0,0,-3,0)
 620 ON MINER GOTO 650,640,630
 630 CALL VCHAR(1,8,107,2)
 640 CALL VCHAR(1,10,107,2)
 650 CALL VCHAR(1,16,107,4)
 660 CALL SOUND(300,500,0,-6,0)
 670 ON MINER GOTO 700,690,680
 680 CALL VCHAR(1,8,32,2)
 690 CALL VCHAR(1,10,32,2)
 700 CALL VCHAR(1,16,32,4)
 710 CALL HCHAR(2,1,32,19)
 720 ON MINER GOTO 750,740,730
 730 CALL HCHAR(2,8,64)
 740 CALL HCHAR(2,10,64)
 750 CALL HCHAR(2,16,64)
 760 C=16
 770 REM  ERASE DEAD MINER
 780 ON MINER GOTO 840,810,790
 790 CALL HCHAR(2,16,64)
 800 GOTO 860
 810 CALL HCHAR(2,8,32)
 820 CALL HCHAR(2,16,64)
 830 GOTO 860
 840 CALL HCHAR(2,10,32)
 850 CALL HCHAR(2,16,64)
 860 REM  KEY/JOYSTICK INPUT
 870 CALL KEY(1,KEY,ST)
 880 IF ST=0 THEN 940
 890 IF KEY=11 THEN 1550
 900 IF KEY>5 THEN 860
 910 IF KEY<1 THEN 920 ELSE 930
 920 KEY=0
 930 ON KEY+1 GOTO 1160,860,1080,12
     40,860,1000
 940 CALL KEY(2,KEY,ST)
 950 IF KEY=18 THEN 1550
```

Continued on p. 29

YOU CAN'T CALL IT A GOOD DEAL UNTIL YOU'VE SEEN THEIR LAST CARD . . .

Fact is, not all of the so-called "RS232 interfaces" on the market conform to the EIA RS232C specification. This means that you could get stuck with one that won't work with your printer, modem or other peripheral.

Worse yet, interfaces that require the Mini-Memory module are not directly compatible with TI Basic, Extended Basic, LOGO and other existing software. This means that you won't be able to LIST your programs directly to your printer!

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Lost Ruins . . . . from p. 27

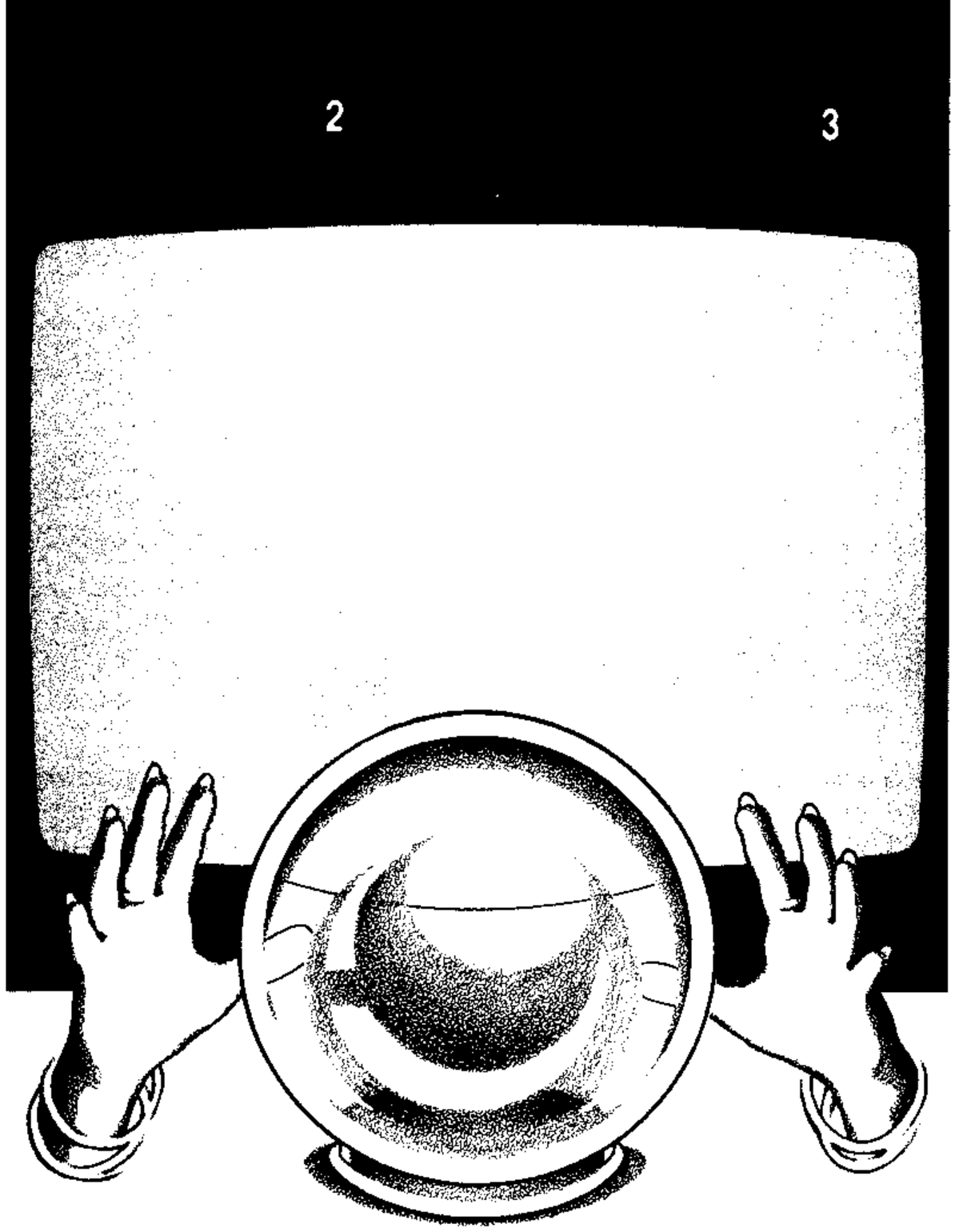
```
 960 CALL JOYST(2,X,Y)
 970 KEY=((X+3*Y)/4)+5
 980 ON KEY GOTO 860,1160,860,1080,
     860,1240,860,1000,860
 990 REM  MOVE SEQUENCE
1000 IF R-1<2 THEN 860
1010 PO=1
1020 CALL GCHAR(R-1,C,CH)
1030 IF (CH=32)+(CH=132)+((CH>111)*
     (CH<118))+(CH=91)THEN 1040 ELS
     E 860
1040 IF CH=132 THEN 2400
1050 CALL HCHAR(R,C,32)
1060 R=R-1
1070 GOTO 1310
1080 IF C-1<1 THEN 860
1090 PO=2
1100 CALL GCHAR(R,C-1,CH)
1110 IF (CH=32)+(CH=132)+((CH>111)*
     (CH<118))+(CH=91)THEN 1120 ELS
     E 860
1120 IF CH=132 THEN 2400
1130 CALL HCHAR(R,C,32)
1140 C=C-1
1150 GOTO 1310
1160 IF R+1>22 THEN 860
1170 PO=3
1180 CALL GCHAR(R+1,C,CH)
1190 IF (CH=32)+(CH=132)+((CH>111)*
     (CH<118))+(CH=91)THEN 1200 ELS
     E 860
1200 IF CH=132 THEN 2400
1210 CALL HCHAR(R,C,32)
1220 R=R+1
1230 GOTO 1310
1240 IF C+1>32 THEN 860
1250 PO=4
1260 CALL GCHAR(R,C+1,CH)
1270 IF (CH=32)+(CH=132)+((CH>111)*
     (CH<118))+(CH=91)THEN 1280 ELS
     E 860
1280 IF CH=132 THEN 2400
1290 CALL HCHAR(R,C,32)
1300 C=C+1
1310 IF CH=32 THEN 1460
1320 IF CH=91 THEN 1490
1330 SNUG=SNUG-1
1340 IF (CH<>112)*(CH<>113)THEN 137
     0
1350 MNUG=MNUG+3
1360 GOTO 1420
1370 IF (CH<>114)*(CH<>115)THEN 140
     0
1380 MNUG=MNUG+5
1390 GOTO 1420
1400 IF (CH<>116)*(CH<>117)THEN 142
     0
1410 MNUG=MNUG+1
1420 R1=23
1430 C1=12
1440 A$=STR$(MNUG)
1450 GOSUB 2570
1460 CALL HCHAR(R,C,64)
1470 CALL SOUND(100,-5,2)
1480 GOTO 860
1490 MNUG=MNUG+DNUG
1500 R1=23
1510 C1=12
1520 A$=STR$(MNUG)
1530 GOSUB 2570
1540 GOTO 1460
1550 REM  EXPLOSIONS
1560 IF (R<2)+(R>21)+(C<2)+(C>31)TH
     EN 860
1570 ON PO GOSUB 1770,1800,1830,186
     0
1580 IF C1<2 THEN 860
1590 CALL GCHAR(R1,C1,CH1)
1600 CALL GCHAR(R1-1,C1-1,CH2)
1610 CALL GCHAR(R1+1,C1-1,CH3)
1620 CALL GCHAR(R1-1,C1+1,CH4)
1630 CALL GCHAR(R1+1,C1+1,CH5)
1640 GOSUB 1890
1650 CALL HCHAR(R1,C1,104)
1660 CALL HCHAR(R1-1,C1-1,105)
1670 CALL HCHAR(R1+1,C1-1,106)
1680 CALL HCHAR(R1-1,C1+1,106)
1690 CALL HCHAR(R1+1,C1+1,105)
1700 CALL SOUND(1000,110,15,-7,2)
1710 CALL HCHAR(R1-1,C1-1,32)
1720 CALL HCHAR(R1,C1,32)
1730 CALL HCHAR(R1+1,C1-1,32)
1740 CALL HCHAR(R1-1,C1+1,32)
1750 CALL HCHAR(R1+1,C1+1,32)
1760 GOTO 2020
1770 R1=R-1
1780 C1=C
1790 RETURN
1800 C1=C-1
1810 R1=R
1820 RETURN
1830 R1=R+1
1840 C1=C
1850 RETURN
1860 C1=C+1
1870 R1=R
1880 RETURN
1890 REM  SUBTRACT NUG & LIMIT EXPL
     OSIONS TO PLAYING SCREEN
1900 IF (CH1=125)+(CH2=125)+(CH3=12
     5)+(CH4=125)+(CH5=125)THEN 860
1910 IF (CH1<112)+(CH1>117)THEN 193
     0
1920 SNUG=SNUG-1
1930 IF (CH2<112)+(CH2>117)THEN 195
     0
1940 SNUG=SNUG-1
1950 IF (CH3<112)+(CH3>117)THEN 197
     0
1960 SNUG=SNUG-1
1970 IF (CH4<112)+(CH4>117)THEN 199
     0
1980 SNUG=SNUG-1
1990 IF (CH5<112)+(CH5>117)THEN 201
     0
2000 SNUG=SNUG-1
2010 RETURN
2020 CHARGES=CHARGES-1
2030 R1=23
2040 C1=27
2050 A$=STR$(CHARGES)
2060 CALL HCHAR(23,27,32,3)
2070 GOSUB 2580
2080 REM  CAVE INS
2090 FOR I=1 TO 10
2100 R1=INT(RND*17)+4
2110 C1=INT(RND*29)+2
2120 CALL GCHAR(R1,C1,CH)
2130 IF (CH>111)*(CH<118)THEN 2380
2140 IF CH=64 THEN 2180
2150 IF CH<>32 THEN 2380
2160 CALL HCHAR(R1,C1,120)
2170 GOTO 2380
2180 DNUG=MNUG
2190 REM  CAVE-IN ON MINER
2200 RESTORE 2330
2210 CALL HCHAR(R,C,91)
2220 MNUG=0
2230 CALL HCHAR(23,12,32,5)
2240 MINER=MINER-1
```

Continued on p. 32

This column is an ongoing tutorial. Part one appeared in the April 1983 issue of 99'er HCM. To obtain full benefits from this column, a newcomer to *Multiplan* may find it useful to read the previously printed columns.

Last month, we took a general look at Microsoft's new *Multiplan* package for the TI-99/4A and showed some examples of spreadsheets that were made using it. In this column, we'll describe in detail how *Multiplan* was used to make one of those worksheets. To give you an idea of what it's like to use *Multiplan*, we'll develop a simple checkbook balancing model that will let you balance your checkbook easily, and provide you with expense totals which can be used in a budget.

What categories of expense do we want to keep track of? Let's use these five categories: rent, food, clothing, education, and entertainment, plus a sixth category for everything else. You will probably want to track different expenses, but the principles are the same.



Getting Started

After you have activated the system, you can select a command by typing its first letter, or you can press the space bar until the command you want is highlighted and use ENTER to select it. Many of the commands have several options which automatically appear on the command line when appropriate. You use the same method to select options.

Notice that the rows of the worksheet are numbered down the left-hand side, and the columns are numbered across the top. Each intersection of a row and column is called a *cell*. Every cell is uniquely identified by its row and column number, with row number always given first. The *cell pointer* shows the position on the worksheet where information is to be entered next. You can move the cell pointer around in a number of ways. The easiest way is to use the arrow keys. To move the cell pointer one cell to the right, press FCTN and D (right arrow). You'll see that the cell at row 1, column 2 is now highlighted and the notation R1C2 appears in the lower left corner of the screen.

Let's get the cell pointer back to row 1, column 1. We can do this with the arrow keys, or we can use the special method of getting to the *home* position: holding down CTRL and 1 together. A plastic keyboard strip which comes with *Multiplan* shows the key positions of many handy functions.

Checkbook Balancer

Now we can begin constructing the model for balancing the checkbook. I usually use line 1 (row 1) for the title of the worksheet. We'll call this worksheet *Checks During January*, and put one word of the title in each of the first three cells of row 1. The cell pointer should be at R1C1. To put the word Checks there, we'll use the ALPHA command. If the command line has ALPHA highlighted already (as it usually does), press ENTER; otherwise type A. The command line will change to ALPHA:, now type the word *Checks*.

There are two ways to tell *Multiplan* to put the word in the cell: you can press ENTER, or you can use one of the arrow keys. Because you want to put the word *During* at R1C2 next, you may press the right arrow after typing *Checks*. This puts *Checks* in R1C1 and leaves the cell pointer at R1C2. The command line now says ALPHA/VALUE:, meaning that you can enter a title or a value into R1C2. If the first character entered is not a number, the entry will be ALPHA and is equivalent to a string in BASIC. If the first character entered is a number, the entry is considered to be numeric only. If your entry requires the first character to be numeric with alphabetic characters to follow, you can return to the master option menu and select ALPHA. You must take care, however, when entering values that the prompt "ALPHA/VALUE:", or "VALUE:" is present, or the value you enter will be considered a string, and computations cannot be performed on it.

Type the word *During*, but watch out! *Multiplan* is primed to accept words or numbers here and it needs a second to think things over. In practice this means that you must type the D, pause for a beat, and then type the rest of the word (as quickly as you like). You'll get used to this after a while, but the first time you may find that you have typed in *Dring* instead of *During*. If you spot this error before you press the arrow key, you can backspace (FCTN 9) and retype the word correctly. (*Multiplan* has many nice editing features; we'll get into them later). In any case, you'll want to press the right arrow key after *During* is typed, and then type the word *January* in R1C3. After typing *January*, just press ENTER. This will leave the cell pointer at R1C3.

Next, we'll put headings on the columns in a similar way. Let's start our column headings in R3C1. Move the cell pointer to R3C1 using the arrow keys. There will be 10 columns on the worksheet, headed: Check#, Paid to, Income, Rent, Food, Clothes, School, Fun, Other, and Balance. Select the command ALPHA, type Check#, press the right arrow key, type *Paid to*, press the right arrow key, and so on until you have all ten headings in successive cells of Row 3. When you are done, your screen will look like Figure 1.

Now start entering the information from the checkbook for January. Start with the checkbook balance at the beginning of January. This item has no check number, and its amount is not allocated to any expense. So put the Alpha description "FOR-

Figure 1

```
#1        7         8         9         10
    1
    2
    3  School    Fun       Other     Balance
    4
    5
    6
    7
    8
    9
   10
   11
   12
   13
   14
   15
   16
   17
   18
COMMAND:  Alpha Blank Copy Del Edit For
   Go Help Ins Lock Move Name Opt Print
   Quit Sort Trans Value Window Xtern
Select option or type command letter
R3C10   ''Balance''                98% TEMP
```

Figure 2

```
#1        7         8         9         10
    1
    2
    3  School    Fun       Other     Balance
    4
    5                                  739.7
    6
    7
    8
    9
   10
   11
   12
   13
   14
   15
   16
   17
   18
FORMAT DEFAULT CELLS align: C Gen L R
   code: Cont Exp Fix(Gen)Int $ * %
   # of decimals: 0
Select option
R3C10   739.7                      98% TEMP
```

WARD'' in R5C2 (under Paid to), and then arrow right until the cell pointer is in the Balance column (R5C10). To enter the balance forward, just type the amount and press ENTER. If you want all the check amounts and totals to have two decimal places (so they will automatically display 25.50, instead of 25.5), you can change the *default* (most common) format for the worksheet.

FORMAT command has two options: CELLS and WIDTH. Choose CELLS. Figure 2 shows the screen at this point. Notice that there are three characteristics of the FORMAT DEFAULT for the CELLS: alignment, code, and number of decimal places. When you first select this command, the defaults are set to General alignment, General format code, and 0 decimal places. General alignment is fine for now, so we don't want to change it. To go on to the format codes, press CTRL and 2 (called TAB on the strip). We want to change the format code from General to Fixed. Press the space bar until FIX is highlighted. Do not press ENTER yet. ENTER is the signal for *Multiplan* to execute the command (in this case, to change the default format), but our default format is not exactly right yet: We still need to change to 2 decimal places. TAB down to the number of decimal places and type 2. Look at the format now. It should have General alignment, Fixed format code, and 2 decimal places. If it doesn't, fix the section that's wrong by TABing around and selecting the correct entry. When the format looks right, press ENTER. You'll see the effect of this format change immediately, as the balance changes to 1069.70.

Checks and Balances

Now you can start filling in checks and deposits. At R6C1, enter the first check number for January. From Figure 3, this would be 1069. As soon as you press ENTER, you'll see that we need to make an adjustment in the model: The system has put 1069.00 under check number. This is because of the new default format which is fine for dollars and cents but not so great in the first column of this model. What to do? You can change the format of the cells in column 1 to be whole numbers (integers). Choose the command FORMAT and then option CELLS. To change all the cells in column 1, type C1 where the system says FORMAT CELLS:, then TAB over to alignment and change it to General by typing G. TAB to format code and type I for integer, and then press ENTER. Watch as the system changes the check number to 1069.

Now arrow over to R6C2 and enter the payee for check 1069 (HomeRlty in Figure 3). This check for 250.00 was a rent expense, so enter 250 in the Rent column of row 6 (R6C4). Now we want to have the system calculate the new balance and put the answer in the Balance column on Row 6. Let's think about this for a minute. Check 1069 just happened to be *entirely* for rent, so the check amount is at R6C4. Some checks, however, may be split among two or more expenses. So what we really want for the balance on this row is the balance from the previous row, minus the sum of any expenses on this row. Some rows will show income instead of expenses, so we need to enter a general formula here because the equation for the balance in row N should be the balance from row N-1 *plus* the income in row N, minus the sum of the expenses in row N!

If you are starting to get confused, don't worry; this is harder to *say* than it is to do with *Multiplan*. Put the cell pointer at R6C10, where the balance to be calculated belongs. Now press = to tell the system you're going to enter a formula. The first term in the formula is the balance from the row above. Use the UP arrow to move the cell pointer to the above balance. You will see the expression R[-1]C in the command line. This notation means ''The cell at Row -1 in the same column.'' This is just right for the first term. Next we want to have the system add in any income from the current row. Hit + and the cell pointer pops back down to R6C10 (where we started building the formula), and the formula is now R[-1]C+. Select the income amount for the same row by left-arrowing until you're in the Income column. Notice that the formula is now R[-1]C+RC[-7]. Since Income is in column 3 and Balance is in column 10, you can see why *Multiplan* expresses this as column minus 7.

Figure 3

Checks During January

Check#	Paid to	Income	Rent	Food	Clothes	School	Fun	Other	Balance
	Forward								739.70
1069	HomeRlty		250.00						489.70
1070	ShopRite			34.12					455.58
	Deposit	550.00							1005.58
1071	Emporium				119.75		29.95		855.88
1072	Tino's			22.50			7.50		825.88
1073	U of D					375.00			450.88
1074	Dalton					32.60		12.50	405.78
	Totals	550.00	250.00	56.62	119.75	407.60	37.45	12.50	

Now for the formula's third term. We want to subtract the sum of any expenses in the same row from the balance. Press −, and the formula becomes R[-1]C+RC[-7]-. We will use the special function called SUM to get the sum of the expenses. When you use SUM, you must tell *Multiplan* what cells to add together in a *FROM: TO* expression. Type SUM(and then indicate the first cell to include in the sum by left-arrowing until you're under Rent (R6C4). The formula will now be R[-1]C+RC[-7]-SUM(RC[-6]. Type : to show that you're ready to put in the last cell to include in the sum. The system will pop the cell pointer back to R6C10. Left-arrow once to select the *other* column, that is, the last cell of the group of expenses to be added together. Finally, type) to close the SUM expression and then press ENTER. The finished formula is R[-1]C+RC[-7]-SUM(RC[-6]:RC[-1]).

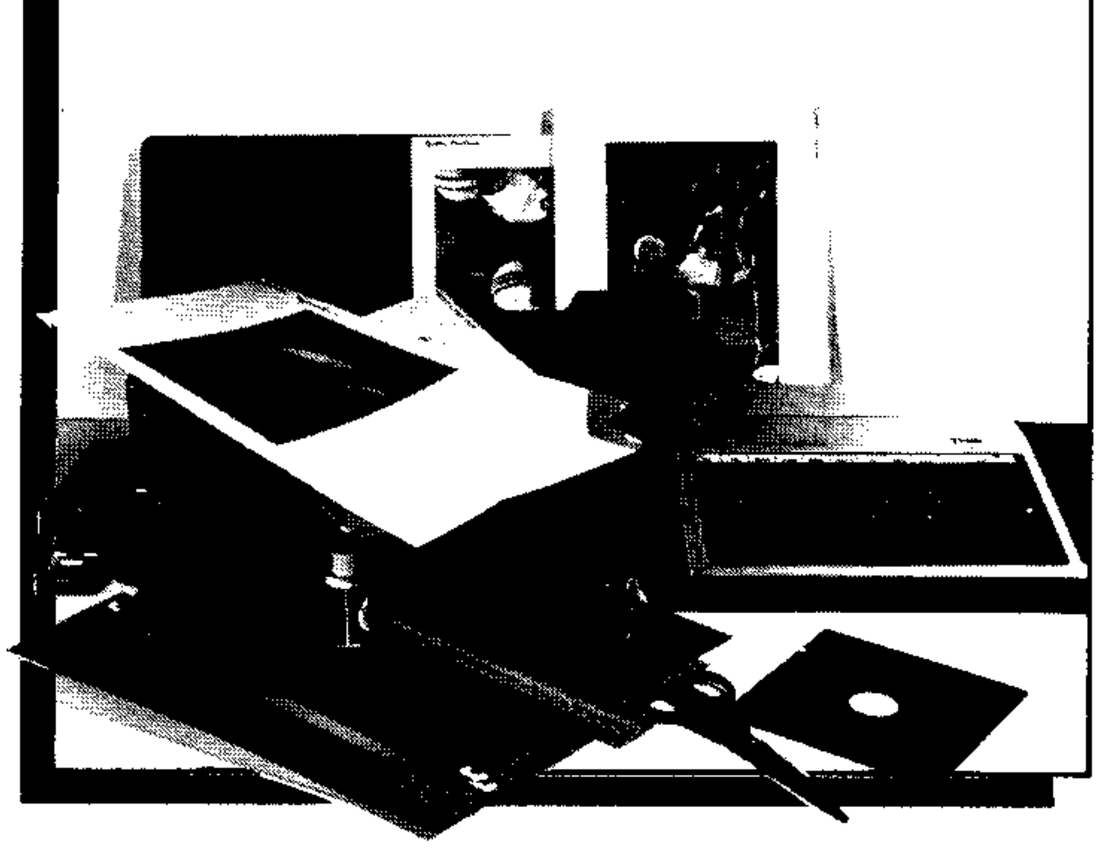
Multiplan will calculate the balance and fill in R6C10. The formula applies only to R6C10, but we'd like it to be used on every row in the balance column. Since we have expressed

Continued on p. 39

Lost Ruins . . . . from p. 29

