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# HOME COMPUTER<sup>TM</sup> magazine

FOCUSING EXCLUSIVELY ON ● APPLE ● COMMODORE ● IBM ● TEXAS INSTRUMENTS

Vol.4 No.2

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Bouncing Ball Graphics for the Apple  
Pixel Tricks for the Commodore 64  
Multi-Color Secrets of the TI-99/4A  
VIC-20 Image Editor  
Animation on the IBM PCjr

FROGO for LOGOphiles  
Your Electronic Home Secretary

Computer Gaming:  
Hungry Cannibals &  
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HOME COMPUTER  
GRAPHICS



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Digest

# All the hits your computer is missing.



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And we've got them for all the hit computers ...Apple, IBM, Commodore 64, Vic-20, Colecovision<sup>\*</sup> and TI 99/4A. We've got Pac-Man, Centipede and Defender for Intellivision too.

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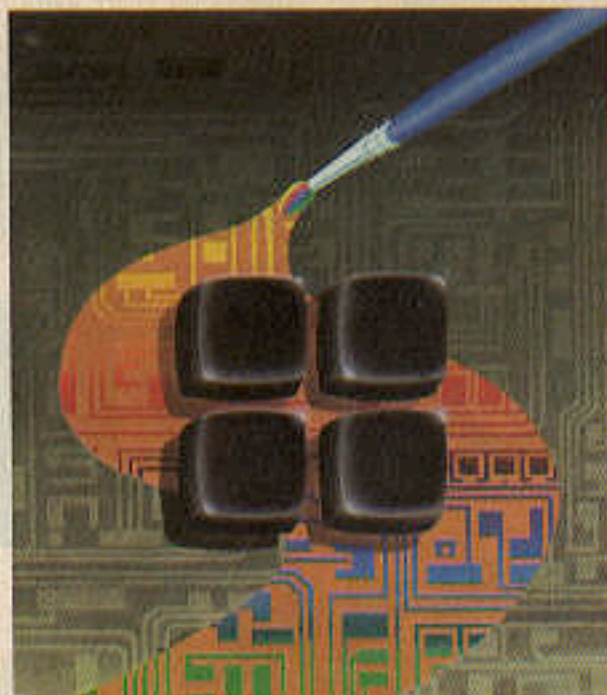
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## Outside HCM

This month's colorful cover painting depicts the rainbow of graphics potential awaiting you within a home computer's integrated circuits. All it takes to release this silicon palette is a little help from your friend, *Home Computer Magazine*. Just press one of the magical graphic keys and begin our visually exciting journey into the realm of the computer artist.

## Inside HCM

Spring—and the Earth takes on a fresh new look as its multi-hued vegetation blossoms into a veritable rainbow of color. This month, we bring the same breath of fresh air to your home computer—transforming it from a monochrome information processor to a colorful showcase of lively computer graphics.

Inside this issue of *Home Computer Magazine* an impressive portfolio awaits. You'll find graphics techniques, tutorials, and product reviews for a wide range of artistic talent—from budding Renoirs to the fingerpaint set.

There's no better way to launch a discussion of computer graphics than with sprites—those marvelous video imps that dart across the screens of both TI-99/4A and Commodore 64 home computers. In *Double Your Pleasure, Double Your Fun* we show users of these machines how to expand their high-resolution graphics repertoire with some spritely never-before-revealed tricks of the programming trade.

Apple users haven't been left out of the picture either. Anyone can learn Apple graphics programming with *Follow the Bouncing Ball: An Apple Graphics Tutorial*. In this issue we also present Part 2 of *3D-Ile: Apple Graphics in Three Dimensions*.

Fans of the VIC-20 don't despair! Nowhere is it written that users of a 5K machine must be excluded from this issue's artistic visions. You can try out some major motion of your own—but first tune in to *Building Your Character: A Graphics Editor for the VIC-20*.

And to round out our theme, we present you with several reviews of commercial graphics packages for all the home machines we cover—utilities that can save you a lot of time, and make design work with the computer that much easier.

For those days when spring showers are busy creating summer flowers, we've got several games ready to key-in and play—computer entertainment

such as *Cannibals*, *Sea of States*, *Tablut*, and *San Francisco Tourist*. Nowhere else will you find as varied a magazine mix of arcade action, educational benefits, and logical skill development.

If number-crunching is your game, we've got just the menu. Youngsters who are getting down to basics can try *Elementary Addition and Subtraction*, while those with more advanced math skills can sink their teeth into *Matrix Muncher*, an easy way to solve simultaneous equations with numerous unknowns.

To help our readers who are more interested in learning music than math, there's *Musical Mystery Words*—where players must identify the letter names of musical notes displayed on the screen and played through their TV. These notes, in turn, spell out the sought-after mystery word. A sound way to learn music, improve spelling skills, and have fun!

Getting the sound out of your home computer doesn't have to remain a mystery any longer when *Jr. Sounds Off* in this issue. And lest the sound of music distract you from your annual spring file cleaning, our *Electronic Home Secretary* offers some valuable organizational help. So get it all together with this versatile program that makes directories, lists, and inventories. Just don't expect it to make coffee...

LOGO lovers can be list makers too—after reading *Files in LOGO*. The article takes you through an interactive graphics program that includes data file access like that in BASIC. On the lighter side of LOGO, there's *FROGO*—a frog-leaping game that will help you to understand the rows and columns, speed, direction, and x and y coordinates of the LOGO language. And rounding off this month's coverage of turtles, frogs, and the like, we learn from an outspoken father-daughter team just how effectively *LOGO Spans the Generation Gap*.

Until next month, have fun reading, learning and RUNing **HCM**

# Letters

## to the Editor

### Happy with 2 Machines

Dear Sir:

It is with a sigh of relief that I write this letter. I was afraid that since the pull-out of Texas Instruments from the home computer market, you would have to put your magazine to rest. How surprised and relieved I was to find your journal alive, well and from all appearances, better than ever.

I began my journey into home computers with a TI-99. Due in large part to your excellent efforts, I was able in a short time to learn much about programming. Several months after my purchase of the 99, a new computer arrived at my place of work: an Apple IIe attached to a pulmonary function machine. Because of this and the fact that TI decided to fold its home computer operations, I recently purchased an Apple-compatible Franklin Ace 1200.

When I began to search for a