```
2250 R=2
2260 C=16
2270 CHARGES=10
2280 R1=23
2290 C1=27
2300 A$=STR$(CHARGES)
2310 GOSUB 2580
2320 READ A,B
2330 DATA 750,117,750,117,183,117,5
     58,117,750,139,183,131,558,131
     ,183,117,558,117,750,110,1500,
     117,0,0
2340 IF A=0 THEN 2370
2350 CALL SOUND(A,B,0)
2360 GOTO 2320
2370 IF MINER>0 THEN 770 ELSE 2640
2380 NEXT I
2390 IF CHARGES=0 THEN 2720 ELSE 86
     0
2400 IF CHARGES>0 THEN 2470
2410 CHARGES=10
2420 R1=23
2430 C1=27
2440 CALL HCHAR(23,27,32,3)
2450 A$=STR$(CHARGES)
2460 GOSUB 2580
2470 TOTAL=10*(MNUG*CHARGES)+TOTAL
2480 MNUG=0
2490 R1=2
2500 C1=24
2510 A$=STR$(TOTAL)
2520 GOSUB 2580
2530 CALL HCHAR(23,12,32,5)
2540 IF SNUG>0 THEN 860
2550 SCREEN=SCREEN+1
2560 GOTO 210
2570 CALL HCHAR(23,12,32,5)
2580 REM  PRINT AT ROUTINE
2590 FOR Z=1 TO LEN(A$)
2600 B$=SEG$(A$,Z,1)
2610 CALL HCHAR(R1,C1+Z,ASC(B$))
2620 NEXT Z
2630 RETURN
2640 REM  PLAY AGAIN
2650 CALL CLEAR
2660 PRINT "THE ARTIFACTS YOU HAVE"
     :"ARE WORTH ";TOTAL;" CREDITS!
     ":::::::"WANT TO PLAY AGAIN ? (
     Y/N)"::
2670 CALL KEY(3,KEY,ST)
2680 IF ST=0 THEN 2670
2690 IF KEY=78 THEN 2710
2700 IF KEY=89 THEN 3910 ELSE 2670
2710 END
2720 REM  TIMED MOVE SEQUENCE
2730 TIME=0
2740 TIME=TIME+1
2750 IF TIME=40 THEN 2180
2760 CALL KEY(1,KEY,ST)
2770 IF ST=0 THEN 2820
2780 IF KEY>5 THEN 2740
2790 IF KEY>1 THEN 2810 ELSE 2800
2800 KEY=0
2810 ON KEY+1 GOTO 2990,2740,2920,3
     060,2740,2850
2820 CALL JOYST(2,X,Y)
2830 KEY=((X+3*Y)/4)+5
2840 ON KEY GOTO 2740,2990,2740,292
     0,2740,3060,2740,2850,2740
2850 IF R-1<2 THEN 2740
2860 CALL GCHAR(R-1,C,CH)
2870 IF (CH=32)+(CH=132)+((CH>111)*
     (CH<118))THEN 2880 ELSE 2740
2880 IF CH=132 THEN 2400
2890 CALL HCHAR(R,C,32)
2900 R=R-1
2910 GOTO 3120
2920 IF C-1<1 THEN 2740
2930 CALL GCHAR(R,C-1,CH)
2940 IF (CH=32)+(CH=132)+((CH>111)*
     (CH<118))THEN 2950 ELSE 2740
2950 IF CH=132 THEN 2400
2960 CALL HCHAR(R,C,32)
2970 C=C-1
2980 GOTO 3120
2990 IF R+1>22 THEN 2740
3000 CALL GCHAR(R+1,C,CH)
3010 IF (CH=32)+(CH=132)+((CH>111)*
     (CH<118))THEN 3020 ELSE 2740
3020 IF CH=132 THEN 2400
3030 CALL HCHAR(R,C,32)
3040 R=R+1
3050 GOTO 3120
3060 IF C+1>32 THEN 2740
3070 CALL GCHAR(R,C+1,CH)
3080 IF (CH=32)+(CH=132)+((CH>111)*
     (CH<118))THEN 3090 ELSE 2740
3090 IF CH=132 THEN 2400
3100 CALL HCHAR(R,C,32)
3110 C=C+1
3120 IF CH=32 THEN 3260
3130 SNUG=SNUG-1
3140 IF (CH<>112)*(CH<>113)THEN 317
     0
3150 MNUG=MNUG+3
3160 GOTO 3220
3170 IF (CH<>114)*(CH<>115)THEN 320
     0
3180 MNUG=MNUG+5
3190 GOTO 3220
3200 IF (CH<>116)*(CH<>117)THEN 322
     0
3210 MNUG=MNUG+1
3220 R1=23
3230 C1=12
3240 A$=STR$(MNUG)
```

```
3250 GOSUB 2570
3260 CALL HCHAR(R,C,64)
3270 CALL SOUND(100,-5,0)
3280 IF R=2 THEN 2400
3290 GOTO 2740
3300 REM  TITLE SCREEN
3310 PRINT TAB(9);"LOST RUINS":::TA
     B(7);"BY B. J. BRUNS":::::::::
     ::
3320 FOR I=1 TO 450
3330 NEXT I
3340 CALL CLEAR
3350 RESTORE 3440
3360 CALL CLEAR
3370 REM  PRINT INTRO & PLAY SONG
3380 PRINT "  WELCOME TO EARTH 9999
      AD.":"MAN HAS REACHED OUT TO
     THE"::"STARS AND LOST TRACK O
     F HIS"::
3390 PRINT "HOME PLANET."::
3400 PRINT "  YOUR ROBOTS HAVE SEAR
     CHED"::"MANY GALAXIES LOOKING
     FOR"::"THE PLANET FROM WHICH M
     AN"::
3410 PRINT "WAS BORN. FINALLY THE Q
     UEST"::"MAY BE OVER, IF YOU CA
     N FIND"::"ENOUGH EVIDENCE.":::
3420 PRINT "PRESS ENTER TO START"
3430 CALL KEY(0,K,S)
3440 IF (K=13)*(S<>0)THEN 3460
3450 GOTO 3430
3460 REM  SET COLORS, CHAR & VARIAB
     LES
3470 CALL CLEAR
3480 CALL CHAR(64,"18187E5A5A242424
     ")
3490 CALL CHAR(91,"18187E7E18181818
     ")
3500 CALL CHAR(104,"8142241818244281
     ")
3510 CALL CHAR(105,"8040201008040201
     ")
3520 CALL CHAR(106,"0102040810204080
     ")
3530 CALL CHAR(112,"0003047C7FFF3810
     ")
3540 CALL CHAR(107,"FFFFFFFFFFFFFFFF
     ")
3550 CALL CHAR(113,"00F0B8BFFFFF1C0B
     ")
3560 CALL CHAR(114,"0804053D35041C20
     ")
3570 CALL CHAR(115,"000748704807")
3580 CALL CHAR(116,"0000181E5EFB63")
3590 CALL CHAR(117,"00043C7E7EF7C6")
3600 CALL CHAR(120,"1184200190042144
     ")
3610 CALL CHAR(125,"1184200190042144
     ")
3620 CALL CHAR(128,"0000000000030CF0
     ")
3630 CALL CHAR(129,"010718207F80194A
     ")
3640 CALL CHAR(130,"80E01804FE019852
     ")
3650 CALL CHAR(136,"00FF929261")
3660 CALL CHAR(137,"00FF92929261")
3670 CALL CHAR(138,"00FF9292929261")
3680 CALL CHAR(139,"00FF929292929261
     ")
3690 CALL CHAR(140,"00FF494986")
3700 CALL CHAR(141,"00FF49494986")
3710 CALL CHAR(142,"00FF4949494986")
3720 CALL CHAR(143,"00FF494949494986
     ")
3730 CALL CHAR(131,"0000000000C0300F
     ")
3740 CALL CHAR(132,"0C03")
3750 CALL CHAR(133,"00FF9261")
3760 CALL CHAR(134,"00FF4986")
3770 CALL CHAR(135,"30C0")
3780 SH1$=CHR$(128)&CHR$(129)&CHR$(
     130)&CHR$(131)
3790 SH2$=CHR$(132)&CHR$(133)&CHR$(
     134)&CHR$(135)
3800 CALL COLOR(10,7,13)
3810 CALL COLOR(12,4,13)
3820 CALL COLOR(13,7,1)
3830 CALL COLOR(14,7,1)
3840 CALL COLOR(11,2,13)
3850 FOR TD=1 TO 20
3860 TB=INT(RND*23)+1
3870 PRINT TAB(TB);SH1$
3880 PRINT TAB(TB);SH2$:::
3890 NEXT TD
3900 PRINT ::::::::::::::::::::::::
     ::::
3910 R=2
3920 C=16
3930 PO=1
3940 TOTAL=0
3950 CHARGES=10
3960 SCREEN=0
3970 MINER=3
3980 MNUG=0
3990 REM  PRINT SCREEN HEADING
4000 PRINT TAB(22);"SCORE";TAB(23);
     "00":::::::::::::::::::
4010 PRINT "ARTIFACTS 0       CHARGE
     S 10"
4020 GOTO 210
```



THE SCHOOL SECRETARY'S SECRETARY

A Review of Scott, Foresman's School Management Application Activity Accountant

By Sharyn Lyon

Name:	School Management Applications: Activity Accountant
Program Type:	School Business Applications
Producer:	Scott, Foresman & Co.
Price:	$275.00

System Requirements:
32K Memory Expansion
RS232 Interface
TI Printer
Disk Drive Controller
Disk Drives (2)

	Poor	Fair	Good	Excellent
Documentation			■■■■■■■■■■	
Error Handling			■■■■■■■■	
Performance			■■■■■■■■■	

Remember the last time you walked into a school office? There was the secretary surrounded by clamoring students, hurried teachers, and piles of paperwork, trying to assign keys, schedule activities, bandage physical and emotional hurts, and grab a little time to help enrich the academic environment. It is no wonder that school secretaries (and teachers) wish for secretaries of their own so they can spend more time helping the students. Well, the long awaited relief is here thanks to Scott, Foresman & Co. It has created *School Management Applications*, a series of software packages carefully designed to reduce the headaches of the school secretary's most detailed and tedious jobs.

The school secretary is involved to one degree or another in the students' extracurricular activities: PTA events, field days, sports events, clubs. Each of these activities requires extensive recordkeeping for which she is responsible—budget, expense and income records. It is no wonder that many would-be extracurricular treasures are left buried. Secretaries and teachers do not have time to dig them out of this bureaucratic mud. Having *Activity Accountant* to help keep activity financial records for you is like slashing your way through mountains of paperwork with a bulldozer!

First Impressions

Immediately upon picking up the software, you will notice everything you need is provided in a well-organized, durable package. In fact, the documentation looks too small to contain all the particulars. Scott, Foresman has condensed all of the required users manuals into one relatively short piece of documentation. *Activity Accountant* (and all the *School Management Applications*) require you to invest in and use the specified hardware components. Although you can use either a 99/4 or 99/4A computer console and a TV instead of TI Video Display Monitor, substitutions should not be made for the printer. You must use the TI 825 or TI 840 printer pictured in the manual. Otherwise it is not possible to use the manual or perform the crucial system checks.

In addition to extensive system checks in the manual, there is a Disk Check built into the beginning of the software that guards against improper use of diskettes. This also serves as a final check on whether any human errors have been made in managing the hardware. The program will not leave the Disk Check mode until all diskettes are properly initialized and inserted, and all the hardware is properly set up. If the program gets stalled here, carefully check the items listed in the display titled DISK ERROR. Leave no stone unturned; the display is deceiving in its simplicity. Pay particular attention to the word ALL in reference to power, cables and disk drive doors. You can waste valuable time and energy looking for complicated problems if you aren't thorough in this first system check.

As soon as you have ENTERed all accounts, you can have the system generate a printout for the Chart of Accounts. The printer will provide you with a list of all schools and accounts with their code numbers. This information is used frequently as you work on the application, so keep this Chart of Accounts close to the console for quick and easy referral.

Documentation

The documentation is easy to follow, accurate, and complete, which is a small miracle when you consider that within its modest sixty pages are separate instructions for operating all hardware components of the system and running the software. There is even an explanation of the diskette. It is like getting at least seven manuals for the price of one.

The first part, *Your School Management System*, is devoted to the hardware. The novice will find that troubleshooting is, if not easy, at least manageable, due to the quick access design of the contents (p.3). Each piece of hardware has its own section and is emphasized in the contents by boldface type. It is advisable to read through the 31 pages of Part I *before* trying to set up the system. The words in the directions are carefully chosen and were meant to be carefully read and followed.

Using Activity Accountant, the second section, tells how to use the software. It is also carefully written, complete and deceptively simple. You can tell where this software section begins at a glance because all of its pages are edged with blue. To let you review quickly what each procedure does, each one is designated by a title in blue print. The use of blue printed subheadings continues throughout the documentation and makes it a ready and reliable reference tool.

The documentation contains many screen displays that help clarify what the user should focus on when certain on-screen prompts are displayed. Perhaps the most disconcerting is the screen bearing the DISK ERROR title. This display lists four things to check that could be preventing the software from running properly, but it cannot list all the possibilities. If you check these four items and you are still getting this screen, then go back to pages 29-31 of the manual and perform all those checks again.

We recommend that you pay close attention to the following items in the documentation:

1) When changing from the *Disk Manager* cartridge to the

Activity Accountant cartridge, take care to avoid losing data by always pressing FCTN 5 (BEGIN) to go back to the Disk Manager main menu and then pressing FCTN 9 (BACK) to close the diskette files and return to the Master title screen.
2) Review the other precautions to protect data on your diskettes on page 17.
3) Review *Checking Your System* (page 29) before entering data for the first time.
4) The documentation reminds you to never use FCTN + (QUIT) but to always use E (END) to leave the application or one of its branches. It is worth repeating again here to underscore the importance of following this advice to avoid loss of data.

The manual is written to be used with a TI-99/4 console and has been amended for the modified TI-99/4A keyboard with a one page insert that "translates" the key functions from the 99/4 to the 99/4A. Those who are used to a 99/4 keyboard will want to keep the keyboad insert close to the console for the "special reminders" it also lists. This list of six forget-me-nots draws attention to the differences between working with a typewriter and a computer. It also points out crucial usages for this specific cartridge. If you are not sure how working with *Activity Accountant* is supposed to progress, check the helpful Flow Chart (pp. 54-55) in the manual. If you are careful, you will find that the software performs in a quick, clear, smooth and accurate manner with few, if any, "surprises."

Performance

Perhaps the most exciting part of *Activity Accountant* is the time and effort you will save by using it. Imagine trying in one day to fulfill central administration's typically urgent request to send them a report of all the receipts and expenditures for all the school activities in each school (with their beginning and current balances tabulated) for a Board of Education meeting that night! Certainly, it could be done with a team of four people (2 secretaries, an accountant, and a bookkeeper) who work on nothing else that day. Such person power and time are luxuries that do not exist in school systems--until now. It will only take *Activity Accountant* about ten minutes to fulfill such a request, and while the computer works, you can be talking to the Superintendent on the telephone assuring him that all will be ready in time!

"Having *Activity Accountant* to help keep activity financial records for you is like slashing your way through mountains of paperwork with a bulldozer!"

There are as many ways to use this application as there are school districts to use it. On pages 56-57 the manual offers some suggested uses. One intriguing possibility they mention is to use two disks to keep track of sports budgets with accounts labeled by school and sport. If the district is small, you may want to use the *school* prompt to mean *department* instead. With so many districts becoming active in Community Education programs, the agency sponsoring such a program could use *Activity Accountant* to maintain financial records for the numerous activities that make up a Community Education program. Whichever way you decide to use the application, you can be sure that the data you store will be up-to-date and secure.

Continued on p. 38

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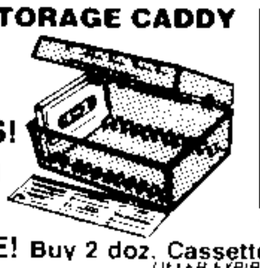

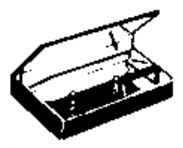

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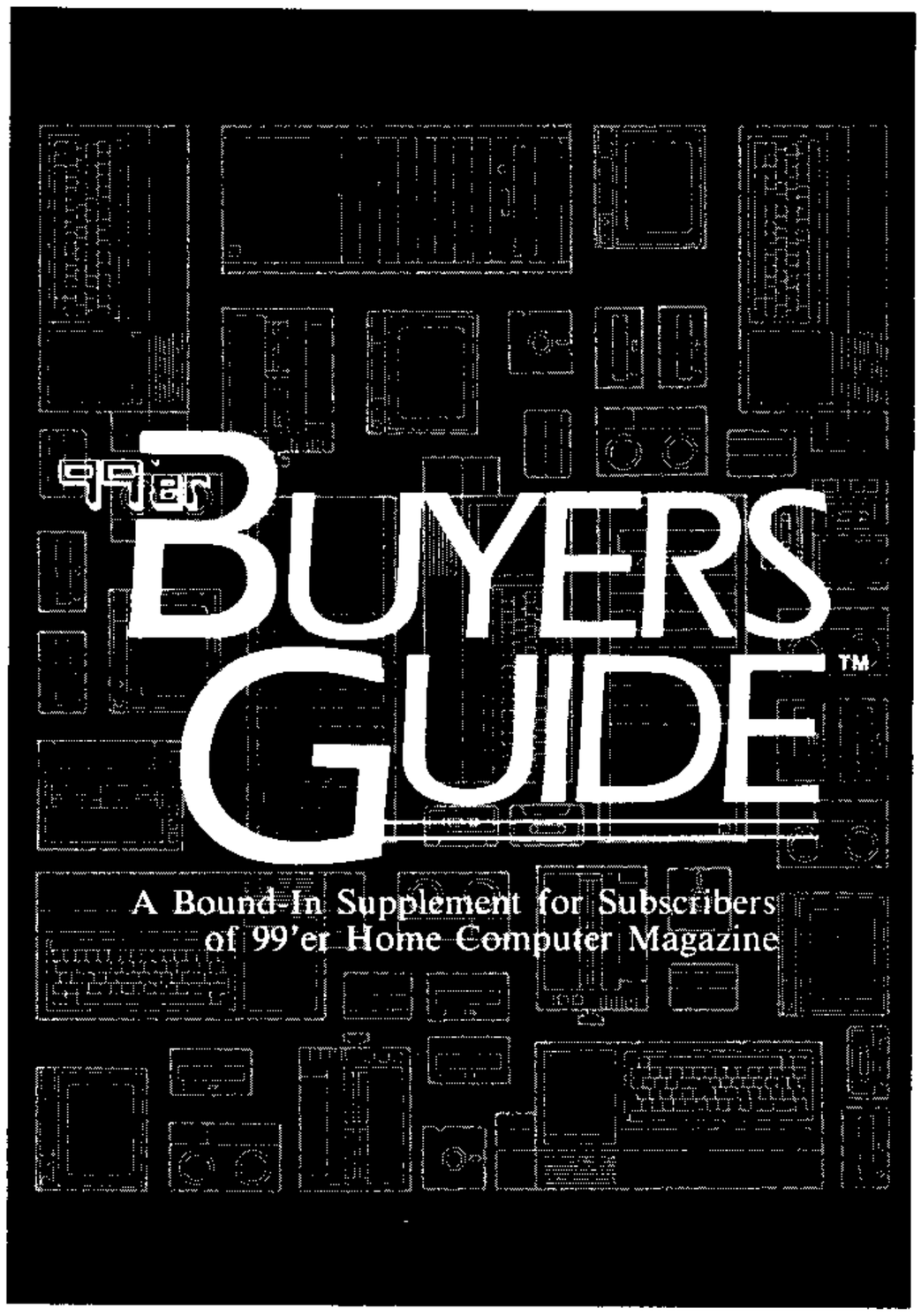

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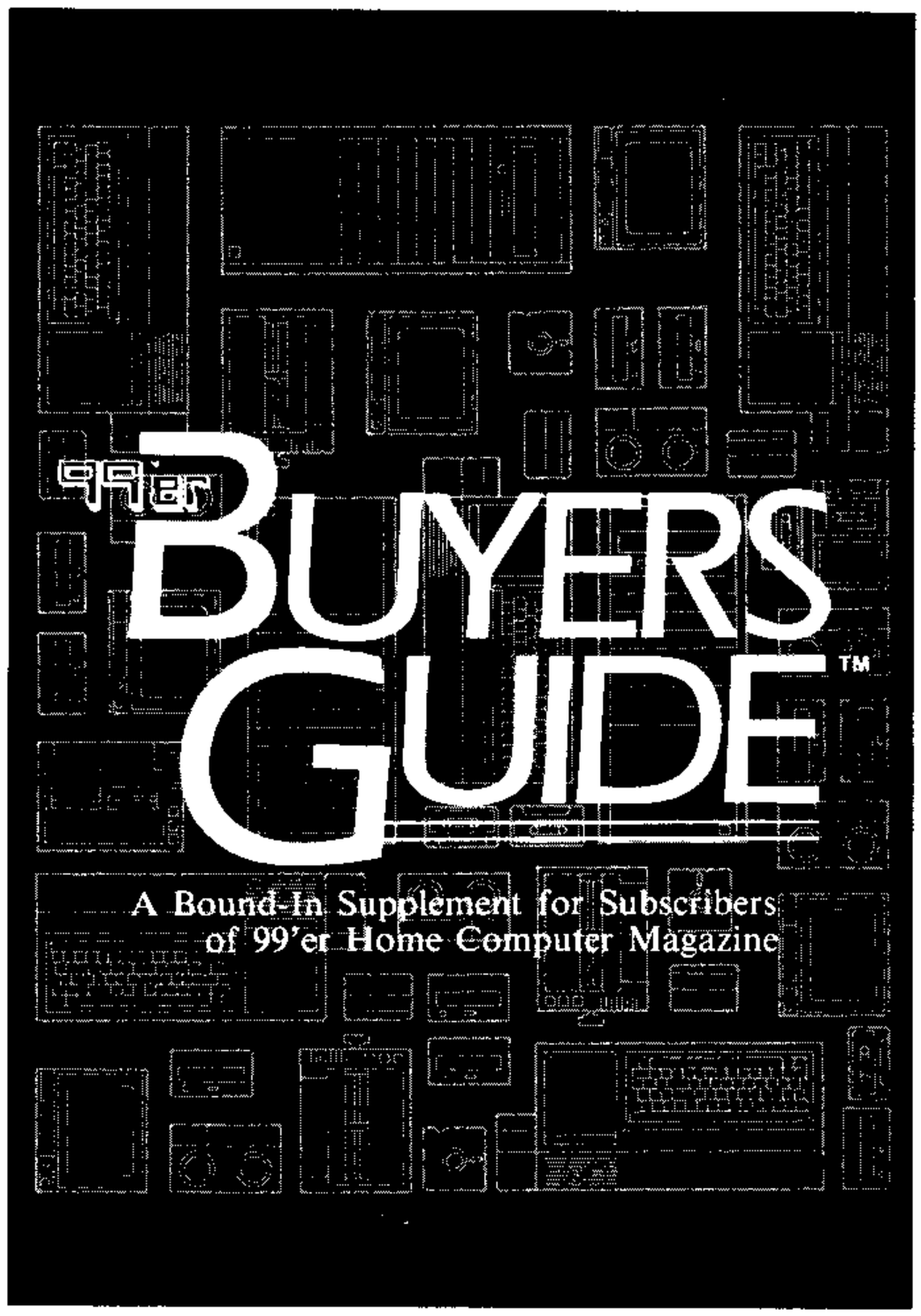

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PHP 1260	Memory Expansion Card (32K RAM)	299.95	215.00
PHP 1270	P-Code Card (32K RAM Memory Expansion required)	249.95	180.00
PHP 1500	Solid State Speech™ Synthesizer	149.95	110.00
PHP 1850	Disk Memory Drive (Exterior)	499.95	350.00
PHP 2500	TI 80 Column Impact Printer	750.00	500.00
PHA 4100	10" Color Monitor	399.95	320.00
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PHA 1950	Thermal Paper (2 Pack)	9.95	8.00
PHA 2000	Cassette Cable	14.95	12.00
PHA 2010	Monitor Cable	19.95	15.00
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PHM 3012	Securities Analysis	54.95	32.00
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PHM3022	Personal Real Estate (Data storage system is recommended)	69.95	56.00
PHM3044	Personal Report Generator (Data storage system is recommended)	49.95	32.00
PHM 3111	TI Writer (32K Memory Expansion required)	99.95	75.00
PHM 3113	Microsoft™ Multiplan™ ††† (32K Memory Expansion required)	99.95	75.00
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PHD 5001	Mailing List	69.95	56.00
PHD 5003	Personal Financial Aids	19.95	16.00
PHD 5021	Checkbook Manager	19.95	16.00
PHD 5022	Business Aids Library—Finance Management (Extended BASIC Command Module is required)	39.95	32.00
PHD 5024	Business Aids Library—Inventory Management (Personal Record Keeping or Statistics Command Module is required)	69.95	56.00
PHD 5027	Business Aids Library—Invoice Management (Personal Record Keeping or Statistics Command Module is required)	69.95	56.00
PHD 5029	Business Aids Library—Cash Management (Extended BASIC Command Module is required)	39.95	32.00
PHD 5038	Business Aids Library—Lease/Purchase Decisions	69.95	56.00
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PHT 6003	Personal Financial Aids	14.95	12.00
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PHM3083	Computer Math Games II	39.95	32.00
PHM3086	Computer Math Games VI	39.95	32.00
	Milliken Home Math Series—K thru 8th grade (Developed by Milliken Publishing Co.)		
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PHM 3091	Subtraction*	39.95	32.00
PHM3092	Multiplication*	39.95	32.00
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PHM 3097	Percents*	39.95	32.00
PHM3098	Number Readiness	39.95	32.00
PHM3099	Laws of Arithmetic	39.95	32.00
PHM 3100	Equations	39.95	32.00
PHM 3101	Measurement Formulas	39.95	32.00
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PHD 5011	Computer Music Box	19.95	16.00
PHD 5018	Market Simulation	19.95	16.00
PHD 5019	Teach Yourself Extended BASIC (Extended BASIC Command Module is required)	24.95	20.00
PHD 5020	Music Maker Demonstration (Music Maker Command Module is required)	14.95	12.00
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PHD 5026	Bridge Bidding I	29.95	24.00
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PHD 5031	Speak & Math™ Program (Solid State Speech™ Synthesizer and Terminal Emulator II are required)	29.95	24.00
PHD 5039	Bridge Bidding II	29.95	24.00
PHD 5041	Bridge Bidding III	29.95	24.00
PHD 5042	Speller Writer (Terminal Emulator II Command Module and Solid State Speech™ Synthesizer are required)	29.95	24.00
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PHD 5079	Elementary Economics*	29.95	24.00
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PHD 5086	Natural Science* (Extended BASIC Command Module is required)	29.95	24.00
PHD 5087	Social Science* (Extended BASIC Command Module is required)	29.95	24.00
PHD 5088	Teacher's Tool Box* (Extended BASIC Command Module and printer are required)	29.95	24.00
	Cassette		
PHT 6007	Teach Yourself BASIC	29.95	24.00
PHT 6009	Music Skills Trainer	24.95	9.00
PHT 6011	Computer Music Box	14.95	9.00
PHT 6018	Market Simulation	29.95	12.00
PHT 6019	Teach Yourself Extended BASIC (Extended BASIC Command Module is required)	19.95	16.00
PHT 6026	Bridge Bidding I	24.95	12.00
PHT 6031	Speak & Math™ Program (Solid State Speech™ Synthesizer and Terminal Emulator II are required)	24.95	12.00
PHT 6039	Bridge Bidding II	24.95	12.00
PHT 6041	Bridge Bidding III	24.95	12.00
PHT 6042	Spell Writer (Terminal Emulator II Command Module and Solid State Speech™ Synthesizer are required)	24.95	12.00
PHT 6067	Beginner's BASIC Tutor	24.95	20.00
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PHD 5017	Oldies But Goodies—Games II	24.95	20.00
PHD 5025	Saturday Night Bingo (Solid State Speech™ Synthesizer is required)	29.95	24.00
PHD 5037	Draw Poker (Extended BASIC Command Modules is required)	24.95	20.00
PHD 5057	Tombstone City 21st Century (32K Memory Expansion and Extended BASIC Command Module are required)	19.95	16.00
PHD 5058	TI Invaders (32K Memory Expansion and Either Extended BASIC or Editor/Assembler Command Module are required)	19.95	16.00
PHD 5060	Munch Man (32K Memory Expansion and Either Extended BASIC or Editor/Assembler Command Module are required)	19.95	16.00
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PHM5046	Adventureland	29.95	24.00
PHD 5047	Mission Impossible	29.95	24.00
PHD 5048	VooDoo Castle	29.95	24.00
PHD 5049	The Count	29.95	24.00
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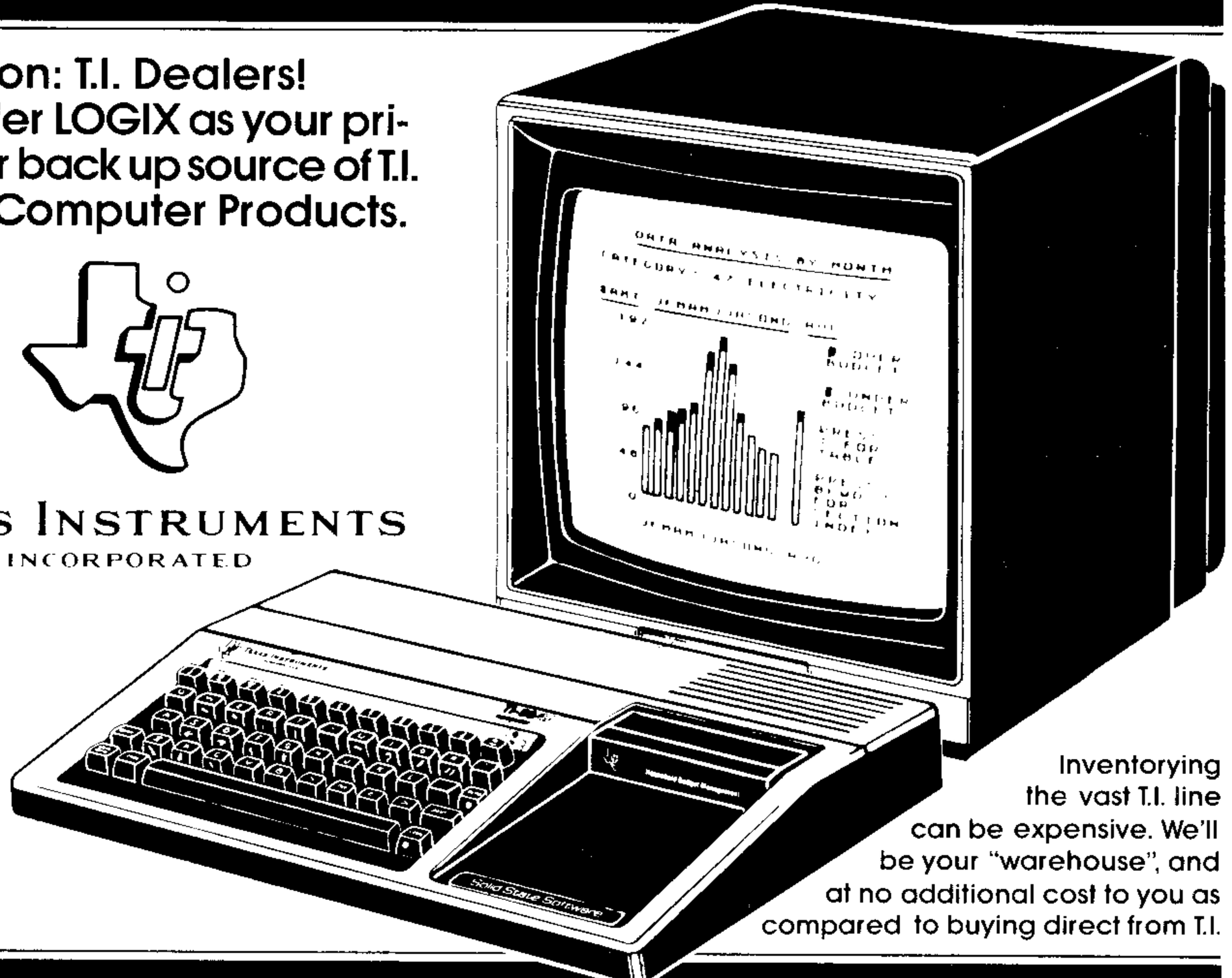

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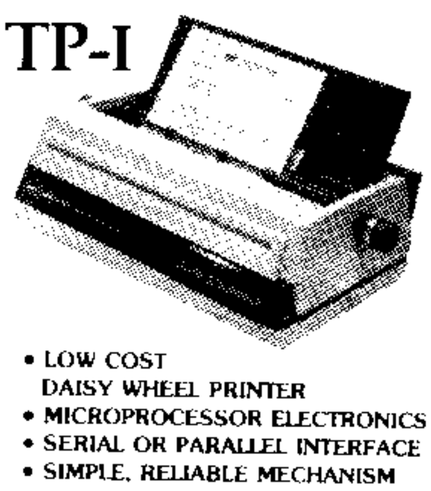

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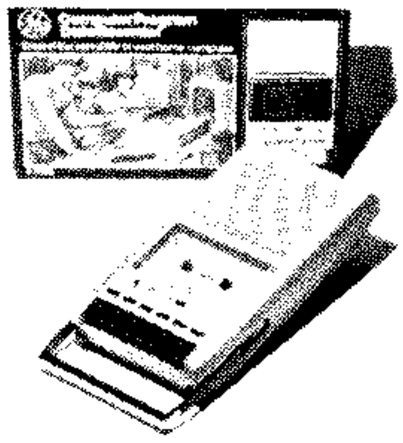

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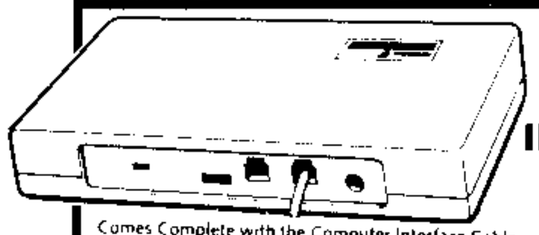

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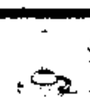

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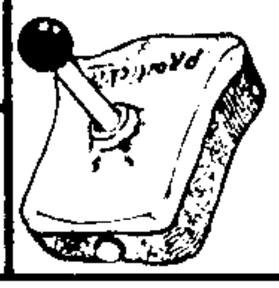

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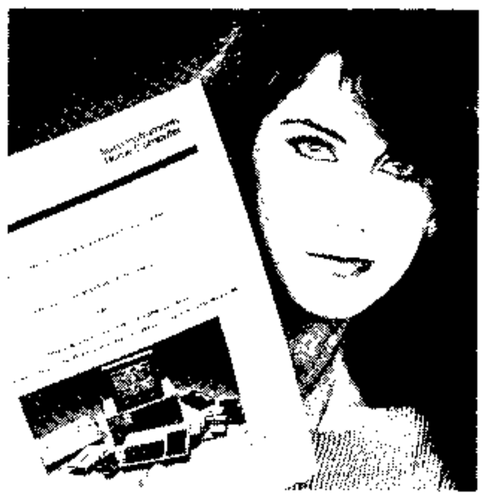

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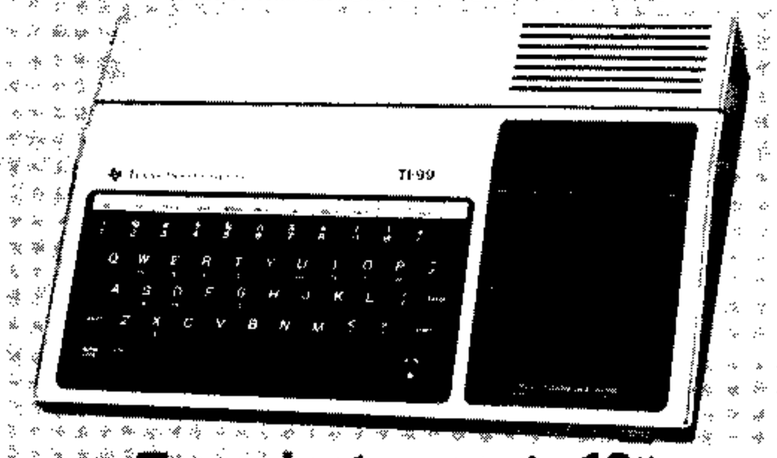

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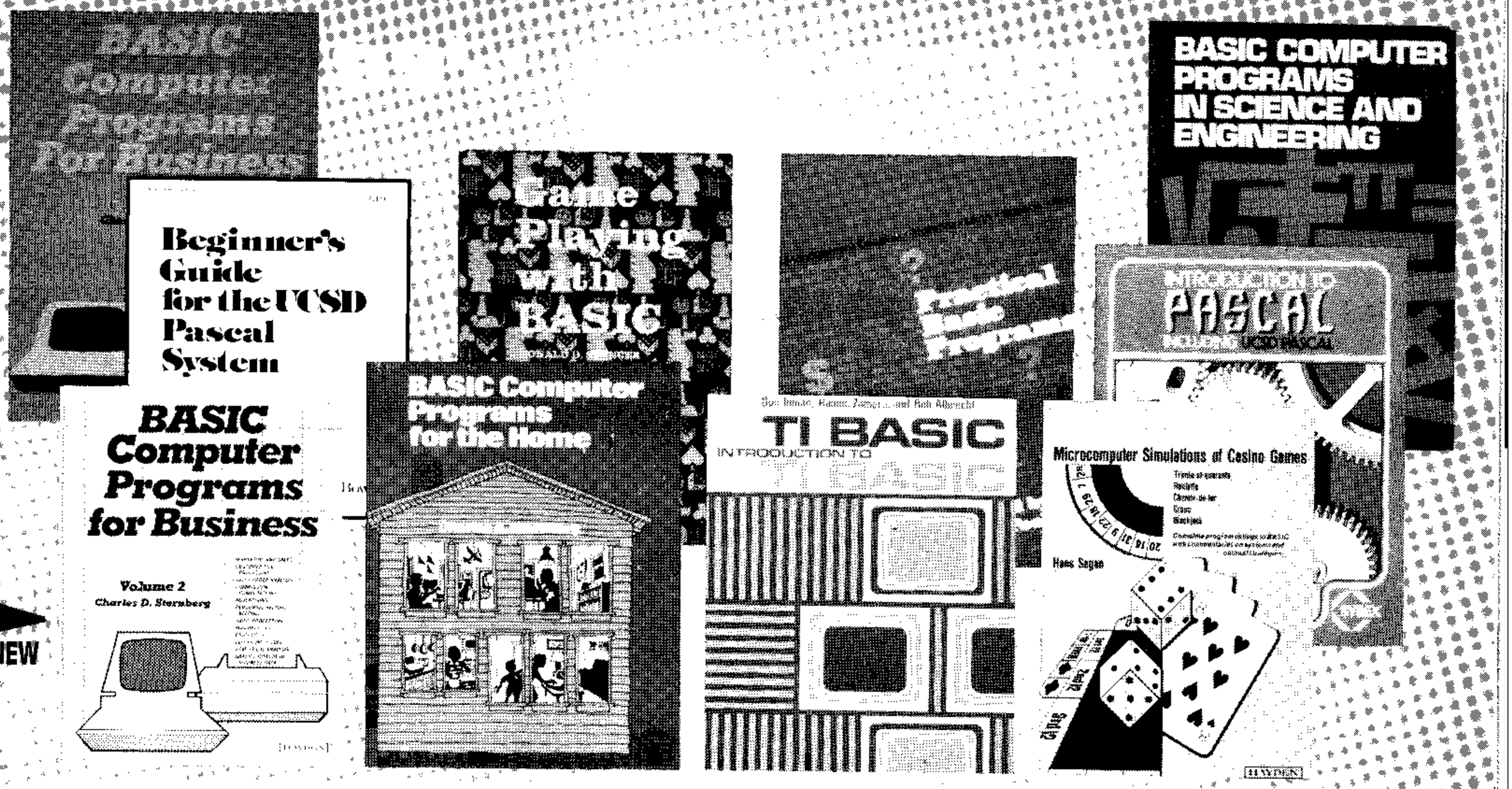

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Before *Activity Accountant*, faculty advisors had to fill out endless forms in duplicate and triplicate to open activity accounts and record transactions. The manual contains two forms which you may reproduce to use with the cartridge. They are easy to fill out and are designed primarily for the use of activity sponsors and secretaries.

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The Account Status form is really two forms in one. The top half of the form is to open an account and the bottom half is a Change of Status form to terminate the account or transfer its funds. In both cases, the reason for the form is to provide a place for the necessary signatures that indicate the action has been approved.

The other form included is the Transaction Record which is meant to be an ongoing handwritten record of all transactions, and proof that approval was obtained when a transaction needed to be edited or deleted. Again, the form is necessary to protect the security of the accounts so that transactions are not changed without written authorization. Frequent use of either of these forms would be rare and perhaps a sign that the accounting cycle in use might need to be re-evaluated.

Data Security

A very real concern of any school system using *Activity Accountant* is the security of the financial data. The forms included will, if used properly, provide for reviewing and authorizing accounts before any changes can be made. Scott, Foresman has made sure that termination of an account is not easy: The procedure to delete an account contains three points at which the user is told that the account cannot be deleted unless the proper sequence of steps is followed. With these safeguards, plus the confidential school and activity account code number for access to the data, it is unlikely that the information will fall into the wrong hands. The manual does make several other suggestions on pages 56-57 to ensure the security of your work – including separate storage spots for the Command Cartridge, master diskettes and backups.

Error Handling

Just as unauthorized use or alteration of data is not likely to happen with this system, it is also improbable that a crucial error will occur when using this application. Scott, Foresman seems to feel that the best way to handle errors is to prevent them in the first place, and this is just what *Activity Accountant* does. When ENTERing an activity on the account roster or editing a

transaction, you will see the prompt, ANY CHANGES ⊏, at the bottom of the screen. You must answer the prompt with either Y (yes), N (no) or E (END) before the application can continue. You are thereby reminded to go back to check your typing, your figures and decimal points! If you type Y, the cursor goes back to the first response you typed in and gives you the opportunity to correct each of your responses. If a correction is not necessary for a given response, simply press ENTER to move the cursor to the next input box. Keep pressing ENTER until you arrive at the error.

It should be noted here that (to guard against error) you cannot record a receipt and a disbursement on the same screen. The application will automatically compute the balance after a receipt is ENTERed, thus skipping over the disbursement input box. You cannot ENTER both, even if you try to do so. A similar precaution is built in as help when you come back to work with accounts later. When you call up an account to edit, perform a transaction, or to print a report, the prompt, IS THIS THE DESIRED DATA? is displayed. The application is helping you make sure you do not ENTER data to the wrong account.

ENTER an account or school code that has already been assigned. The only errors that the computer will not catch are the mistyping of figures or misspelling of names. Even then, the ANY CHANGES? prompt, which reminds you to check your entry over, will decrease the chances that mistakes of this nature go unnoticed.

In these times of economic upheaval it is appropriate that the public should want the schools they support with their dollars (tax and otherwise) to provide a stimulating learning environment for their children. All who work in education, secretaries, teachers, and administrators alike, do strive to do just that. Sometimes, however, the good people with good ideas for our children do not have the extra energy and time to make things come together. Scott, Foresman and TI have reduced the energy drain of paperwork and time-consuming record keeping that comes with providing quality extracurricular activities for our children. We can only hope that districts will use this excellent *School Management Applications* software to do just that.

99'er

Cut & Paste . . . from p. 11

Some options may or may not be important to you, depending on your kind of writing. Are you writing a long work such as a novel or a list of household chores scheduled for summer? Then you'll want a page-numbering feature that will adjust the whole manuscript's *pagination* for pages taken out or put in. And how about a name or title at the top of each page? Some software can do it, others can't.

Some other considerations: For people in a great hurry, there are time-saving devices which vary from program to program. For example, the cursor in some programs moves much more rapidly than in others. Other software lets you correct a single character simply by typing another over it anywhere on the screen.

How about an *error recovery* feature or "oops key" that allows you to *bring back* text you just deleted by accident? You probably will never need such a thing, but it is fun to demonstrate to your friends . . .

Yes, these details need your attention before you hurry through that last little bit of writing by hand—in your checkbook, that is. Since pre-purchase research always pays off and gives you a better idea of what to look for in a word processor software package, we have a companion article for you entitled *Word Processor Market Basket*. Here you will find four of the available word processing packages compared and rated in easy to comprehend charts.

99'er

MULTIPLAN . . . from p. 31

the formula in relative terms (for example, using "the row above this one" instead of "row 5"), the same formula can be used for every balance. In the sample, there are 6 more lines of checks and income, so you should copy the formula down 6 cells. With the cell pointer still at R6C10, invoke the command COPY, then choose the option DOWN. Type 6 at NUMBER OF CELLS and press ENTER. The system will copy the formula down 6 cells. For now, this will give you identical balances in all 7 cells because there are no income or expense figures below row 6 yet. This will change as you make more entries.

The Grand Total

After you finish filling in the checks and deposits, the final touch is to add totals for the income and expense columns. Label the totals line by skipping a row after the last check and entering TOTALS under the Paid to column. Arrow one to the right, and get ready to enter a formula by typing =. We'll use the SUM function again. Enter SUM(and then arrow up to R6C3 for the first item to sum. Type : and then choose R12C3 with the up arrow. Finish off your formula by typing), check that the formula is SUM(R[-8 C:R[-2]C), and then press ENTER and see the Income total appear. To total the other columns, just Copy the formula 6 cells to the right.

It would be a good idea to save the worksheet on disk now. You should not use the *Multiplan* disk to store your models. If you have only one disk drive, you should remove the *Multiplan* disk and mount a work disk.

If you have a printer, now would be a good time to print the worksheet. Follow the procedures on pp. 84-86 in your manual. One thing to change here is the left print margin. The checkbook model has 10 columns of 8 characters each, or 80 print positions. This will fit exactly on many printers, as long as we use a left margin of 0. Another thing to change here is the print width; you want to use 80 instead of the default 70. Type 0 for left margin, TAB over to print width, type 80, and press ENTER. Then you have to set the options for your printer. You enter the command PRINT by pressing P. TAB over to SETUP: and type the string you usually use in OPEN statements in BASIC programs, without the quotes (e.g., RS232.BA=1200.PA=0.DA=7). Then press ENTER. You'll find yourself back at the PRINT command line again. Press ENTER to select option Printer. Figure 3 shows the printed output. When the system is finished printing, you might save your model again to preserve the printer margins and options just set. This time choose the TRANSFER command, followed by option Save. The Save option will default to the same file name you used above, so just press ENTER. The system will ask if it's OK to write over the file; answer Y for yes.

That's all there is to it! We'll leave *Multiplan* for now, but next time we'll explore some of *Multiplan's* theories, and present some general strategies for using the package. We'll also talk about what *Multiplan* is *not* good for and describe *templates* in general terms.

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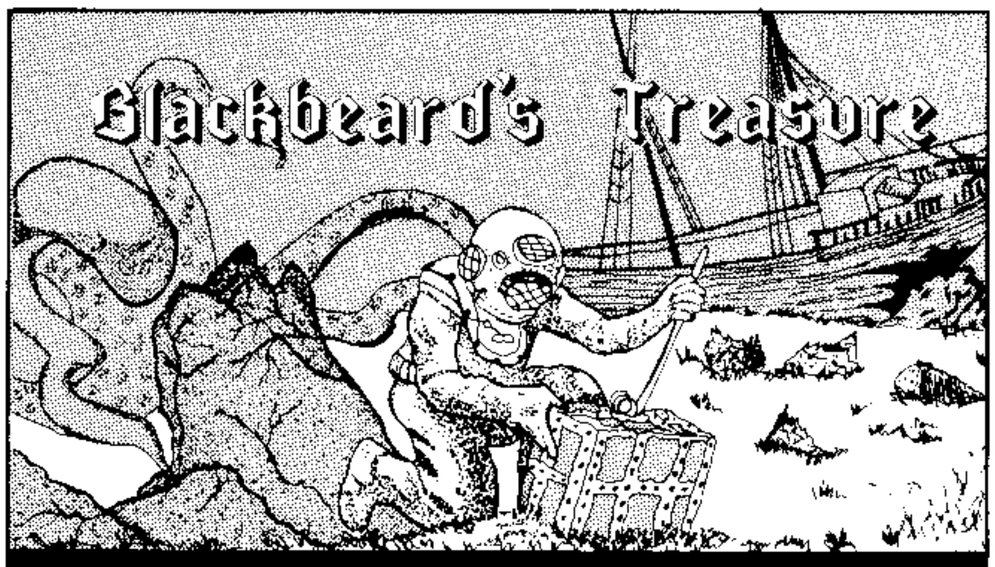

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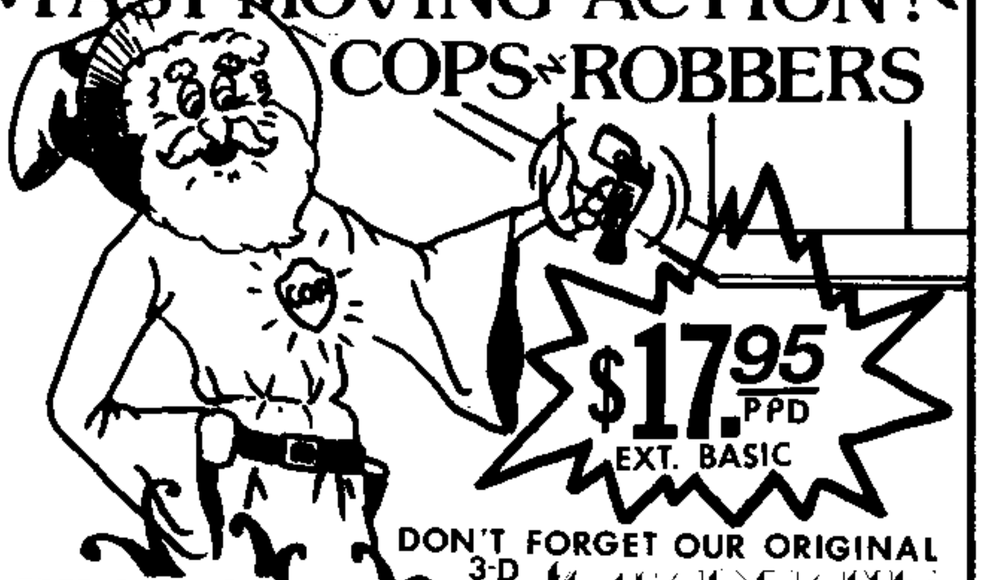

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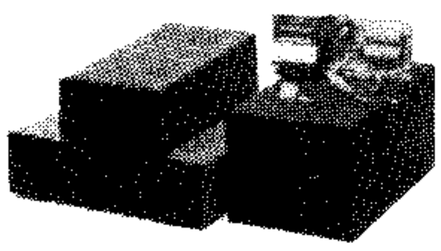

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Mini Memory Relocator

RAMpaging Through Memory

A Program By Martin Kroll, Jr.
218 Kaplan Ave.
Pittsburgh, PA 15227

BASIC

If you purchased your Mini Memory cartridge thinking you would have 4K of RAM in which to write Assembly Language programs, you may find yourself a bit disappointed. In order to write in Assembly Language, you need an *assembler*, a program which takes your assembly statements and converts them into the machine code the computer can understand. The Line-by-Line Assembler that comes with the Mini Memory only lets you assemble one line at a time, until you have written your program. And even this simple assembler requires Mini Memory to run in, so you won't have all the RAM to use for your program. There is, however, a remedy for this limited memory problem, which we present in the form of the *Mini Memory Relocator*.

This program will let you move any program in Mini Memory from one location to another. You may ask "What good will that do, when the amount of memory space is still small?" First, it will let you make use of the space taken by the assembler, once the program has been written in. It will also allow you to write several short programs, or subroutines, move them to predetermined locations, then load another program and move it to its own location, thus making more efficient use of the memory you have.

For example, suppose you have written four subroutines. For simplicity's sake, let's say that each subroutine was assembled to start at location 7D00 and end at 7DFF. You can take the first routine, and move it to 7300-73FF, relocating two other routines at 7400-74FF, and 7500-75FF. These routines can all be linked together, either internally with each other, or by a fifth routine you can write to access each subroutine.

The Program

The program is, of course, written in TI BASIC so that it can be used with the Mini Memory cartridge. The Mini Memory cartridge must be installed before the program can function. Failure to install it will cause the program to halt with an error.

When running the program, the user will have to answer some questions pertaining to the program's relocation. First, the program asks: DO YOU WANT TO DO LIMIT CHECKS FOR MEMORY BORDERS. (Y/N). In other words, the system is asking whether you want it to alert you if the relocator program tries to go outside of a predetermined area of memory. For example, let's say you already have a subroutine which takes up locations 7200-72FF. If you set the low memory limit to 7300, any time the relocator program tries to go below that location, it will stop moving, inform you, and ask if the move outside the limit is valid.

After telling the system that you wish to do limit checks, you must then enter the HIGH and LOW limits. Any time the program being relocated exceeds those limits, you will be notified and asked whether you want to enter new parameters or continue as is. In only one circumstance will you not be allowed to re-enter the parameters—if the relocator is already in the process of making the move when it encounters the limit error. Then your choice will be to either continue as is, or halt the program, and reload Mini Memory with the code to be relocated.

Next, the relocator will ask: FIRST ADDRESS OF MEMORY TO BE RELOCATED? (4 DIGIT HEX ADDRESS):. This will be the very first location in which code for your program occurs. (This includes data as well.) The next question asks: LAST ADDRESS OF MEMORY TO BE RELOCATED? (4 DIGIT HEX ADDRESS):. After that is keyed in, you will need to enter the entry address of your program. This is the address that gets put into the REF/DEF table and tells the computer where the starting instruction is located. This location cannot be DATA or your code will not run.

The next question you are asked is RELOCATE MEMORY TO WHICH ADDRESS. You then enter the new address to which your code will be moved. To continue our example, if the first address of memory to be relocated were 7D00, and the address to which it moved were 7200, then all code starting at 7D00 would now start at 7200. Any internal location references (such as instructions which refer to relative addresses) will be modified so that after the move, the code should be ready to run.

There are two more options which you must consider before the move takes place. The first is whether or not you want a hard copy report of the relocation. If you have a printer, you may want to select this option to keep a permanent record while developing your assembly program.

The last option lets you either update the REF/DEF table or leave it as it is. You may be relocating code which you do not want entered in the REF/DEF table. If so, you can answer no to this option. If you choose to update the REF/DEF table, you can either replace an existing entry or add a completely new one. If you want to re-

EXPLANATION OF THE PROGRAM
Mini Memory Relocator

Line Nos.	
100-160	Header and REMs.
170-240	Dimension arrays, and initialize variables.
250-360	Input option for limit checks.
370-610	Input memory addresses.
620-680	Input printer option.
690-940	Input option to update the REF/DEF table.
950-1070	Set up variables for the memory move.
1080-1240	Transfer memory.
1250-1680	Update the REF/DEF table.
1609-1790	Convert a hexadecimal value to a decimal value.
1800-1900	Convert a decimal value to a hexadecimal value.
1910-2030	Subroutine to input a 4 digit hexadecimal address and check limits.
2040-2300	Print the final report on the screen.
2310-2490	Optional print routine for the printer.
2500-3000	Error messages.
3010	The end.

place an old entry, you will need to supply its name. If the name does not exist, NOT IN THE TABLE will be displayed. Upon entering the name of the REF/DEF entry, the program will be relocated. When the move is complete, a report will be printed on the screen. If you earlier chose the printer option, pressing ENTER will produce your printed report and then end the program. Otherwise, you will need to copy the information from the screen before halting the program.

Now that you don't have to worry quite as much about running short on memory, you will be able to more fully explore the world of Assembly Language programming. The more ambitious you are as a programmer, the more uses you will find for this program (with a few modifications). The only limit is your imagination, so happy computing—and don't let the program bug bite.

99'er

```
100 REM  **********************
110 REM   * MEMORY RELOCATOR *
120 REM  **********************
130 REM  BY MARTIN KROLL JR
140 REM  99'ER VERSION 2.7.1MM
150 REM
160 REM
170 REM   DEFINE DIMISOR/MULTIPLIE
    R FOR NUMBER CONVERSIONS
180 DIM S(4),PNAME$(20),PLOC$(20,2
    )
190 LM=28672
200 HM=32767
210 S(1)=4096
220 S(2)=256
230 S(3)=16
240 S(4)=1
250 CALL CLEAR
260 PRINT "DO YOU WANT TO DO LIMIT
    ":"CHECKS FOR MEMORY BORDERS."
270 INPUT "(Y/N)":CT$
280 PRINT ::::
290 IF (CT$<>"Y")*(CT$<>"N")THEN 2
    60
300 IF CT$="N" THEN 370
310 PRINT "HIGH MEMORY LIMIT?"
320 GOSUB 1910
330 HM=TN2
340 PRINT "LOW MEMORY LIMIT?"
350 GOSUB 1910
360 LM=TN2
370 PRINT "FIRST ADDRESS OF MEMORY
     TO  BE RELOCATED?"::
380 GOSUB 1910
390 A=TN2
400 FAP$=TEMP$
410 PRINT "LAST ADDRESS OF MEMORY
    TO   BE RELOCATED?":
420 GOSUB 1910
430 B=TN2
440 IF B<=A+1 THEN 2970
450 LAP$=TEMP$
460 PRINT "FIRST EXECUTION ADDRESS
     OF  THE PROGRAM;(ENTRY ADDRES
    S)?"::
470 GOSUB 1910
480 C=TN2
490 EAP$=TEMP$
500 IF (C<A)+(C>B)THEN 2990
510 PRINT "RELOCATE MEMORY TO WHIC
    H":"ADDRESS?"::
520 GOSUB 1910
530 D=TN2
540 IF D>A THEN 570
550 K=0
560 GOTO 580
570 K=1
580 IF CT$="N" THEN 610
590 IF D<LM THEN 2590
600 IF D+(B-A)>HM THEN 2500
610 NPA$=TEMP$
620 PRINT "DO YOU WANT A PRINTED R
    EPORTON THE CHANGES IN MEMORY?
    "
630 INPUT "(Y/N)":PR$
640 PRINT ::::
650 IF (PR$<>"Y")*(PR$<>"N")THEN 6
    20
660 IF PR$="N" THEN 690
670 INPUT "PRINTER DEVICE:":DEV$
680 PRINT ::::
690 PRINT "WANT REF/DEF TABLE UPDA
    TED?"
700 INPUT "(Y/N)":RD$
710 PRINT ::::
720 IF (RD$<>"Y")*(RD$<>"N")THEN 6
    90
730 IF RD$="N" THEN 950
740 PRINT ::::
750 PRINT "DO YOU WANT TO REPLACE
    A":"REF/DEF ENTRY?":
760 INPUT "(Y/N):":RP$
770 IF (RP$<>"Y")*(RP$<>"N")THEN 7
    50
780 IF RP$="N" THEN 910
790 INPUT "NAME OF OLD REF/DEF TAB
    LE   ENTRY TO BE REPLACED:":NM
    $
800 NM$=SEG$(NM$&"          ",1,6)
810 CALL PEEK(28702,N,D)
```

Continued on p. 68

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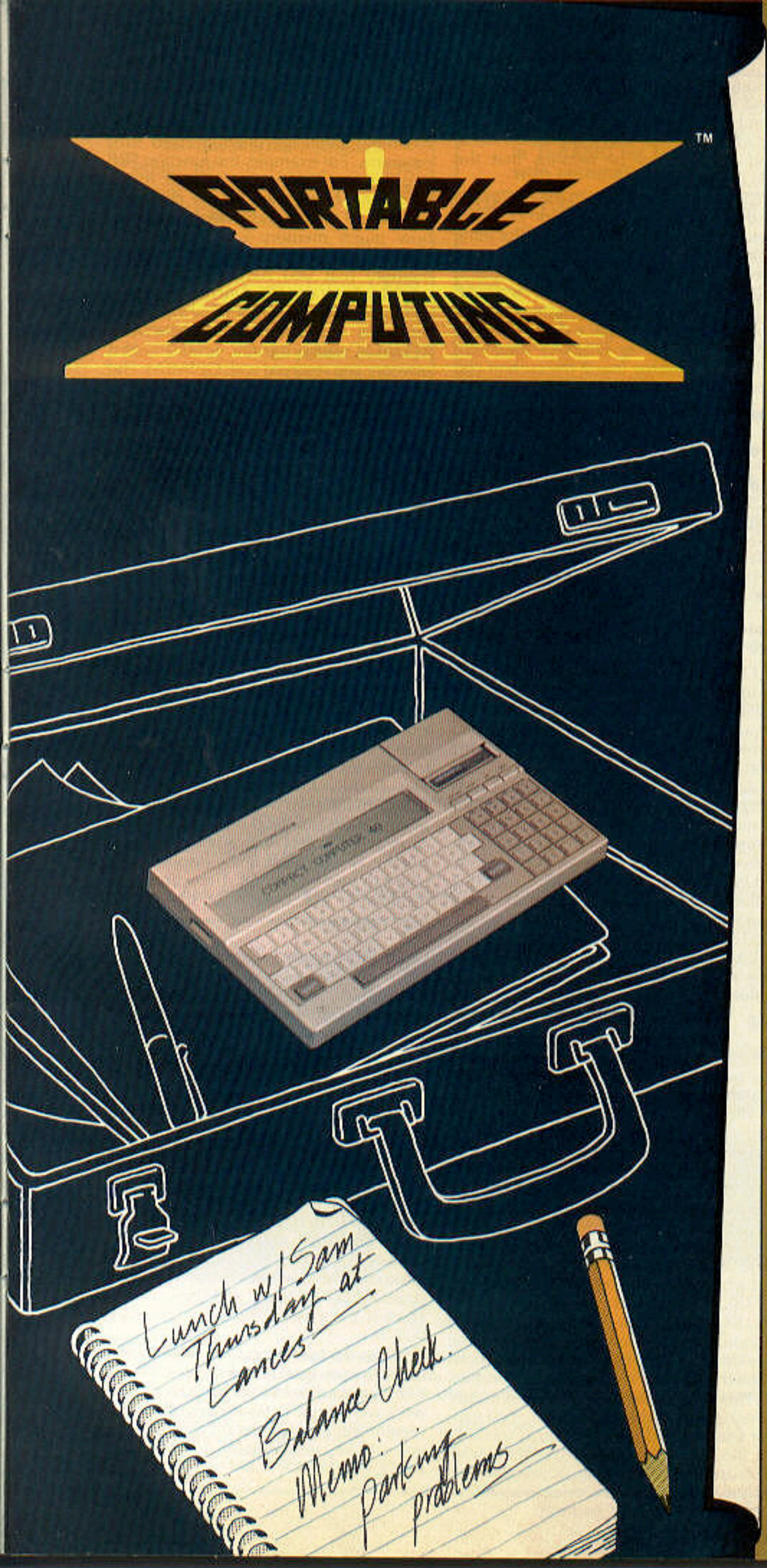

Touring Compact Computer Country

Part II: A Further Look At the CC-40 Compact Computer

By Gary M. Kaplan

In this article, we will begin exploring the Enhanced BASIC language that is resident in the CC-40. The Enhanced BASIC in the compact series resembles TI Extended BASIC more than the 99/4 console BASIC, in that it uses the additional features of Extended BASIC and then adds its own particular extensions to create the "Enhanced" version.

To illustrate a basic difference between the two BASICs, let's look at the way a user would edit program lines on the machine. With the CC-40's Enhanced BASIC, you cannot delete a line by entering its line number alone. You must use the DELETE key word. This DELETE key word can also delete a group of program lines. You can go into the DELETE mode by either pressing [FN] [DEL], or by typing DELETE or DEL. You then key in: a single line number to delete a single line; the line number followed by a dash which deletes that line and all following lines; the dash preceding a line number which deletes that line and all preceding lines; or a line number, a dash, and another line number, which deletes that inclusive range of lines.

DEL 150	Deletes line 150.
DEL 150–	Deletes line 150 and following lines.
DEL –150	Deletes line 150 and all preceding lines.
DEL 150–200	Deletes lines 150-200 inclusive.

Play It Again

A nice feature is the play-back key, [SHIFT] [PB] which causes the previously displayed line to reappear. This is useful if the line of code is similar to the previous line. You can play back the previous line into memory, make the necessary changes, and enter it. This avoids having to retype a long line of code or data.

The PAUSE statement is an attractive new feature of this language. Because the CC-40 displays printed items so quickly that you cannot see them, this statement is very helpful. During a PAUSE, the underlying cursor is displayed in column one and waits for you to acknowledge it by pressing [ENTER] or [CLR]. After either of the keys is pressed, the computer

resumes execution of the program with the next statement. You may also have the computer pause after a specific statement by following that statement with PAUSE and the number of seconds that the PAUSE is to last.

Multiple prints-per-line to the display are also possible. If the PRINT or DISPLAY statement is followed by a comma or semicolon, a pending print condition is created. If a comma ends the statement, the computer spaces over to the next field. If a semicolon ends the statement, the computer does not space over. Then the following PRINT or DISPLAY statement prints on the same line at the current column position:

```
100 INPUT "Enter Starting Mileage: ";SMILE
110 INPUT "Enter Ending Mileage: ";EMILE
120 INPUT "Enter Gallons Used: ";GALL
130 MPG=(EMILE-SMILE)/GALL
132 IMAGE Miles per gallon: ###.##
134 PRINT "Miles=";EMILE-SMILE;
136 PRINT "Gallons=";GALL:PAUSE 2.5
140 PRINT USING 132;MPG
150 PAUSE
```

Other than the addition of the PAUSE feature and the pending PRINT and DISPLAY statements, Enhanced BASIC's input and output commands are handled similarly to TI's Extended BASIC cartridge with only minor syntax differences.

Another interesting feature of this language is the ability to test a string for a numeric constant. A user can test the string to determine if it is a valid representative of a numeric constant by using the NUMERIC function. NUMERIC returns a value of minus one (true) if the string is a valid representation of a numeric constant and a value of zero (false) if it is not. NUMERIC can also be used on a string to see if VAL will convert it to a numeric value:

```
160 IF NUMERIC(A$) THEN A=VAL(A$) ELSE PRINT "NOT A NUMBER":PAUSE
```

Lasting Attachments

The ATTACH and RELEASE statements are also quite useful. You can reduce the execution time of a program that repeatedly calls a subprogram by using the ATTACH statement when you have sufficient memory. The variables are initialized only once when the ATTACH is executed and *not* each time the subprogram is called. The values of the variables are maintained whenever the subprogram terminates.

To release used memory, use the RELEASE statement. The variables in the subprogram are then initialized each time the subprogram is called and are not maintained when the subprogram terminates.

There is an extensive list of built-in subprograms available to the user. You can, for example, add to the internal memory of the CC-40 by using CALL ADDMEM. This appends the random access memory (RAM) in an installed memory expansion cartridge to resident memory.

Along the Assembly Line

Many of the built-in subprograms were designed to allow the user to work with Assembly Language programs and subprograms. For example, the function FRE is useful for determining a) how much memory is being used for the operating system and the program memory, and b) how much memory is available. The GETMEM subprogram is for reserving the memory that you have determined is available from the FRE function. You can then store data and Assembly Language programs and subprograms there. The RELMEM subprogram releases the memory you reserved with GETMEM. The amount of memory reserved should be significantly less than the largest block available, because sufficient memory space must remain available for statements that require additional temporary memory.

PEEK, POKE, and LOAD are used in a way similar to Extended BASIC's PEEK and LOAD. (Extended BASIC's CALL LOAD actually does the job of both POKE and LOAD.) EXEC is used to execute an Assembly Language program or subprogram. There is also an I/O subprogram to perform control operations on peripheral devices.

Watch Your Language

The language prompt subprogram SETLANG is an interesting feature. It allows a user to set the prompts and messages of many of the Solid State Software cartridges to either the English or a foreign language. The CHAR, KEY and VERSION subprograms are used in much the same way as they are in Extended BASIC. The INDIC subprogram is new. This is needed to control the 17 indicators in the display that a user can turn on and off. There are six indicators at the bottom of the display reserved for users.

Getting Your Act Together

The final two subprograms are extremely useful to the serious programmer. The CLEANUP subprogram allows you to eliminate any variables that are not being used in the current program and memory. CLEANUP cannot, however, be called from a program. The DEBUG subprogram allows access to the DEBUG monitor—allowing users to read and change memory locations, as well as RUN and debug Assembly Language programs and subprograms. The monitor is designed to be used with the CC-40's separate editor-assembler cartridge. This monitor, by the way, contains some very powerful features. For example, a user has the ability to modify the microprocessor's *program counter*, *status register*, and *stack pointer*. There is also a useful *single-step* command built in.

When the tour continues, we'll look at how to use external devices with the CC-40, examine file organization, and work with simple data handling. We'll also present you with some short programs that you can key in and RUN on your Compact Computer.

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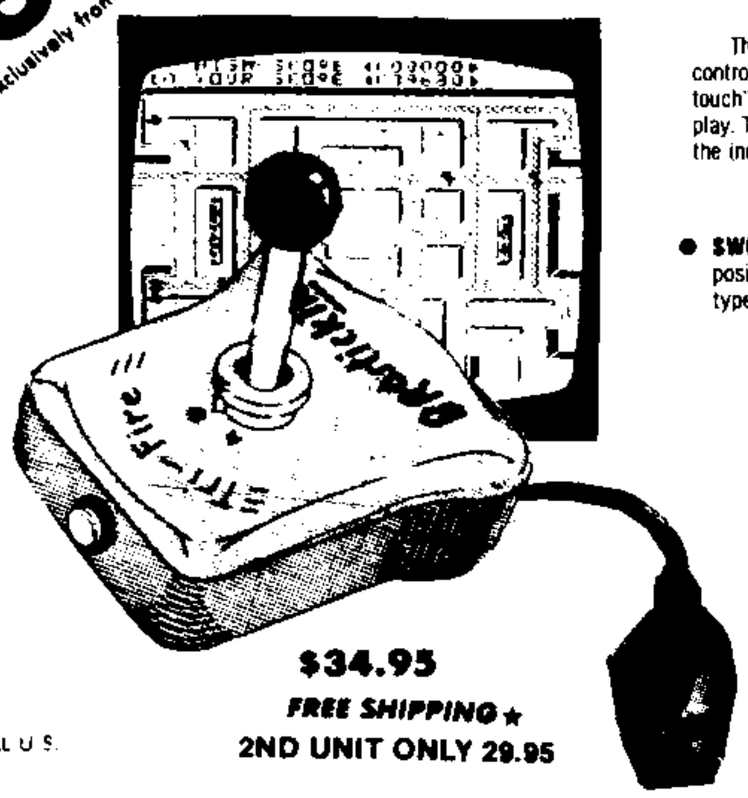

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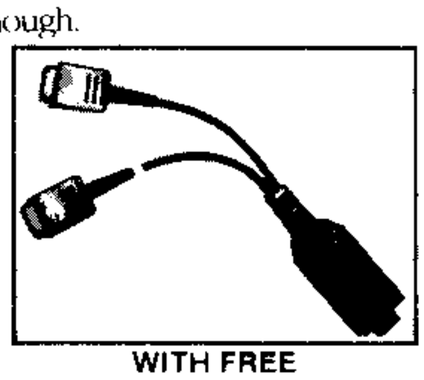

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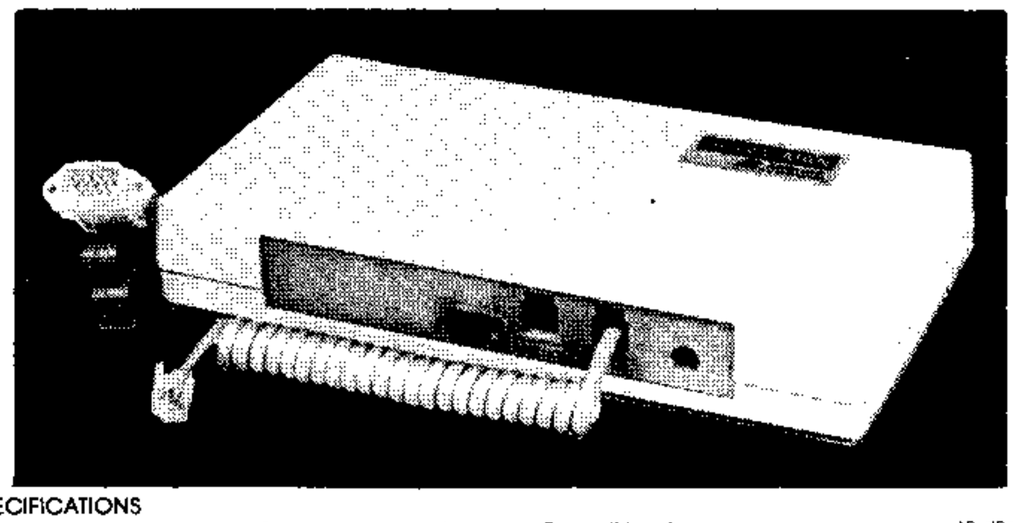

SPECIFICATIONS

Data Format	Serial, binary, asynchronous	
Operate Mode	Manual dial, Automatic ANSW/ORIG selection	
Data Rate	0 to 300 bps, full duplex	
Modulation	Frequency shift-keyed (FSK)	
Line Interface	Direct-connect	
Data Interface	TI RS-232C compatible, built-in cable to computer	
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SPACE	1070 Hz	2025 Hz
Transmit Frequency Accuracy	± 0.01%	
Transmit Level	−12 dBm typical	
Receive Frequency	ORIG	ANSW
MARK	2225 Hz	1270 Hz
SPACE	2025 Hz	1070 Hz
Receive Frequency Tolerance	± 0.5%	
Carrier Detect Threshold	−44 dBm typical	
Carrier Detect Indicator	Audible tone	
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Size	8 1/16" x 4 9/16" x 1 3/16"	

*Not included

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THE BASIC Issue AND THE Tortoise's Retort

By Henry Gorman, Jr.
Contributing Editor

We all know the old story . . . the brash young hare taunts the tortoise throughout the race, and then ends up losing—the victim of overconfidence. Well, that age-old competition is being waged once again. But this time, the race is between two computer languages: the popular favorite, BASIC and the slowly-but-steadily rising LOGO turtle. Is LOGO merely a fabulous graphic language for children, or is it a high-level language capable of holding its own next to the front-running BASIC? While more and more computer users are beginning to realize LOGO's potential, there are still those who underestimate this language. To understand the basis of LOGO's inferior image, let's briefly review the origins of the two languages.

Created Equal

BASIC and LOGO were created at about the same time. The authors of both languages intended their languages to be "friendly," easily learned and usable by computer novices. To accomplish these objectives, the BASIC authors wrote a language which had just a few statements to learn. This tactic had two consequences. First, statements had to be concatenated to gain sufficient computational power. Second, since it had few statements, the language could be implemented on relatively small, inexpensive computers.

In contrast, LOGO's authors created a language rich in statements so that each one was unambiguous and, when possible, similar to the English in meaning. Unfortunately, this meant that LOGO required larger and more sophisticated computers (than did BASIC) to support it. This difference was hardly trivial back when relatively inexpensive machines cost between $10,000 and $100,000, and LOGO-capable computers cost two to ten times as much! Consequently, almost all serious work intended for novices was done with BASIC. Today, it still costs between two and ten times as much to implement LOGO as it does to use BASIC. But a TI LOGO system is only three times the cost of a simple 99/4A BASIC system. As TI continues reducing the price of their hardware while they increase its power, this

THE RESOURCE FOR 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; 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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1500 Valley River Dr., Suite 250
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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.

Our Contributing Editors

Henry Gorman, Jr.
Department of Psychology
Austin College
Box 1584
Sherman, TX 75090

Roger B. Kirchner
Department of Mathematics
Carleton College
Northfield, MN 55057

three-fold difference in cost will become inconsequential.

BASIC in the Lead

BASIC enjoys a 15-year lead over LOGO. The greatest advantage gained by BASIC in this period was not in the large amounts of software developed for BASIC during this time. Rather, BASIC's main advantage has been what S. Papert[1] calls the *qwerty* phenomenon. The qwerty effect refers to the resistance people have to improvements in a technology due to their familiarity with older technology. A good example of qwerty is our stubborn adherence to the English measuring system.

The insidiousness of qwerty can be seen in two examples of reasoning by educators (people who should be the most aware of qwerty). I recently spoke with a district curriculum coordinator about using LOGO at his high school which has an enrollment of 2,000. He said that although LOGO was probably the language of the future, the high school already had 10 Apple II's set up to run console BASIC and so they couldn't switch to TI. When I suggested that he add Apple LOGO (although this would cost almost as much as buying complete TI systems), he surprisingly said that they had a good setup and there was no reason to change. My guess is that in the next decade they will expand to at least 200 computers! *Time Magazine* last year quoted another curriculum coordinator who said "Yes, LOGO is a superior language, but you cannot get students jobs in it, so we don't teach it." This educator clearly had a problem understanding education and relevance (how many of his students have jobs in plane geometry or Latin?). His qwerty problem was an assumption that things will always remain as they are now. If we have learned nothing else from the electronics revolution, we should have learned that change is a constant.

Why do I think LOGO is a superior language to BASIC? Because LOGO is friendlier, easier to learn, and in most ways, more powerful than BASIC.

The Friendly Tortoise Gains

The term "user friendliness" has been so overused it has become a cliche. Doonesbury pointed out the difficulty novices have using non-friendly computers. Even TI BASIC (a fairly good version of BASIC) is considerably less friendly than LOGO. LOGO is more amiable from its initial message, WELCOME TO TI LOGO! (compared to TI BASIC READY), through to the sign off, AND A PLEASANT DAY TO YOU! (there is nothing in BASIC). The difference in messages may be subtle, but it sets the tone for everything you do with the computer.

Error messages in TI BASIC are not only terse (e.g., CAN'T DO THAT or SYNTAX ERROR or IO ERROR 06) but they are uninformative and often require a translation into English. Is there any sound reason why a user should have to memorize a long series of error code numbers? With TI LOGO you don't have to. Error messages are more informative and stated in English (TELL ME MORE or OUT OF INK or :X HAS NO VALUE). Thus, finding bugs in LOGO is not an arduous task. Given that debugging represents a major portion of computer programming, this LOGO advantage is significant.

Ease of Learning

The ease or difficulty of learning a language is closely related to its user friendliness. As noted earlier, BASIC was designed to be simple by having very few primitives (built-in instructions). Consequently, it was necessary to give primitives several meanings, depending upon their contexts. The user must, therefore, learn not just the primitives, but their contextual meanings as well. In many cases, the meanings are quite different from their equivalents in spoken English, so that the user must also unlearn that meaning. Consider the = , for example. In English this is read "equals" and is interpreted either as the statement that the left-hand side is equivalent to the right (as 3 × 2 = 6) or as an implicit question: "Does the left side equal the right?" In BASIC, LET X = X + 1 or X = X - 1 have nothing to do with equality; here = should be read as "becomes" as "Let X become X + 1." As soon as this new meaning of = is learned, one finds that in IF X = 20 THEN GOTO 140, there is the old implicit question, "Is X equal to 20?" To avoid such ambiguities, the LOGO authors used each primitive uniquely and made that meaning as close as possible to standard English. To test for equality in TI LOGO, one can use either IF :X = 20 THEN STOP or TEST :X = 20 IFT STOP. These statements can be read, "If the value of X is equal to 20, then stop." TI LOGO handles the attribution of a value to a name or the changing of a value assigned to a name with either MAKE or CALL (the choice is up to the user). CALL :X + 1 "X means to assign the value of X plus 1 to the name X. The statement MAKE "X :X + 1 means "Make the name X have the value of X plus 1." With a few possible exceptions (perhaps FPUT, LPUT, or SENTENCE) in which there are no one- or two-word English equivalents, the TI LOGO authors managed to make the primitives correspond to English. In some cases (CARRY or LOOKLIKE), users are given a choice of primitives.

Turtle Power

There is actually one sense in which BASIC *is* more powerful than LOGO! Currently, BASIC users can send information from their 99/4A through an RS232 interface to any compatible device (such as a printer). Extended BASIC users can POKE around in the workspace memory, and program music. Mainly for production reasons (and because LOGO was originally thought of as a children's language), TI LOGO can not output to an RS232, allow access to the workspace memory, or program music. (It only makes a "beepy" sound.) These shortcomings will, however, be remedied in TI's LOGO II which will be able to output to an RS232, will allow for user-on-demand garbage collection, and will have full access to music.

Here are two programs which demonstrate the power of LOGO for handling a common problem of information processing. The problems are actually inverses of each other. The first is how to find the largest number in a list of numbers and the second is how to find the smallest number in a list of numbers. The strategy that the two programs (*Biggest* and *Smallest*) use is to take the first number in the target list and assume that it is the biggest (or the smallest) and then to check that number against all other numbers in the list. If a larger number (or smaller) is found, then it is checked against all others in the list until all numbers have been checked.

Smallest

```
TO SMALLCHECK :LIST
IF :SMALLEST & FIRST :LIST
   CALL FIRST :LIST "SMALLEST
IF BUTFIRST :LIST = [ ]
   "SMALLEST
OUTPUT SMALLCHECK
   BUTFIRST :LIST
END
```

Biggest

```
TO BIGGEST :LIST
CALL FIRST :LIST "BIGGEST
OUTPUT BIGCHECK BUTFIRST
   :LIST
END

TO BIGCHECK :LIST
IF :BIGGEST > FIRST :LIST
   CALL FIRST :LIST
   "BIGGEST
IF BUTFIRST :LIST = [ ]
   OUTPUT :BIGGEST
OUTPUT BIGCHECK
   BUTFIRST :LIST
END
TO SMALLEST :LIST
CALL FIRST :LIST
   "SMALLEST
OUTPUT SMALLCHECK
   BUTFIRST :LIST
END
```

Simplification

In all other senses, LOGO is more powerful than BASIC. The most interesting power advantage of LOGO is in its heuristics, or what Papert calls "powerful ideas." LOGO provides such problem solving devices as solution by simplification, solution by recursion, solution by sub-goals, and solution by better definition of the problem-space (through explicit naming of states and procedures.)

There are some problems which are so complicated that they cannot be readily solved. The LOGO philosophy is to set aside the total problem temporarily and look for the simplest cases of the problem. For example, many students try to set up "shoot" games in which a sprite is aimed and fired at a moving target. If the sprite comes close to the target, some change in the screen occurs. This simple game idea is actually quite elaborate and beyond the programming ability of most of us. An initial strategy would be to begin with a program in which the sprite automatically fires at the target, hits the target, and begins an exciting change in the screen. After this is achieved, an upgraded version might put control of firing the sprite into the hands of a game player. A more elaborate edition then adds a coincidence check gradually increasing the sophistication, and the original project is accomplished in three steps! A nice side-effect of this tactic is that the programmer never feels that the project is completed; even greater elaborations can be added as the project idea grows.

A second type of simplification (one I call the physicist's tactic because so many college physics projects involve simplifying assumptions) is to look for *boundary* conditions of a problem. Boundary conditions are those which occur at problem extremes. For example, the problem of writing a program which determines if a word occurs in a list is very difficult if you consider all possibilities for words or lists. Extreme cases, however, in which there are no words in the list or when there is no target word, can be quite easily programmed. The slightly more complicated case, in which the target word is the first word in the list, is also easily dealt with. The problem can then be classified as one of these three easily-handled extremes. Simplification is so strongly built into the LOGO primitives and structure that novice LOGO programmers find themselves using it as a tactic without becoming consciously aware of any growth in their problem-solving abilities. BASIC on the other hand, does not lend itself to simplification. For some projects it is possible to put elaborations in BASIC, but this is usually difficult because it requires squeezing lines into the program rather than adding subordinate programs onto the main, executive program.

Recursion

The strategy of solving problems by reapplication of the same program over and over is not even allowed in BASIC. Using the name of a program inside the definition of that program results in a syntax error message in BASIC. For some recursive LOGO programs there are equivalent BASIC interactive programs. For example:

LOGO	BASIC
TO BEEPER	100 REM BASIC BEEPER
BEEP	110 CALL SOUND (1000,1000,1)
WAIT 60	120 CALL SOUND (1,000,19000,1)
NOBEEP	
WAIT 60	
BEEPER	130 GOTO 110
END	

Continued on p. 69

By S. T. Holl
Qtrs. 327A Yerba Buena Island
San Francisco, CA 94130

Keeping Your Files Organized with a Linked List

Here is a big, wallaby pocket-sized program demonstrating a technique which has been a recurring theme in programming almost since the inception of computer science. This concept, called *linked lists*, is so unnatural on paper that beginners usually have great difficulty grasping it at first. Once they get it, however, the notion becomes so obvious in the context of the computer that they wonder (a) why they didn't see it right off, and (b) why their friends still don't understand it. The pocket program presented here lets you create, modify, and store linked lists on the 99/4A computer. The principal advantage of using this program over pencil and paper list-making is that the computer version will insert or delete lines in the middle of your list. (This program was originally intended to list furniture for a household insurance policy.)

Figure 1

Underground Railroad

The linked list is a simple idea that has been elevated by computer scientists to the status of a major mystery. Imagine a spy network or an underground railroad in which each agent knows only the identities of his predecessor and successor on the path. People (or messages, or computer programs . . .) can traverse such a path only by picking up addresses step by step along the way. So far as the foul conspirators in the network are concerned, they are arranged in a line like the fowl in Figure 1, but geographically they could very well be scattered as in Figure 2.

Table 1 illustrates the computer analog, implemented as in the *Pocket Inventory Program*. Each line of this table is a self-contained *cell*. On the left is the line number or *address*. In the first column is the address of the previous line, next is the line number of the following line; finally, under *Item* is the list entry itself. Beginning at address 2, see if you can follow the list through to the end (that is, back to where you started).

Now you know who is on call to pull the sleigh tonight.

These linked lists are described as *double linked* because, each *cell* has *pointers* in both directions—to both the predecessor and successor. Singly linked lists have pointers in only one direction and are intended to be traversed in one way only. That's perfectly satisfactory for a lot of applications and takes less storage space.

Cellmates

It is customary for linked lists to have *header* and sometimes *footer* cells which store the information differently from the other cells. Their presence puts the top and bottom items of stored information *inside* the list, instead of on the ends, so that these cells can be deleted (as can all the rest of the cells in the middle of the list). This saves programming. In the *InvList* program a single header/footer cell does the work of both, and the wrap-around gives us the freedom to move easily between the top and bottom of the list.

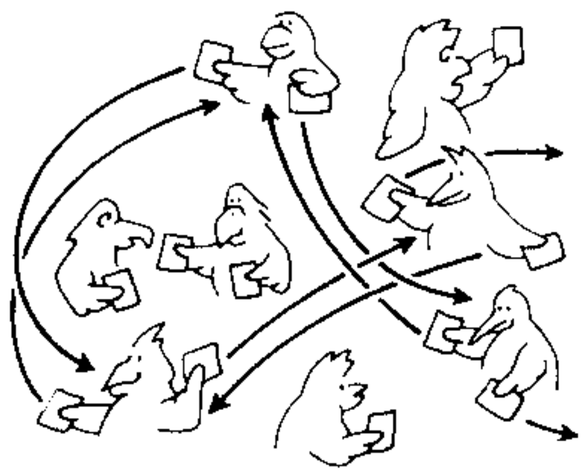

Figure 2

Table 1

Address	Previous	Following Item	
0	500	1	
1	0	3	(Pool)
2	10	6	(Header/footer)
3	1	5	Singer
4	6	8	Dancer
5	3	7	Foxhound
6	2	4	Dasher
7	5	9	Rabbit
8	4	10	Donner
9	7	11	Vixen
10	8	2	Blitzen
500	499	0	Rhino

When the program is first run, it (silently) initiates storage, and then asks "Next task?" The tasks possible are:

S (for *screen*) = display the list, as it presently exists, on the screen.

I (for *insert*) = accept from the keyboard another list item, to go right behind the last one displayed.

D (for *delete*) = delete the last item displayed.

P (for *prior*) = back up and display the item before the last one displayed.

F (for *following*) = go forward and display the next item on the list.

WT (for *write tape*) = write the entire list on tape.

RT (for *read tape*) = read from tape a list previously written with "wt."

Q (for *quit*) = quit.

Variables List:

CELL = an argument in subroutine calls; a frame address.

CUR = a pointer to an entry; an argument in the subroutine calls.

CURINV = pointer to the current entry in the Inventory list.

FOL (follower) = vector of addresses of the following frames in the lists.

INV = top of inventory list

ITEM$ = vector of string-variable list entries.

POOL = top of list of unused entry frames.

PRIOR = vector of addresses of predecessors of frames in lists.

TASK = what the user wants to do next.

Problems

1. (Introductory exercise): To get the hang of working *InvList* as it appears here, you might begin by listing the names of the seven dwarves as they come to mind. Insert them alphabetically; notice how easy it is to make insertions into the list anywhere you want.

2. (Simple): Change the task symbols to letters which are more meaningful to you. (Would you rather use D for DOWN and then E for ERASE?)

3. (Moderate): Complete task T (tape) for tape or disk, depending on what your system has.

4. (Simple): Fix S (screen) so it pauses after every pageful.

5. (Simple): Childproof this pocket program, so that it will tell the user when the Pool is exhausted.

6. (Complex): Add a task enabling the user to enter an Item$ which will then be inserted in alphabetical order (that is, right before the highest Item$ on the list which is alphabetically after the new entry).

7. (Complex): Add a task permitting the user to alphabetize the Item$ list with a single command.

8. (Moderate to complex): Add a "value" vector to the program, so that an item's value can be recorded in a numeric field along with its description. Complex extension: Keep a running total value, automatically adjusted as values are added, deleted, or changed.

```
100 REM  ********************
110 REM  * POCKET INVENTORY *
120 REM  *   LIST PROGRAM   *
130 REM  ********************
140 REM  BY S. T. HOLL
150 REM  99'ER VERSION 2.6.1
160 CALL CLEAR
170 PRINT TAB(6);"POCKET INVENTORY
    ":::::::::::
180 REM
190 REM
200 DIM PRIOR(500),FOL(500),ITEM$(
    500)
210 FOR I=0 TO 500
220 PRIOR(I)=I-1
230 FOL(I)=I+1
240 NEXT I
250 PRIOR(0)=500
260 FOL(500)=0
270 POOL=1
280 CUR=FOL(POOL)
290 GOSUB 920
300 INV=CELL
310 ITEM$(INV)="HEADER/FOOTER; DON
    'T DELETE!"
320 FOL(INV)=CELL
330 PRIOR(INV)=CELL
340 CURINV=INV
350 INPUT "NEXT TASK?":TASK$
360 IF TASK$<>"I" THEN 440
370 CUR=FOL(POOL)
380 GOSUB 920
390 INPUT "ITEM?":ITEM$(CELL)
400 CUR=CURINV
410 GOSUB 980
420 CURINV=CUR
430 GOTO 350
440 IF TASK$<>"D" THEN 520
450 IF ITEM$(CURINV)="HEADER/FOOTE
    R; DON'T DELETE!" THEN 520
460 CUR=CURINV
470 CURINV=FOL(CURINV)
480 GOSUB 920
490 CUR=POOL
500 GOSUB 980
510 DISPLAY ITEM$(CURINV)
520 IF TASK$<>"P" THEN 550
530 CURINV=PRIOR(CURINV)
540 DISPLAY ITEM$(CURINV)
550 IF TASK$<>"F" THEN 580
560 CURINV=FOL(CURINV)
570 DISPLAY ITEM$(CURINV)
580 IF TASK$<>"S" THEN 640
590 CURINV=INV
600 CURINV=FOL(CURINV)
610 DISPLAY ITEM$(CURINV)
620 IF CURINV<>INV THEN 600
630 GOTO 350
640 IF TASK$<>"WT" THEN 760
650 OPEN #1:"CS1",INTERNAL,OUTPUT,
    FIXED
660 CUR=FOL(INV)
670 PRINT #1:ITEM$(CUR)
680 IF ITEM$(CUR)="HEADER/FOOTER;
    DON'T DELETE!" THEN 730
690 GOSUB 920
700 CUR=FOL(POOL)
710 GOSUB 980
720 GOTO 660
730 RESTORE #1
740 CLOSE #1
750 GOTO 350
760 IF TASK$<>"RT" THEN 890
770 OPEN #1:"CS1",INTERNAL,INPUT ,
    FIXED
780 INPUT #1:T$
790 IF T$="HEADER/FOOTER; DON'T DE
    LETE!" THEN 860
800 CUR=FOL(POOL)
810 GOSUB 920
820 ITEM$(CELL)=T$
830 CUR=PRIOR(INV)
840 GOSUB 980
850 GOTO 780
860 RESTORE #1
870 CLOSE #1
880 GOTO 350
890 IF TASK$<>"Q" THEN 350
900 STOP
910 REM  REMOVE CUR FROM LIST AND
    PUT IT IN CELL
920 CELL=CUR
930 CUR=FOL(CELL)
940 FOL(PRIOR(CELL))=FOL(CELL)
950 PRIOR(FOL(CELL))=PRIOR(CELL)
960 RETURN
970 REM  INSERT "CELL" FOLLOWING C
    UR
980 PRIOR(CELL)=CUR
990 FOL(CELL)=FOL(CUR)
1000 PRIOR(FOL(CELL))=CELL
1010 FOL(CUR)=CELL
1020 CUR=CELL
1030 RETURN
```

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FULFILLING UNTAPPED POTENTIAL

By Sam L. Jenkins
907 6th Ave. East
Menomonie, WI 54751

Many educators have already discovered that something very special happens when they put mentally handicapped children or adults and computers together. As a developer of software for the mentally handicapped, I was pleased to notice that using the computer gave them a *new* feeling of strength and power with which to tackle learning about their environment. The computer seems to have the ability to focus the learners' attention on the cues that are crucial to performing a learning task. The feeling of success that this creates is a strong motivating factor in the learning process for everyone, but it is especially important for handicapped learners.

IQ and Performance

To look a little deeper into what makes the computer and the mentally handicapped learner such a good team, I supervised a modest research study conducted by a graduate student at the University of Wisconsin-Stout. Our hypothesis stated that there was no relationship between IQ and the ability to perform one step interactions on a computer. We conducted our tests at Indianhead Enterprises, a center for the developmentally disabled in Menomonie, Wisconsin. Using my TI and a program I developed, we asked each of the thirty participants to follow a model of the keyboard on the screen in order to learn key positions. Keys flashed on and off at random and the computer's Speech Synthesizer told the user which key to press. The computer automatically tallied the student's responses for later analysis. Meanwhile, the students got immediate feedback with an audible RIGHT or a NO, TRY AGAIN with each response.

We selected five people for a brief pilot study to iron out procedural difficulties. Following that, we tested the twenty-five members of the sample in individual five-minute sessions. The computer recorded correct responses and calculated the percentage correct of the total number of key presses. These scores ranged from 0 to 100%. In some instances, students with higher IQ's did not do as well as some with lower ones. The correlation between IQ and performance on the research task was not significant.

Results

While the statistical findings of the study are not of great significance, the *practical* applications are important. First and most important, persons classified by IQ tests as mentally retarded showed us that they could interact with a computer. Second, we found other factors that seem to contribute to a successful computer performance: the ability to follow visual and auditory cues and integrate them. Also, we explored how the knowledge of alphabetical and numerical characters influenced performance on computer drills. Since each participant was asked at the outset of the exercise to record letters and numbers, we could observe who demonstrated this skill. The results showed that three of the seven persons who performed at 87% or above on the computer exercise could record neither numbers, nor more than half the letters of the alphabet. We concluded that a knowledge of the keyboard characters did not assure a better performance on the computer exercise.

Our overall interpretation of the results is that IQ measures alone are not adequate in judging a retarded student's ability to profit from a computer assisted instruction program.

Further Research

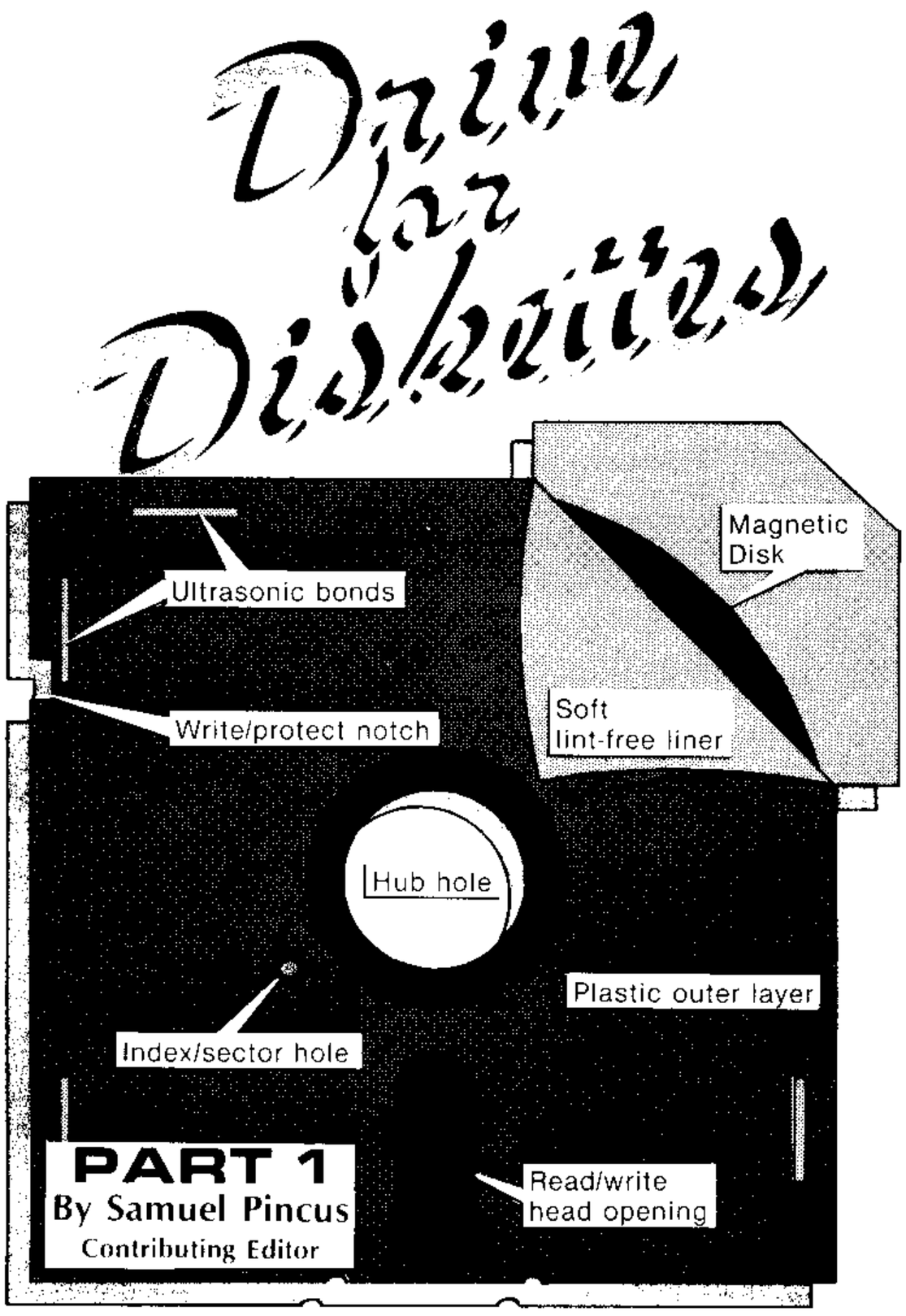
We are currently finishing a follow-up study on training and computer use. In our first study, when we encountered someone who did not grasp the exercise, our first question was "Would this person be able to do this with additional training?" The same participants were allowed to practice the exercise for fifteen minutes with additional prompting and assistance from the researcher. Then we readministered the tests, and in many cases performances improved. Clinical observations suggest that simple verbal prompts and encouragement from a trainer *greatly* aid the student in learning the key strokes. This is consistent with our general experience in working with the mentally retarded on computer exercises. Simple common-sense assistance can be extremely helpful to any learner.

There are several benefits of computer assisted instruction with the retarded. Most important, learning becomes fun. The facial expressions and verbal remarks we observed suggested that the students were enjoying the activity. Learners seem to be motivated by the sights and sounds of computer exercises. From such motivation comes increased attention spans. Frequently it is difficult to coax the students from their keyboards. Also, a strong spirit of competition is apparent in their approach to the activity. Repetition affords them the opportunity to "beat the machine" or to "win the game."

This, in my understanding, is using the computer to its fullest advantage. For the nonreader, I find that the programming features of the Texas Instruments computer meet the challenge to provide a multisensory instruction format. The programs that I have written use the graphic, sound, and speech capabilities of the TI to teach basic counting skills, arithmetic,

Continued on p. 69

Disk Drives



PART 1

By Samuel Pincus
Contributing Editor

As you use cassette tape to load and store programs and data to and from your Home Computer, you may begin to wonder if there isn't a better way. Tired of waiting the 2-3 minutes it takes before you can play your favorite game or run that bowling league handicap update? Well, cheer up! There is indeed a better way. You can go disk!

With disk drives attached to your computer, you can do all the things that you now do with tape, in a fraction of the time. Imagine loading long programs in 5-6 *seconds* instead of 1-2 minutes! In addition, TI's Disk Operating System (DOS) allows certain advantages you cannot get with cassette tape files. But before we get into the details of DOS and files, let's look at the hardware.

The Diskette

The hardware needed to use diskettes is more complex than the cassette tape recorders you may be used to. The 5¼" diskette used with the TI-99/4A is a circular piece of flexible mylar plastic with a large hole (for the *drive hub*) in the center. A magnetic material is bonded to the plastic on both sides. To protect the diskette from dirt, dust, and fingerprints, as well as accidental creases and bends, it is necessary to house it inside a semi-rigid plastic jacket. Always use a soft felt marker when writing on the labels attached to a diskette jacket. A ball-point pen or sharp pencil could score the floppy diskette inside, rendering it useless.

The unit that "reads" the information from the diskette is called the disk drive. Because information is stored magnetically on the diskette, a disk read/write head (similar to a tape recorder head) in the disk drive must touch the diskette's surface. In order to allow the read/write head to make contact with the diskette inside, there is a large oval cut-out on each side of the jacket. In addition, there is a small round hole in the jacket, called the *index hole* and a square notch at one edge, the *write-protect notch*.

If this notch is uncovered, you can read from *and* write to a diskette. If there is tape covering it, the disk drive cannot write to the diskette. This prevents you from accidentally erasing important data. Each diskette you buy comes with a strip of adhesive tape to cover the notch. It is important, when affixing a label, to make sure that it doesn't cover the write-protect notch!

The illustration shows a floppy diskette with its plastic jacket. The arrangement is a little bit like a 45 RPM record, except that information is recorded magnetically and doesn't need grooves.

You may have read about something called a dual-sided diskette. This is one that you can turn over to use both sides with a single-sided drive. The only difference between single-sided and dual-sided diskettes is that the index hole and write-protect notches are missing on the back side of the former. In addition, a single-sided diskette manufacturer won't guarantee that the back side is flawless.

Disk Drive

Just as the 45 rpm record needs a record player to make it work, the floppy disk needs a disk drive. After the diskette is placed inside the disk drive and the drive door is closed, a spindle hub inside the diskette hole spins it around very quickly (at about 300 RPM). A magnetic read/write head moves in towards the hub or outward towards the edge. The combination of the spinning and head movements allows data to be placed on almost any part of the diskette. Data is written onto the diskette or read from it as it spins around inside the disk drive. The characters are stored as a series of magnetic pulses, treated as zeroes and ones, called bits. Each grouping of 8 bits is called a byte and represents a unit of data—either a single character (letter) or a part of a number.

All disk drives have a light in the front that will glow when the drive is in use. When that light is on, you must never open the door to the disk drive. Some drives have locks that prevent the door from opening when the light is on.

There are also *flippy* disk drives which can use either side of the diskette even without extra holes. In effect, they have two sets of index hole and write-protect notch sensors. In any case, you have to take the diskette out and flip it over before you can use the back side.

Some disk drives are double-sided. This means that they have two of everything (including read/write heads) and can read from or write to both sides of the diskette without flipping it over.

In addition, you may have heard of *double-density* disk drives. These are not the same as double-sided drives. Each track of a double-density disk drive can hold twice the usual number of bytes. This will give you twice the room for data on a single side. In effect, this is like having two diskettes simultaneously mounted inside one drive. Because the data is so closely packed together with these drives, some firms manufacture *double-density* diskettes which are guaranteed to handle this density. [Note that most disk drives on the market can work with either single- or double-density systems—Ed.]

For the TI-99/4A system, the *single-density* disk drives are all you need. If you decide to buy a non-TI disk drive, you must remember that they come in two styles. The first style is called *bare*. It does not include a power supply (power cord or transformer) or cabinet. This is the kind of drive you'll need if you are going to install it inside the Peripheral Expansion System (PES). For those of you who choose not to go the PES route, or want to add a second (or third) disk drive, this style of drive can't work. You will need a regular drive which includes the power supply and cabinet. Make sure you know what kind of disk drive you are ordering if you do it through mail order or magazine ads. There is usually a $50-$60 difference in price, so what may look like a bargain regular drive may really be a quote for a *bare* drive.

Tracks

The data is read or written on concentric bands called *tracks*. Some disk drives can only utilize 35 tracks of data per diskette; others can handle 40 or more. The 99/4A DOS is capable of interfacing with either 35 or 40 track disk drives. All good quality diskettes will handle 40 tracks. This capacity actually depends on the disk drive, rather than the diskette.

You may wonder, "With the diskette spinning around so fast, how does a disk drive know where to find the starting and stopping points within a track?". The answer lies in the index hole mentioned earlier. Both sides of the plastic jacket and

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the floppy diskette have this index hole. When the three holes are lined up, you can see right through the disk. In the disk drive, a beam of light is aimed at the holes and will pass through them only when they are lined up. The light beam then strikes a photo receptor which tells the drive that it is at the start of a track. As the diskette continues to rotate, the holes will no longer line up; the disk drive electronics will read (or write) the data from that track and pass the results to the computer.

Sectors

Each track on a diskette is usually broken down into equal-sized areas called *sectors*. There can be as few as 8 or as many as 16 sectors on a diskette. The number chosen depends on both the hardware and DOS. In a *hard sectored* diskette, this is all hardware controlled. Only a computer geared for this particular number of sectors can use this disk drive and floppy diskette combination. In a *soft sectored* diskette (the type used by the 99/4A) the number of sectors is chosen and controlled by the DOS. With this kind of system, the same disk drive may be used by different computers. For example, the disk drive that I currently use in my TI will also work in a Radio Shack computer.

The TI-99/4A uses 9 sectors per track. With a 40 track drive, that gives 360 sectors of data. Each sector holds up to 255 bytes (or characters) of information. This gives a total of 255 × 360 or about 90,000 (called 90K) bytes of storage on a single disk. The important thing to remember, however, is that a sector holds exactly 255 bytes and that any information to be written on to, or read from a diskette will have to be in "chunks" of 255 bytes or less.

When you go shopping for drives, it is important to ask about *track-to-track access time*. This tells how long it takes for the read/write head to move from one track to another. In order to function correctly with a particular computer, a disk drive must not take longer than a specified amount of time to move to the next track. If it does, the computer will think that something went wrong and stop the drive with an error message. Before you buy a disk drive, make sure that it is fast enough to keep up with your 99/4A. You will need something with about an 18 millisecond or less access time.

Controller

Although many people talk as if disk drives can run themselves, all of these machines require a special hardware controller to make them act in accordance with the computer manufacturer's hardware and DOS. Not only must you buy a disk drive, you must also buy a disk controller to run it. A single controller is capable of handling all three disk drives (called DSK1, DSK2, and DSK3) that you can attach to your 99/4A computer.

The controller locates the proper disk drive and tells it what you want. It will receive the data bits from the drive one at a time and build them into bytes which it feeds into the 99/4A (or vice-versa). It also contains the program code for some of the various functions that you give it. The controller literally takes control of the computer as it tries to access your disk. In fact, it does take control of about 2000 bytes of RAM (computer memory) in order to hold the data being written or read. Disk drive controllers are different for each computer. Only a TI disk controller will work on your machine.

In addition to the controller, you will need a special 34-pin connecting cable which comes included with each TI disk drive or can be bought at many computer or electronic stores. This cable attaches the disk drives to the controller. Don't worry too much about the hookup. TI cables have notches in them so that you can't put them in backwards. If you buy a non-TI cable and you do hook it up wrong, it will be pretty

obvious and no damage will be done. If it was cabled correctly, the light will not come on, but the drive will 'whirr' slightly when you power up the computer.

To review what we have learned: In order to use a floppy disk system with your computer, you will need a disk drive for 5 1/4", soft-sectored, mini-floppy diskettes. It must handle either 35 or 40 tracks and have a track-to-track access time of about 18 milliseconds or less. As long as your drive has these features, it will probably work with a TI computer. If ordering a non-TI drive, make sure you can return it if it doesn't match up with the computer. If you have any doubts, don't take chances. Stick to a drive that is advertised as TI-compatible.

To hook up a disk drive to your 99/4A, you will need a TI disk drive controller, a TI compatible disk drive, a 34-pin connecting cable, and at least one soft-sectored, single-sided, single-density, mini-floppy diskette.

Armed with all the necessary accouterments, you are now prepared to reap the many benefits the disk system has to offer. Toss those cassettes aside—you are ready to go disko-tech!

This is the first of two parts explaining the operation of disk systems for loading and storing data. Part one examined the necessary hardware. Part two will cover the Disk Operating System, file processing, and disk system advantages.

EXPLANATION OF THE PROGRAM
Findex

Line Nos.	
150-170	Reserves memory for string and numeric arrays.
180-280	Prints title screen.
290-340	Receives selection and directs program to proper line.
350-510	Opens a file (option #3) and reserves space on disk for 30 categories.
520-730	Checks status of the disk.
740	Directs program to appropriate line, depending upon option requested.
750-770	Category option (#5) sends program into category subroutine. Also allows editing of categories.
780-870	Explains use of Entering Cases option (#1), and displays number of cases and categories on file.
880-940	Opens file #1 (categories) and #2 (cases).
950-1040	Inputs the three 4-letter categories.
1050-1080	Accepts 2-letter abbreviation for state.
1090-1160	Accepts citation of up to 10 characters.
1170-1200	Inputs summary.
1210-1270	Forms the total "CASE$" from all parts entered, including hyphens.
1280-1480	All categories for case entered (except "NONE") are compared to existing categories.
1490-1630	Files case in file #2. If no additional cases are to be entered, the files close and program returns to title screen.
1640-1780	Retrieval option, up to three categories; if "4" is entered, all categories are retrieved.
1790-1890	Input printer options.
1900-1980	In Retrieval option, cases may be printed either at the selection of the operator (P1 = 2), or automatically, without further input (P1 = 1).
1990-2020	Explain Edit option (#4).
2030-2150	Input cases from the disk file.
2160-2280	Either print the case immediately (P1 = 1), or ask if case should be printed (P1 = 2).
2290-2390	In Edit option (#4), each case is displayed.
2400-2490	End program for inputting cases from disk file. Returns to title screen.
2500-2660	Deletes cases.
2670-2820	Subroutine which displays all categories in a file, ten at a time.
2830-2860	Subroutine holds a screen on display until "ENTER" is pressed.
2870-2920	Subroutine indicates full file and returns program to main title screen.
2930-3100	Display categories one-by-one.
3110-3290	Deletes categories chosen to be deleted.
3300-3480	Subroutine to search the disk for a file name.
3490	End.

```
100 REM  **********
110 REM  * FINDEX *
120 REM  **********
130 REM  BY BRENT R. CROMLEY
140 REM  99'ER VERSION 2.5.1
150 DIM D(101),CATT$(3),CAT$(30)
160 CALL SCREEN(3)
170 CALL CLEAR
180 CALL CLEAR
190 PRINT TAB(9);"FINDEX":::"   CH
    OOSE MODE:"::"1 ENTER NEW RECO
    RDS"::"2 RETRIEVE DATA"::"3 OP
    EN A NEW FILE"
200 PRINT :"4 EDIT AN ENTIRE FILE"
    ::"5 REVIEW/EDIT CATEGORIES":"
      IN AN EXISTING FILE"::"6 END
     PROGRAM":::::
210 CALL SOUND(120,1402,3)
220 CALL KEY(0,K,S)
230 IF (K<49)+(K>54)=-1 THEN 220
240 CALL CLEAR
250 DEL=0
260 MODE=K-48
270 ON MODE GOTO 450,450,290,450,4
    50,3420
280 REM  OPEN NEW FILE OPTION (#3)
290 PRINT "INSERT A DISK ON WHICH
    YOU":::"WANT TO FILE RECORDS.
     (YOU":::"MAY USE THIS  ONE TO
     STORE"
300 PRINT ::"ABOUT 315 RECORDS. A
    CLEAR":::"DISK HOLDS ABOUT 350
    .)":::::::
310 GOSUB 2760
320 OPEN #1:"DSK1.CATEGORIES",FIXE
    D 28,RELATIVE
330 PRINT #1:0
340 FOR I=1 TO 30
350 PRINT #1:"THIS IS EMPTY FILE"
360 NEXT I
370 CLOSE #1
380 OPEN #2:"DSK1.CASES",FIXED 142
    ,RELATIVE
390 PRINT #2:0
400 CLOSE #2
410 PRINT "THE DISK NOW HAS AN":::
    "EXISTING FILE.":::::::::::
420 USE=1
430 GOSUB 2760
440 GOTO 190
450 IF USE<1 THEN 480
460 PRINT "   SAME DISK?  (Y/N)"::
    :::::::::
470 GOTO 500
480 PRINT "HAVE YOU INSERTED A DIS
    K":::"ON WHICH THERE IS AN":::
    "EXISTING FILE?  (Y/N)":::::::::
    ::
490 USE=0
500 CALL SOUND(120,1402,3)
510 CALL KEY(0,K,S)
520 IF K<>78 THEN 540
530 IF USE THEN 480 ELSE 170
540 IF K<>89 THEN 510
550 CALL CLEAR
560 IF USE THEN 670
570 OPEN #1:"DSK1.CATEGORIES",FIXE
    D 28,RELATIVE
580 INPUT #1:CATNO
590 FOR I=1 TO CATNO
600 INPUT #1:CAT$(I)
610 NEXT I
620 CLOSE #1
630 USE=1
640 OPEN #2:"DSK1.CASES",FIXED 142
    ,RELATIVE
650 INPUT #2:CASENO
660 CLOSE #2
670 ON MODE GOTO 710,1570,100,1920
    ,680
680 REM   CATEGORY OPTION (#5)
```

Findex

```
 690 GOSUB 2600
 700 GOTO 190
 710 REM  ENTERING OPTION (#1)
 720 PRINT "YOU  HAVE";CATNO;" CATE
     GORIES ON"::"FILE.   EACH RECO
     RD IS FILED"::"UNDER 1, 2 OR 3
      CATEGORIES.":;
 730 IF CATNO<30 THEN 770
 740 PRINT :"YOU HAVE USED ALL  30
     CATE-"::"GORIES ON THIS DISK,
     SO YOU"::"MAY NOT FILE RECORDS
      UNDER A"
 750 PRINT :"NEW CATEGORY.":::
 760 GOTO 790
 770 PRINT "IF YOU USE A NEW  CATEG
     ORY"::"I WILL ASK YOU TO  EXPL
     AIN"::"IT.  I WILL RECORD THE N
     EW"
 780 PRINT :"CATEGORY  AND  EXPLANA
     TION.":;"DO NOT USE COMMAS!":"
     -- ---- ---- ------":::
 790 PRINT "YOU HAVE";CASENO;"RECOR
     DS ON FILE.":::
 800 GOSUB 2760
 810 OPEN #2:"DSK1.CASES",FIXED 142
     ,RELATIVE
 820 OPEN #1:"DSK1.CATEGORIES",FIXE
     D 28,RELATIVE
 830 CALL CLEAR
 840 INPUT #2,REC CASENO:A$
 850 IF EOF(2)>-1 THEN 880
 860 GOSUB 2800
 870 GOTO 1540
 880 FOR I=1 TO 3
 890 CALL CLEAR
 900 PRINT "ENTER CATEGORY #";I;"OR
      ""CAT"":"TO SEE CATEGORIES.
     ":::;
 910 IF I<2 THEN 930
 920 PRINT "IF USING  LESS THAN THR
     EE"::"CATEGORIES, YOU MAY ENTE
     R"::""NONE"".":::
 930 INPUT CATT$(I)
 940 IF CATT$(I)<>"CAT" THEN 960
 950 GOSUB 2600
 960 IF LEN(CATT$(I))<>4 THEN 890
 970 NEXT I
 980 CALL CLEAR
 990 PRINT "ENTER 2-LETTER ABBREVIA
     TION":::"OF STATE.  OR YOUR OWN
      REF.":::"CODE.":::::::::
1000 INPUT ST$
1010 IF LEN(ST$)<>2 THEN 980
1020 CALL CLEAR
1030 PRINT "USE NO MORE THAN 10 LET
     TERS,":::"NUMBERS AND SPACES F
     OR CITE:":::::::::
1040 INPUT CITE$
1050 IF LEN(CITE$)>10 THEN 1020
1060 CALL CLEAR
1070 FOR I=1 TO 10-LEN(CITE$)
1080 CITE$=CITE$&"-"
1090 NEXT I
1100 PRINT "ENTER SUMMARY OF RECORD
     ":;"USING 4 LINES OR LESS.  YOU
     ":;"MAY WANT TO USE A KEY WORD
     ."
1110 PRINT :"TO IDENTIFY THE NAME O
     F":;"RECORD, AND YOU MAY WANT
     TO":;"INCLUDE THE DATE.":::
1120 PRINT "     DO NOT USE COMMAS!"
     :"     -- ---- ---- ------":::::
1130 INPUT SUM$
1140 CALL CLEAR
1150 CASE$=CATT$(1)&"-"&CATT$(2)&"-
     "&CATT$(3)&"-"&ST$&"-"&CITE$&S
     UM$
1160 PRINT "     CHECK IT CAREFULLY
     ":::::CASE$::::"   OKAY?  (Y/N
     )"
1170 CALL SOUND(120,1402,3)
1180 CALL KEY(0,K,S)
1190 IF K=78 THEN 880
1200 IF K<>89 THEN 1180
1210 CALL CLEAR
1220 REM  TEST FOR NEW CATEGORY
1230 FOR I=1 TO 3
1240 IF CATT$(I)="NONE" THEN 1410
1250 FOR J=1 TO CATNO
1260 IF CATT$(I)=SEG$(CAT$(J),1,4)T
     HEN 1410
1270 NEXT J
1280 IF CATNO<30 THEN 1320
1290 CALL CLEAR
1300 PRINT "YOU MAY NOT FILE THIS R
     ECORD":;"BECAUSE ";CATT$(I);"
     WOULD PUT THE":;"TOTAL CATEGOR
     IES OVER 30.":::::
1310 GOTO 1480
1320 CALL CLEAR
1330 PRINT "ENTER EXPLANATION OF ";
     CATT$(I)::;"WITH 23 OR LESS LE
     TTERS:":::
1340 INPUT X$
1350 IF LEN(X$)>23 THEN 1320
1360 CATT$(I)=CATT$(I)&"-"&X$
1370 CATNO=CATNO+1
1380 PRINT #1,REC CATNO:CATT$(I)
1390 PRINT #1,REC 0:CATNO
1400 CAT$(CATNO)=CATT$(I)
1410 NEXT I
1420 CALL CLEAR
1430 PRINT "THE RECORD WILL NOW BE
     FILED"::
1440 PRINT #2,REC CASENO+1:CASE$
1450 CASENO=CASENO+1
1460 PRINT #2,REC 0:CASENO
1470 CALL CLEAR
1480 PRINT "DO YOU WANT TO ENTER AD
     DI-":"":"TIONAL RECORDS NOW?
     (Y/N)":::::
```

Continued on p. 62

Findex . . . . from p. 61

```
1490 CALL SOUND(120,1402,3)
1500 CALL KEY(0,K,S)
1510 IF K=89 THEN 830
1520 IF K<>78 THEN 1500
1530 CALL CLEAR
1540 CLOSE #2
1550 CLOSE #1
1560 GOTO 170
1570 REM  RETRIEVAL OPTION (#2)
1580 PRINT "YOU MAY REVIEW RECORDS
     UNDER"::"1, 2, 3 OR ALL CATEGO
     RIES.":::::"PUSH 1, 2, 3 OR 4
     . (4=ALL)"::
1590 CALL SOUND(120,1402,3)
1600 CALL KEY(0,K,S)
1610 IF (K<49)+(K>52)=-1 THEN 1600
1620 CATTNO=K-48
1630 IF CATTNO=4 THEN 1720
1640 FOR I=1 TO CATTNO
1650 CALL CLEAR
1660 PRINT "ENTER 4 LETTERS OF CATE
     GORY":::I;"OR ""CAT"" TO REVIE
     W":::" CATEGORIES:"
1670 INPUT CATT$(I)
1680 IF CATT$(I)<>"CAT" THEN 1700
1690 GOSUB 2600
1700 IF LEN(CATT$(I))<>4 THEN 1650
1710 NEXT I
1720 CALL CLEAR
1730 CALL SOUND(120,1402,3)
1740 PRINT "ARE YOU USING PRINTER (
     Y/N)":::
1750 CALL KEY(0,K,S)
1760 IF K=89 THEN 1800
1770 IF K<>78 THEN 1750
1780 CALL CLEAR
1790 GOTO 1960
1800 PRINT "ENTER FULL SPECIFICATIO
     NS"::"FOR PRINTER:":::
1810 INPUT P$
1820 OPEN #3:P$
1830 CALL CLEAR
1840 PRINT "      CHOOSE PROPER FORM
     AT:":::"1  PRINT ALL RECORDS W
     ITHOUT":"     DISPLAYING ON SCRE
     EN"::
1850 PRINT "2  SELECTIVE PRINTING F
     ROM":" RECORDS DISPLAYED ON SC
     REEN"::::
1860 CALL SOUND(120,1402,3)
1870 CALL KEY(0,K,S)
1880 IF (K<49)+(K>50)=-1 THEN 1870
1890 CALL CLEAR
1900 P1=K-48
1910 GOTO 1960
1920 REM  EDIT OPTION (#4)
1930 PRINT "RECORDS WILL BE DISPLAY
     ED"::"ONE BY ONE. IF YOU WANT
     TO"::"SAVE THAT RECORD, PUSH "
     "N"".":: 
1940 PRINT "TO DELETE, PUSH ""Y""."
     ::::
1950 GOSUB 2760
1960 REM  INPUT
1970 OPEN #2:"DSK1.CASES",FIXED 142
     ,RELATIVE
1980 INPUT #2:CASENO
1990 FOR I=1 TO CASENO
2000 INPUT #2,REC I:CASE$
2010 IF MODE=4 THEN 2100
2020 IF CATTNO=4 THEN 2090
2030 FOR J=1 TO CATTNO
2040 IF SEG$(CASE$,1,4)=CATT$(J)THE
     N 2090
2050 IF SEG$(CASE$,6,4)=CATT$(J)THE
     N 2090
2060 IF SEG$(CASE$,11,4)=CATT$(J)TH
     EN 2090
2070 NEXT J
2080 GOTO 2330
2090 IF P1=1 THEN 2200
2100 CALL CLEAR
2110 PRINT CASE$:::::
2120 IF MODE=4 THEN 2220
2130 IF P1<>2 THEN 2150
2140 PRINT "PUSH ""P"" TO PRINT REC
     ., OR"::
2150 PRINT "PUSH ""ENTER"" TO CONTI
     NUE."
2160 CALL SOUND(120,1402,3)
2170 CALL KEY(0,K,S)
2180 IF K=13 THEN 2290
2190 IF K<>80 THEN 2170
2200 PRINT #3:SEG$(CASE$,1,28):SEG$
     (CASE$,29,LEN(CASE$)-28):::
2210 GOTO 2290
2220 PRINT "DELETE?  (Y/N)"
2230 CALL SOUND(120,1402,3)
2240 CALL KEY(0,K,S)
2250 IF K=78 THEN 2290
2260 IF K<>89 THEN 2240
2270 DEL=DEL+1
2280 D(DEL)=I
2290 CALL CLEAR
2300 IF DEL<100 THEN 2330
2310 PRINT "YOU NOW HAVE DELETED 10
     0":::"RECORDS. THIS IS THE MAX
     IMUM":::"FOR ONE OPERATION.":: 
     ::
2320 GOTO 2430
2330 NEXT I
2340 CALL CLEAR
2350 PRINT "THAT IS ALL RECORDS."::
     ::
2360 IF MODE=4 THEN 2430
2370 IF P1=0 THEN 2400
2380 CLOSE #3
2390 P1=0
2400 CLOSE #2
2410 GOSUB 2760
```

Findex

```
2420 GOTO 190
2430 IF DEL<1 THEN 2560
2440 X=1
2450 PRINT "STAND BY WHILE";DEL;" R
     ECORDS"::"ARE DELETED..."
2460 FOR I=D(1)TO CASENO-DEL
2470 IF I+X<>D(X+1)THEN 2500
2480 X=X+1
2490 GOTO 2470
2500 INPUT #2,REC I+X:CASE$
2510 PRINT #2,REC I:CASE$
2520 NEXT I
2530 CASENO=CASENO-DEL
2540 PRINT #2,REC 0:CASENO
2550 CALL CLEAR
2560 PRINT "YOU NOW HAVE";CASENO;"R
     ECORDS ON"::"FILE ON THIS DIS
     K."::::::::
2570 CLOSE #2
2580 GOSUB 2760
2590 GOTO 190
2600 REM  CATEGORY SUBROUTINE
2610 CALL SCREEN(16)
2620 FOR II=1 TO CATNO
2630 IF (II-1)/10>INT((II-1)/10)THE
     N 2660
2640 CALL CLEAR
2650 PRINT "     CATEGORIES, PAGE";
     INT(II/10)+1::
2660 PRINT CAT$(II)::
2670 IF II=CATNO THEN 2690
2680 IF II/10>INT(II/10)THEN 2710
2690 PRINT
2700 GOSUB 2760
2710 NEXT II
2720 IF MODE<5 THEN 2740
2730 GOSUB 2860
2740 CALL SCREEN(3)
2750 RETURN
2760 REM  "PRESS ENTER" ROUTINE
2770 INPUT "PRESS ""ENTER"" TO CONT
     INUE. ":X$
2780 CALL CLEAR
2790 RETURN
2800 REM  END OF FILE
2810 CALL CLEAR
2820 PRINT "THIS FILE HAS";CASENO;"
     RECORDS"::"AND IS FULL. YOU WI
     LL HAVE"::::"TO DELETE SOME REC
     ORDS OR"::
2830 PRINT "START A NEW FILE.":::::
2840 GOSUB 2760
2850 RETURN
2860 REM  EDIT CATEGORIES
2870 CALL CLEAR
2880 PRINT "DO YOU WANT TO EDIT OUT
      ANY":::"CATEGORIES?  (Y/N)"::
     ::::
2890 CALL SOUND(120,1402,3)
2900 CALL KEY(0,K,S)
2910 IF K=78 THEN 3210
2920 IF K<>89 THEN 2900
2930 FOR I=1 TO CATNO
2940 CALL CLEAR
2950 PRINT CAT$(I)::::"      DELETE?
       (Y/N)"
2960 CALL SOUND(120,1402,3)
2970 CALL KEY(0,K,S)
2980 IF K=78 THEN 3020
2990 IF K<>89 THEN 2970
3000 DEL=DEL+1
3010 D(DEL)=I
3020 NEXT I
3030 CALL CLEAR
3040 IF DEL<1 THEN 3210
3050 X=1
3060 PRINT "THE";DEL;"CATEGORIES WI
     LL"::"NOW BE REMOVED.":::::::
3070 OPEN #1:"DSK1.CATEGORIES",FIXE
     D 28,RELATIVE
3080 FOR I=D(1)TO CATNO-DEL
3090 IF I+X<>D(X+1)THEN 3120
3100 X=X+1
3110 GOTO 3090
3120 INPUT #1,REC I+X:X$
3130 PRINT #1,REC I:X$
3140 CAT$(I)=X$
3150 NEXT I
3160 CATNO=CATNO-DEL
3170 PRINT #1,REC 0:CATNO
3180 CLOSE #1
3190 PRINT "YOU NOW HAVE";CATNO;"CA
     TEGORIES"::"ON FILE ON THIS DI
     SK.":::
3200 GOSUB 2760
3210 CALL CLEAR
3220 RETURN
3230 OPEN #3:"DSK1.",INTERNAL,RELAT
     IVE,INPUT
3240 INPUT #3:PR$,PR,PR,PR
3250 IF PR$="" THEN 3320
3260 IF PR$="CASES" THEN 3290
3270 IF PR$="CATEGORIES" THEN 3290
3280 GOTO 3240
3290 CLOSE #3
3300 REPET=2
3310 RETURN
3320 PRINT "FILE IS NOT FOUND ON DI
     SK"
3330 INPUT "TRY AGAIN (Y/N)":AGA$
3340 IF (AGA$<>"Y")*(AGA$<>"N")THEN
      3330
3350 IF AGA$="N" THEN 3390
3360 REPET=1
3370 CLOSE #3
3380 RETURN
3390 REPET=0
3400 CLOSE #3
3410 RETURN
3420 END
```

99'er

NEWS FLASH

Dealers, distributors, & chain store buyers will be able to see the revolutionary new line of 99'er-ware software, accessories, & books at the June Consumer Electronics Show in Emerald Valley Publishing Co.'s Booth #5216 in McCormack West—the next aisle over from TI.

Excerpts from the

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of news & happenings in the Home Computer world

PRICE EROSION IN MARKETPLACE NIXES BASIC COMPUTER

Because of the rapid price erosion in the color home computer market---the 99/4A's street price dropping to about $150 in mid-April, with a further $50 slide when the new rebate goes into effect June 1st--Texas Instruments will hold off launching full-scale production of the 99/2 Basic Computer. Instead, TI will conduct test market studies to determine whether a sufficient market exists for the 99/2 at its current and projected price points. The decision to lower the 99/4A's price will make the full-featured color computer attractive to the wider audience which the 99/2 would have captured, keeping TI competitive in the under-$100 market.

PEGASUS TECHNOLOGY MAY MIGRATE TO THE HOME

The question that looms in the minds of industry watchers these days is how long it will take for the state-of-the-art technology announced for the TI Professional Computer (code-named Pegasus) to migrate from TI's Austin-based Data Systems Group to Lubbock's Consumer Products Group and wind up on the Home Computer. The first offering, a speech options package, permits voice-commanded operation, and allows speech and textual data to be combined, stored, forwarded, and replayed---emulating a "smart" telephone in the process. The natural language interface allows users to speak in common English words and phrases when asking database questions or giving commands for specific tasks.

NEW USER-FRIENDLY PRINTING TERMINAL MAKES DEBUT

This month, TI starts shipping its 6th generation of silent 700 portable data terminals--a new line of lightweight battery-powered teleprinters that fit inside half the space of a standard briefcase. Higher levels of chip integration are responsible for both its small size and relatively low price--$695 suggested retail for a model with built-in 300-baud modem. Optional 2K plug-in CMOS software cartridges allow users to create a directory of auto-dial telephone numbers and automatic log-ons. Although these units are being targeted mostly at business customers wanting a low-cost, desk-top keyboard terminal, Compaci Computer and peripheral users can expect to see much of this technology appearing in the Consumer Group products as well.

DISK-BASED PRODUCTS EXPECTED TO BOOM

Falling prices in the Home Computer marketplace have magnified the need for lower system prices when adding peripherals. The present Peripheral Expansion Box will no longer present a viable option for the vast majority of the additional millions of consumers who will be buying under-$100 computers. The Digest therefore expects to see new, very-low-cost peripherals for the Home Computer. In the mass-storage department, a good candidate for users who need more performance than a Wafertape can offer would be small disk drives that interface via a Hex-bus. Third-party software developers take note.

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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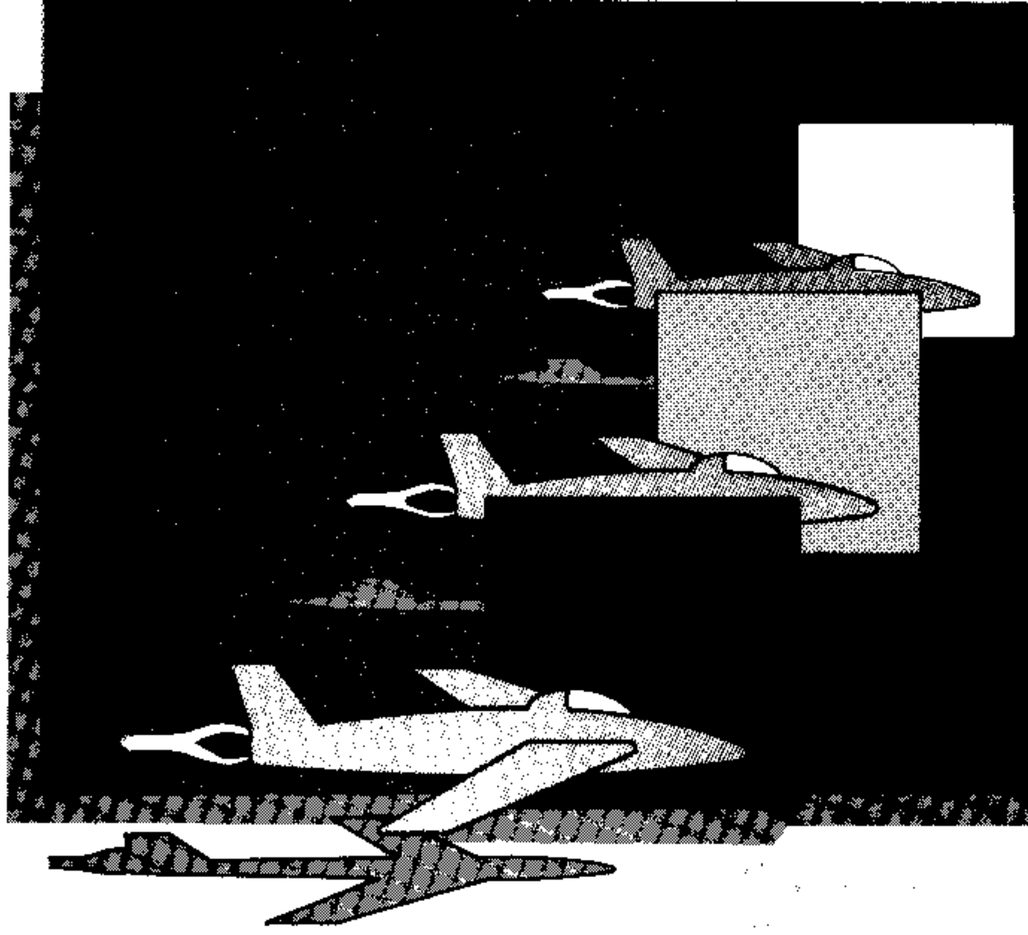

SPRITES IN DEPTH

W. K. Balthrop
Technical Editor

How is a Cyclops like a video screen? They both have only one eye. We fortunate humans have two, but have you ever wondered why we don't have the second one on the back of our heads so we could back out of the driveway without using our rearview mirrors? Without two eyes in front, we would be no better off than the Cyclops. We need both eyes right where they are so we can perceive the world in dimensions of height, width and depth.

The inability to provide all three dimensions is a major drawback of the video screen. No matter how high the resolution of the graphics, their two-dimensional quality detracts from their realism. To get around this problem, programmers have resigned themselves to using tricks on the screen, or *optical illusions*, to fool the mind into thinking it is looking at a three-dimensional object. This has normally required expensive computers and graphics terminals—until now.

Three-D Video

TI's 9918A video controller chip, used in the 99/4A, now offers three-dimensional screen effects to the average consumer. Among the graphics are sprites—best known for their ability to move with high resolution across the screen. As we will see, there is more to the sprite than meets the eye.

Sprites have an uncanny ability to make us think we are seeing in three dimensions. By overlapping, or making one sprite appear to be behind another, we simulate the third dimension: depth of field. This first short program illustrates how this effect can be used. The program is not complete to run as a game; it is only a demonstration of the three-dimensional effects of sprites.

Line number 170 clears the screen and sets the background to black. Lines 180 and 190 assign a graphics pattern to 8 characters. Notice that only two CALL CHARs were used. By extending the pattern code to 64 hexadecimal characters, four characters are defined for each statement. Line number 200 sets the sprite number to two, and the magnification mode to four. A magnification of four creates double-sized sprites made up of four characters, so that each sprite is 32×32 pixels. This was done only so that the effect would be easier to see, and is not necessary for the three-dimensional effect.

Line numbers 210 through 240 place eight large sprite squares on the screen. The sprites are numbered 2, 4, 6, 8, 10, 12, 14, and 16, with sprite #2 at the lower left-hand corner. You will notice that each sprite overlaps one quarter of another sprite. The sprite with the lowest number appears to be on top of the higher-numbered sprite. This in itself gives the illusion of depth, and it can be done with simple graphic characters. The next step, however, can not be done without sprites, as you will see.

Line 250 resets the sprite counter to sprite #1. Line numbers 260 through 280 place eight more sprites on the screen. This time they resemble space ships. These sprites now appear to lie between each of the large squares (except for the front one). This is because the space ships have been numbered 1, 3, 5, 7, 9, 11, 13, and 15. By giving the space ships motion in Lines 290 and 300, they appear to travel between the square walls we have created. The special effects you can create using this method are limited only by your imagination. You now can work with all three dimensions.

The Shadow of Your Sprite

When you walk down the street on a sunny day, you may turn around to be confronted with a double of yourself. There on the sidewalk lies your shadow. Now, with the help of sprites, you can give your graphics a shadow too.

You can use these shadows to give your graphics an additional illusion of three dimensions. In the first program, we used overlapping sprites to simulate depth. Now we are going to use that feature with the addition of a shadow to show an airplane's altitude and position relative to the ground. If you have seen the popular arcade game *ZAXON*, then you know about this effect already. Now you can create it with your 99/4A.

```
100 REM **************************
110 REM * ON YOUR MARK-GET SET *
120 REM **************************
130 REM BY W. K. BALTHROP
140 REM 99'ER VERSION 2.6.1XB
150 REM
160 REM
170 CALL CLEAR :: CALL SCREEN(2)
180 CALL CHAR(96,"FFFFFFFFFFFFFFFF
    FFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFF
    FFFFFFFFFFFFFFFF")
190 CALL CHAR(100,"8060307F7F30608
    0000000000000300000000000000000
    00000000000000000000")
200 SP=2 :: CALL MAGNIFY(4)
210 FOR X=150 TO 21 STEP -16
220 CALL SPRITE(#SP,96,SP/2+2,X,20
    0-X)
230 SP=SP+2
240 NEXT X
250 SP=1
260 FOR X=150 TO 21 STEP -16
270 CALL SPRITE(#SP,100,16-SP/2,X+
    8,200-X)
280 SP=SP+2 :: NEXT X
290 FOR X=1 TO 27 STEP 2
300 CALL MOTION(#X,0,5):: NEXT X
310 CALL KEY(0,K,S):: IF S=0 THEN
    310
320 END
```

```
100 REM ****************
110 REM * SHADY SPRITES *
120 REM ****************
130 REM BY W. K. BALTHROP
140 REM 99'ER VERSION 2.6.1XB
150 REM
160 REM
170 CALL CLEAR
180 CALL MAGNIFY(3)
190 CALL CHAR(33,"0103070F1F3F7FFF
    "):: CALL CHAR(35,"FFFFFFFFFFFF
    FFFFFF"):: CALL CHAR(36,"FFFEFC
    F8F0E0C080")
200 CALL COLOR(1,12,2)
210 READ L$ :: FOR X=1 TO 24 :: DI
    SPLAY AT(X,1)SIZE(28):SEG$(L$,
    X,28):: NEXT X
220 CALL SCREEN(2)
230 CALL HCHAR(14,2,33):: CALL VCH
    AR(15,2,35,10):: CALL HCHAR(15
    ,1,33):: CALL VCHAR(16,1,35,9)
240 CALL VCHAR(1,31,35,7):: CALL H
    CHAR(8,31,36):: CALL VCHAR(1,3
    2,35,6):: CALL HCHAR(7,32,36)
250 CALL CHAR(60,"0000000000000B0C0
    A0918A4424150E040000000000000202
    60A0202040B0")
260 CALL CHAR(64,"00040A1120408 0C0
    A0918A4424150E040000000B040 20
    60A0202040B0")
270 CALL SPRITE(#3,60,7,8,186,4,-4
    ,#5,60,7,4,186,4,-4,#6,64,7,1,
    186,4,-4)
```

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

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Sprites In Depth

```
280 CALL CHAR(68,"0000010204091326
    4C523F1C63820201000008040C040A0
    5C52A2448810204080")
290 CALL SPRITE(#4,68,7,1,210,5,-5
    )
300 CALL CHAR(96,"000000007F3F1F0F
    07070FFEFC7C4C0001061E7CF8F8F0
    F0F0F0F0F070301000")
310 CALL SPRITE(#1,96,6,130,90)::
    CALL SPRITE(#2,96,2,160,90)
320 GOSUB 400 :: CALL JOYST(1,JX,J
    Y):: JZ=((JX+3*JY)/4)+5
330 IF CR=-1 AND JZ<>2 THEN 320
340 ON JZ GOTO 350,360,350,370,350
    ,380,350,390,350
350 CALL MOTION(#1,0,0,#2,0,0):: G
    OTO 320
360 CALL MOTION(#1,-4,0,#2,0,0)::
    GOTO 320
370 CALL MOTION(#1,-4,-4,#2,-4,-4)
    :: GOTO 320
380 CALL MOTION(#1,4,4,#2,4,4):: G
    OTO 320
390 CALL MOTION(#1,4,0,#2,0,0):: G
    OTO 320
400 CALL POSITION(#3,XP1,YP1,#4,XP
    2,YP2)
410 IF XP1>190 OR YP1<20 THEN CALL
     LOCATE(#3,8,186,#5,4,186,#6,1
    ,186)
420 IF XP2>190 OR YP2<20 THEN CALL
     LOCATE(#4,1,210)
430 CALL COINC(#1,#2,2,CR):: IF CR
    >-1 THEN RETURN
440 CALL MOTION(#1,0,0,#2,0,0):: C
    ALL SOUND(-1000,-6,0)
450 CALL COLOR(#1,7):: FOR TD=1 TO
     30 :: NEXT TD :: CALL COLOR(#
    1,6):: CALL COLOR(#1,7):: CALL
     COLOR(#1,6)
460 RETURN
470 DATA "                    !#####
    ##########                  "
    ##########$
```

Line numbers 170 and 180 clear the screen, and the sprite magnification factor is set to 3. A magnification of three sets the sprite characters to normal size. It takes four characters to make up one sprite, so that each sprite is 16 pixels wide. Line numbers 190 and 200 set the patterns for the ground, and make color light yellow. Line 210 reads the DATA statement at 470 and uses that to display the entire screen. Line 220 sets the background at black, and Lines 230 and 240 finish filling in the screen where the display statement could not reach. Lines 250 through 290 create the shapes for the sprites which move along the ground, and 300 sets the pattern for the airplane. Line 310 creates two sprites. The first is the blue airplane; the second is the airplane's black shadow. Both sprites use the same character for their patterns. Line 320 reads the joystick and converts its reading to a number from 1 to 9. Line 330 makes a check so that a plane on the ground can only go up. In Line 340, the value returned from the joystick is used to branch to the appropriate subroutine. Numbers 360 through 390 set the plane in motion if the joystick input is one of the four legal directions; otherwise line 350 will stop the plane.

Two considerations: The sprites I used as objects on the ground would not wrap to the same position after going off the bottom of the screen. To fix this problem, it was necessary to check their position in Line 400, and relocate them when they reached the bottom of the screen in Lines 410 and 420.

The second problem was the plane's tendency to pass right through its shadow, completely destroying the three-dimensional effect. To alleviate this problem, I put in a coincidence check in Line 430 against the shadow and plane, with a tolerance of two. This means that if the two sprites get within two pixels of each other, the motion stops, you hear a crash and the plane flashes colors. All of this takes place in Lines 440 to 460. The only way to recover from a crash is to pull the plane back up to a safe altitude. Line 470 is the DATA for displaying the screen.

This last program could be modified and built into a full game with a little more effort. For you aspiring programmers, here are a few ideas you might like to try:

1. Increase the number of enemy craft on the ground. Be careful of multiple sprites on one line, and make the plane obstacles clear.
2. Read the fire button on the joystick and give the plane a way to defend itself. Check for any hits against the enemy.
3. Place another plane at the top right corner of the screen, controlled by a second player and joystick number two. Have the two players fight each other in a three-dimensional battle in the air.
4. Design messages to be displayed, and put them on the screen.
5. Modify Lines 340 to 390 in order to use all eight directions of the joystick.
6. Find other uses for shadows and three-dimensional effects.

99'er

DeBUGS on DisPLAY

99'er Program Bug

A DEBUG occurred in the **Electrical Engineering Resistance Combination** program in the January, 1983 issue beginning on page 19. All occurrences of RAND should be RND instead. The **Quintus** article (March, 1983, page 42) mis-stated the game rules. Rule one only prohibits *the Human* from taking the middle square on the first move. The program will not stop you if you try—only your sense of fair play. Apologies to those who looked for, but couldn't find, the rest of line 480 in the **Saving** program on page 13 of the April, 1983 issue. It was accidentally amputated, so here it is in its entirety:

```
480  I=RK  ::  TY=Y+M/12  ::  TP=
     INT(NP*TY):: IF TP=0 THEN TP=1
```

Index to Advertisers

99'er Buyers Guide*

*99'er Buyers Guide found only in subscription copies.

Game Show Time . . . from p. 22

player has a chance to guess a consonant contained in the word puzzle. For each occurence of that consonant in the puzzle, the player is awarded that number of "hundred dollar bills."

The Choice is Yours

Each time it is your turn, you may choose to 1) spin, 2) buy a vowel, or 3) solve. If you select 1, the wheel-of-fortune spins as described above. If 2 is your choice, you may buy a chance to guess a vowel that is part of the word puzzle. The purchase price for this opportunity is $250. If you select 3 and fail to guess the total word puzzle correctly, you lose your turn—but, if you are right you win the current round and get to keep the money that you have built up during the round. Your opponent(s) get a big fat zero.

The instruction booklet is brief, but it describes the game play well. It is a bit sketchy when it comes to describing how to make your own files with version B. For instance, I had to discover for myself that only disk drive number one will work for saving and recalling a puzzle file (naturally I had tried to use drive number two).

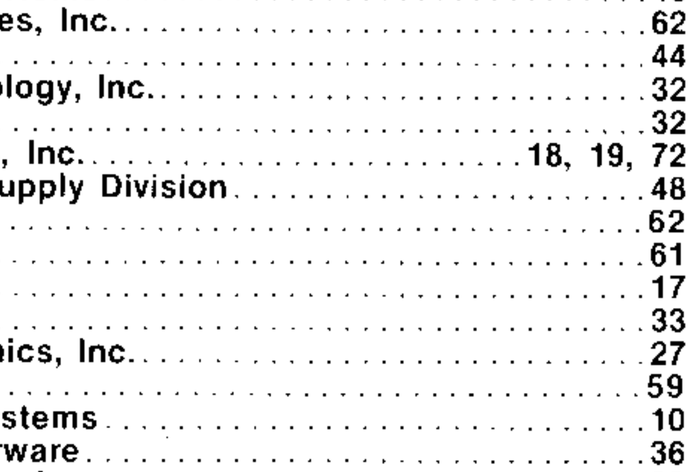
From two to four people may play Spin•A•Fortune, although, I enjoyed playing it all by myself, taking on the roles of two players. It is definitely worth the money for those of you who are looking for a computerized party game. In fact, I think I will plan a party right now just so I can play it . . .

Well, go get a snack and settle back for Spin•A•Fortune! Your host tonight is TI-99/4A brought to you by Sunrise Software, and now . . . heeeere's TI!

99'er

Answers to April's Crossbytes™

P	R	O	G	R	A	M	M	I	N	G
I	■	■	B	I	T	L	S	■	■	A
R	L	B	■	P	L	A	■	N	A	M
I	N	A	N	E	X	T	R	E	M	E
P	I	U	R	■	T	■	■	W	F	P
H	E	X	A	D	E	C	I	M	A	I
E	R	I	■	■	D	■	T	O	G	A
R	E	T	A	L	I	A	T	O	R	Y
A	D	E	■	A	T	E	■	G	E	E
L	■	■	S	I	O	R	E	■	■	R
S	Y	N	C	H	R	O	N	O	U	S



B.A.R.C.* BACK

***(Best Article—Reader's Choice)**

March's Choice

By popular demand, the winner of the March B.A.R.C. Back competition was Jerry Spacek for his article, *Converting Extended BASIC to Assembly Language*. Our hearty congratulations and a $100 prize go to Mr. Spacek.

Super Language . . . . from p. 43

```
820 RDT=N*256+O
830 IF RDT>32760 THEN 890
840 CALL PEEK(RDT,C1,C2,C3,C4,C5,C
    6)
850 RDT$=CHR$(C1)&CHR$(C2)&CHR$(C3
    )&CHR$(C4)&CHR$(C5)&CHR$(C6)
860 IF RDT$=NM$ THEN 910
870 RDT=RDT+8
880 GOTO 830
890 PRINT :::"NOT IN THE TABLE":::
900 GOTO 750
910 INPUT "NAME OF NEW REF/DEF TAB
    LE    ENTRY:":TITLE$
920 TITLE$=SEG$(TITLE$&"          ",1,
    6)
930 PN=1
940 PNAME$(PN)=TITLE$
950 DIF=A-D
960 C2=C-DIF
970 VA=C2
980 GOSUB 1810
990 PLOC$(1,2)=VAL$
1000 IF K=0 THEN 1050
1010 A1=B
1020 B1=A
1030 STP=-2
1040 GOTO 1080
1050 A1=A
1060 B1=B
1070 STP=2
1080 FOR LOC=A1 TO B1 STEP STP
1090 IF LOC<32768 THEN 1120
1100 LOC1=LOC-65536
1110 GOTO 1130
1120 LOC1=LOC
1130 CALL PEEK(LOC1,X,Y)
1140 IF (X<113)+(X>127)THEN 1220
1150 Z=X*256+Y
1160 V=Z-DIF
1170 IF CT$="N" THEN 1200
1180 IF (V>LM-1)*(V<HM+1)THEN 1200
1190 GOSUB 2660
1200 X=INT(V/256)
1210 Y=V-X*256
1220 CALL LOAD(LOC-DIF,X,Y)
1230 NEXT LOC
1240 IF RD$="N" THEN 1670
1250 REM  UPDATE REF/DEF TABLE
1260 CALL PEEK(28700,L,M,N,O)
1270 FFAM=L*256+M
1280 LFAM=N*256+O
1290 IF RP$="Y" THEN 1310
1300 LFAM=LFAM-8
1310 VA=LFAM
1320 GOSUB 1810
1330 LAVAIL$=VAL$
1340 PLOC$(1,1)=VAL$
1350 FFAM=8-DIF+2
1360 VA=FFAM-2
1370 GOSUB 1810
1380 FAVAIL$=VAL$
1390 L=INT(FFAM/256)
1400 M=FFAM-L*256
1410 N=INT(LFAM/256)
1420 O=LFAM-N*256
1430 CALL LOAD(28700,L,M,N,O)
1440 IF RP$="N" THEN 1470
1450 LOC=RDT
1460 GOTO 1480
1470 LOC=LFAM
1480 FOR SS=1 TO 6
1490 CALL LOAD(LOC,ASC(SEG$(TITLE$,
    SS,1)))
1500 LOC=LOC+1
1510 NEXT SS
1520 J=INT(C2/256)
1530 K=C2-J*256
1540 IF RP$="N" THEN 1570
1550 CALL LOAD(RDT+6,J,K)
1560 GOTO 1580
1570 CALL LOAD(LFAM+6,J,K)
1580 PN=PN+1
1590 IF LFAM+((PN-1)*8)>32760 THEN
    2040
1600 CALL PEEK(LFAM+((PN-1)*8),C1,C
    2,C3,C4,C5,C6,A1,A2)
1610 PNAME$(PN)=CHR$(C1)&CHR$(C2)&C
    HR$(C3)&CHR$(C4)&CHR$(C5)&CHR$
    (C6)
1620 VA=A1*256+A2
1630 GOSUB 1810
1640 PLOC$(PN,2)=VAL$
1650 VA=LFAM+((PN-1)*8)
1660 GOSUB 1810
1670 PLOC$(PN,1)=VAL$
1680 GOTO 1580
1690 REM  CONVERT TO DECIMAL
1700 TN2=0
1710 FOR P=1 TO 4
1720 TEMP2$=SEG$(TEMP$,P,1)
1730 IF ASC(TEMP2$)>57 THEN 1780
1740 TN=ASC(TEMP2$)-48
1750 TN2=TN2+TN*S(P)
1760 NEXT P
1770 RETURN
1780 TN=ASC(TEMP2$)-55
1790 GOTO 1750
1800 REM  CONVERT TO HEX
1810 VAL$=""
1820 FOR P=1 TO 4
1830 V=INT(VA/S(P))
1840 VA=VA-(V*S(P))
1850 IF V>9 THEN 1880
1860 VAL$=VAL$&STR$(V)
1870 GOTO 1890
1880 VAL$=VAL$&CHR$(V+55)
1890 NEXT P
1900 RETURN
1910 INPUT "(4 DIGIT HEX ADDRESS):"
    :TEMP$
1920 IF LEN(TEMP$)>4 THEN 1910
1930 IF LEN(TEMP$)=4 THEN 1950
1940 TEMP$=SEG$("0000"&TEMP$,LEN(TE
    MP$)+1,4)
1950 FOR TT=1 TO 4
1960 TT1=ASC(SEG$(TEMP$,TT,1))
1970 IF (TT1<48)+(TT1>70)+((TT1>57)
    *(TT1<65))THEN 1910
1980 NEXT TT
1990 GOSUB 1700
2000 IF CT$="N" THEN 2020
2010 IF (TN2<LM)+(TN2>HM)THEN 2850
2020 PRINT :::
2030 RETURN
2040 CALL CLEAR
2050 PRINT TAB(19);"OLD   NEW"
2060 PRINT "FIRST ADD.";TAB(19);FAP
    $;TAB(25);NPA$
2070 PRINT "LAST ADD.";TAB(19);LAP$
    ;TAB(25);FAVAIL$
2080 PRINT "ENTRY POINT";TAB(19);EA
    P$;TAB(25);PLOC$(1,2)
2090 PRINT "REF/DEF STARTS AT";TAB(
    25);LAVAIL$
2100 PRINT ::"MEMORY RELOCATED ";(-
    1)*DIF;"BYTES"
2110 PRINT :::
2120 PRINT "REF/DEF TABLE ENTRIES"
2130 SS1=1
2140 PRINT :"LOCATION   NAME      E
    NTRY"
2150 FOR SS=SS1 TO SS1+6
2160 IF SS=21 THEN 2250
2170 IF PNAME$(SS)="" THEN 2250
2180 PRINT PLOC$(SS,1);TAB(12);PNAM
    E$(SS);TAB(22);PLOC$(SS,2)
2190 NEXT SS
2200 PRINT ::"PRESS ENTER TO CONTIN
    UE"
2210 CALL KEY(0,K,S1)
2220 IF S1=0 THEN 2210
2230 SS1=SS
2240 GOTO 2150
2250 IF PR$="Y" THEN 2270
2260 PRINT ::"RECORD ALL DATA, AND"
2270 PRINT "PRESS ENTER TO CONTINUE
    "
2280 CALL KEY(0,K,S1)
2290 IF S1=0 THEN 2280
2300 IF PR$="N" THEN 2490
2310 OPEN #1:DEV$
2320 PRINT #1:"MEMORY RELOCATION RE
    PORT":::
2330 PRINT #1:TAB(25);"OLD";TAB(35)
    ;"NEW"
2340 PRINT #1:"FIRST ADDRESS";TAB(2
    5);FAP$;TAB(35);NPA$
2350 PRINT #1:"LAST ADDRESS";TAB(25
    );LAP$;TAB(35);FAVAIL$
2360 PRINT #1:"ENTRY POINT";TAB(25)
    ;EAP$;TAB(35);PLOC$(1,2)
2370 PRINT #1:"REF/DEF STARTS AT";T
    AB(35);LAVAIL$
2380 PRINT #1:::"MEMORY RELOCATED";
    (-1)*DIF;"BYTES"
2390 PRINT #1:::::
2400 PRINT #1:"REF/DEF TABLE ENTRIE
    S"
2410 PRINT #1:::
2420 PRINT #1:"LOCATION";TAB(12);"N
    AME";TAB(25);"REF/DEF ENTRY PO
    INT"
2430 FOR SS=1 TO 20
2440 IF PNAME$(SS)="" THEN 2470
2450 PRINT #1:PLOC$(SS,1);TAB(12);P
    NAME$(SS);TAB(25);PLOC$(SS,2)
2460 NEXT SS
2470 PRINT #1:::"END OF REPORT"
2480 CLOSE #1
2490 STOP
2500 PRINT ::::"YOU ARE TRYING TO M
    OVE ABOVEYOUR LIMIT"
2510 VA=D+(B-A)
2520 GOSUB 1810
2530 PRINT "HIGH LIMIT NEEDS TO BE
    ";VAL$
2540 PRINT :::"DO YOU WISH TO CHANG
    E THE   PARAMETERS?"
2550 INPUT "(Y/N):":CHP$
2560 PRINT :::
2570 IF (CHP$<>"N")*(CHP$<>"Y")THEN
     2540
2580 IF CHP$="Y" THEN 250 ELSE 620
2590 PRINT ::::"YOU ARE TRYING TO M
    OVE BELOWYOUR LIMIT":::
2600 PRINT "YOUR LOW LIMIT NEEDS TO
     BE":TEMP$:::
2610 PRINT "DO YOU WISH TO CHANGE T
    HE   PARAMETERS?"
2620 INPUT "(Y/N):":CHP$
2630 PRINT :::
2640 IF (CHP$<>"N")*(CHP$<>"Y")THEN
     2610
2650 IF CHP$="Y" THEN 250 ELSE 610
2660 VA=V
2670 GOSUB 1810
2680 TO$=VAL$
2690 VA=Z
2700 GOSUB 1810
2710 FROM$=VAL$
2720 VA=LOC1
2730 GOSUB 1810
2740 PRINT ::::"YOUR PROGRAM WILL N
    EED TO   WORK OUTSIDE OF YOUR
    LIMITS"
2750 PRINT ::"THE INSTRUCTION AT LO
    CATION":VAL$;" ORIGINALLY USED
     THE":"ADDRESS REFERENCE ";FRO
    M$;"."
2760 PRINT ::"IT NOW NEEDS TO CHANG
    E THAT ADDRESS REFERENCE TO ";
    TO$;"."::::
2770 PRINT "DO YOU WISH TO HALT THI
    S":"PROGRAM AND START OVER?"
2780 INPUT "(Y/N):":CHP$
2790 PRINT ::
2800 IF (CHP$<>"N")*(CHP$<>"Y")THEN
     2770
2810 IF CHP$="Y" THEN 2830
2820 RETURN
2830 PRINT ::::"YOU MUST RELOAD MEM
    ORY WITH YOUR ASSEMBLY PROGRAM
     BEFOREUSING THIS PROGRAM AGAI
    N":::::
2840 STOP
2850 PRINT ::::"THAT ADDRESS IS OUT
    SIDE OF  YOUR LIMITS"::
2860 VA=HM
2870 GOSUB 1810
2880 PRINT "HIGH MEMORY LIMIT=";VAL
    $
2890 VA=LM
2900 GOSUB 1810
2910 PRINT "LOW MEMORY LIMIT=";VAL$
2920 PRINT ::"YOUR INPUT WAS FOR AD
    DRESS":TEMP$::
2930 PRINT "IS THIS A VALID ADDRESS
    ?"
2940 INPUT "(Y/N):":CHP$
2950 IF (CHP$<>"Y")*(CHP$<>"N")THEN
     2920
2960 IF CHP$="Y" THEN 2030 ELSE 260
2970 PRINT :::"YOU HAVE ENTERED A L
    AST":"ADDRESS LOWER THAN OR EQ
    UAL TO THE FIRST ADDRESS":::
2980 GOTO 260
2990 PRINT "THE ENTRY ADDRESS MUST
    BE":"BETWEEN THE FIRST, AND LA
    ST ADDRESSES. TRY AGAIN"
3000 GOTO 260
3010 END
```

FULFILLING . . . from p. 55
and word recognition. Feedback from users indicates that the students have responded positively.

Encouraging Development

From our own observations and from those of parents using the system, we are encouraged about the future of computer assisted instruction for the mentally handicapped. Parents comment that their children show uncharacteristic enthusiasm and persistence when doing the lessons. These parents are realistic in their appraisal of the lessons and do not expect dramatic or revolutionary improvement. They are, however, optimistic about the potential for developing their child's ability. They know that their children are not going to be made into average learners any more than the Special Olympics has produced a 4-minute miler. They recognize that the activity is healthy and rewarding and can help improve skills. Our initial hopes for the lessons have been supported, and we have gained insight into other benefits unexpected a year ago.

Serendipity

We have been delighted to observe students working in small groups or in pairs, cooperating with each other. A healthy social interaction comes of students supporting and encouraging each other. This social interaction is a very beneficial experience. The computer exercise can also provide a focal point for family interaction, with parents and siblings working with the learner at home. In the institution, the professional worker can help the student develop social skills as they work on counting and word skills. All in all, this supportive social interaction removes the computer experience from the realm of a cold mechanical process. This was a surprising bonus which we were delighted to observe, because we felt all along that the computer should *never* be used as a substitute for sensitive human interaction. Now we know that it can effectively *stimulate* communication and support among the students.

Software Requirements

There are several factors that determine whether a program will be successful with mentally handicapped learners. We found, for example, that color animated graphics integrated with synthesized speech are absolutely essential if the lessons are to be effective with non-readers. It is amazing that some well-meaning computer programmers design software to develop beginning skills which must be used on an intermediate or advanced level. Some programs designed to teach the alphabet require students to read in order to use the software!

Major publishers have yet to provide software for the mentally retarded. Much of the software for very young children is, however, easily adapted for the retarded. Indeed, it is not necessary for the software to have been developed specifically for the retarded so long as the content and design of the program are suitable for beginning learners (whether they be 3 or 30 years of age.) Of some concern though, is the type of visual content provided for the student of mature years. The thirty-year-old retarded individual functioning at a mental age of 10 is not the same student as a fifteen-year-old at the same mental age or a normal ten-year-old. A cartoon character which works very well for a 10 year old may be perceived as "childish" by the older learner. This should be kept in mind by those planning to develop software for the retarded.

We have developed eight programs in basic counting, arithmetic, and word recognition that are available for distribution. We also plan to design additional software for handicapped/retarded learners. These will assist in development of concepts preliminary to counting and spelling. We plan to concentrate on such areas as color recognition, shape and size discrimination, measuring, telling time, and directions. If you are aware of special programs which are available through other sources or would like to see us develop them, please contact us. We are certain that the next two years will see the rapid development of software to serve our mentally handicapped children and adults.

99'er

Tortoise's . . . . from p. 51

But, for other recursive programs, there are no BASIC equivalents. For example:

```
TO COUNT :LIST
IF :LIST = [ ] OUTPUT 0
OUTPUT 1 + (COUNT BUTFIRST :LIST)
END
```

Sub-Goals

A strategy closely related to recursion is breaking down a problem into sub-goals. The best example of such a solution is the *Tower of Hanoi* problem (as solved in Vol. 1, No. 6 of this magazine by Roger Kirchner). In that particular problem, each sub-goal is solved with a program which can be applied to the next larger goal. The sub-goals strategy is related to simplification—a complex job is thought of as a series of several less complex jobs. Each of the less complex jobs is accomplished by writing simple programs and the complex job is accomplished by putting all these simple programs together. Notice that this also teaches the programmer to consider the problem one step at a time. In memory training, disease fighting, military combat, and computer problem solving, the maxim "Divide and conquer" is more than just an empty saw. LOGO lends itself to such hierarchical programming. BASIC discourages powerful heuristics because such tactics can only be modestly simulated with a spaghetti bowlful of GOSUBs and EXITs.

Problem Space Definition

LOGO facilitates the resolution of problems by helping you to 1) view from different perspectives, 2) break down the problem space into its independent states, and 3) name those states and procedures which may be solutions. Naming solutions may not seem especially powerful, but it is when you consider what having a name affords. Once a procedure is named, you can talk about it, think about it, and manipulate it symbolically without producing the entirety of it. Without the ability to name procedures, procedural thinking would be difficult and constrained, if not impossible.

Both the philosopher of science Thomas Kuhn and the historian Herbert Butterfield attribute revolutions in science to new perspectives discovered by visionaries. An example that Papert often uses is to compare definitions of circles. Circles can be described with Euclidean geometry, with Cartesian analytic geometry, with integral calculus, or with Turtle Geometry. In LOGO all four definitions can exist simultaneously. In particular, LOGO makes transitions between Cartesian and Turtle views of problems easy. The Turtle geometry commands of Right or Left can coexist happily in a program which also contains the more Cartesian SETHEADING.

Psychologists and mathematicians who study problem solving attribute successful solutions to defining a problem in a view concordant with the ultimate solution. The more different ways that a problem can be seen, the more likely it is that a view concordant with the solution will be used. Similarly, the better you can see the problem space's states, the more likely you are to isolate the relevant parts of the problem space.

LOGO facilitates state descriptions by forcing the programmer to see that a sprite's xcor, number, ycor, heading, color, shape, and speed are each independent of all other sprite states as are the states of the turtle (xcor, ycor, heading) and the turtle's pen (up, down, erase, reverse).

A Real Winner

Which is the winning computer language? Certainly BASIC has its uses, but LOGO gives you the power to solve programming problems quickly, easily, and elegantly. And you are the real winner if you realize that LOGO problems are not limited to just graphics and games, and use LOGO to its full list processing power.

Papert S. *Mindstorms: Children, Computers, and Powerful Ideas*. New York, Basic Books, Inc., 1982.

99'er

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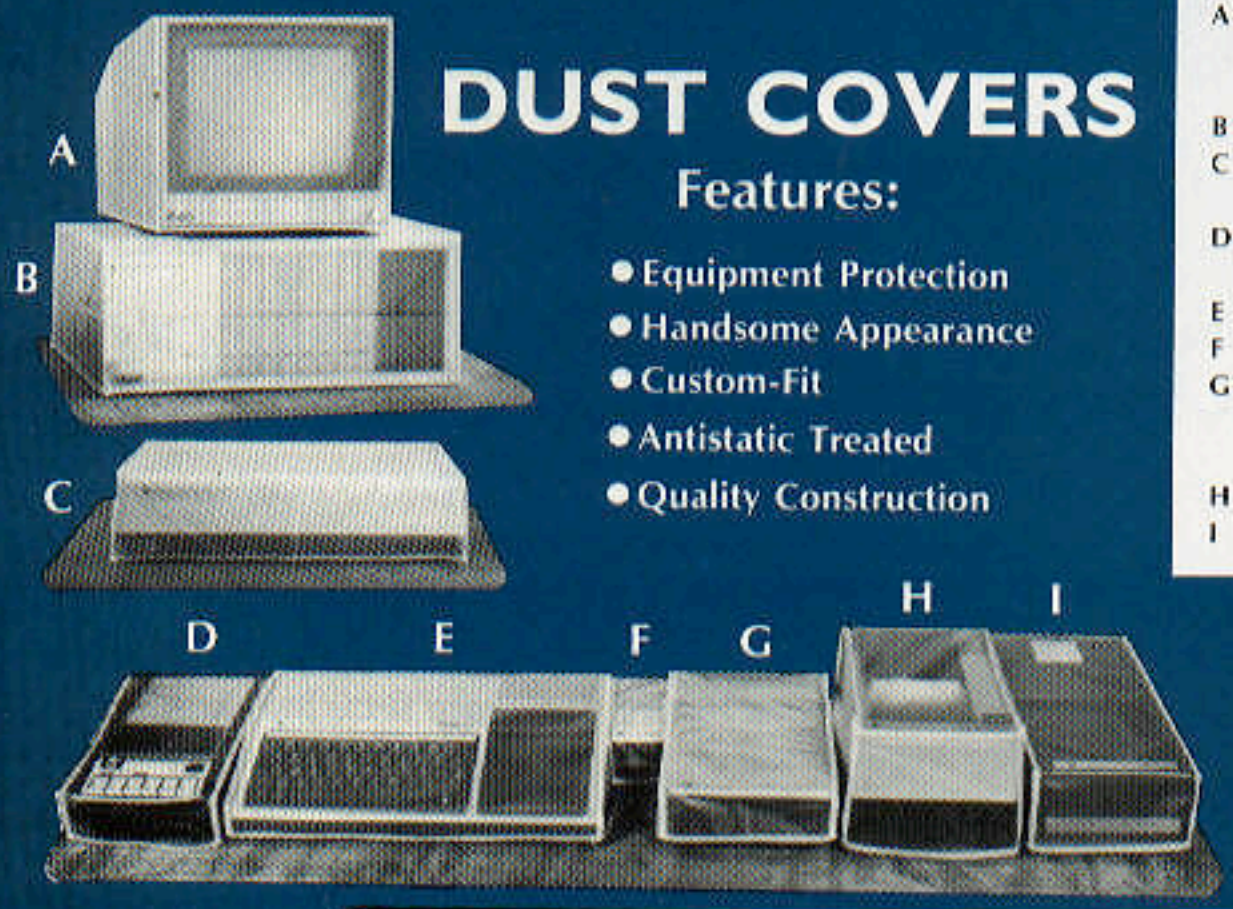

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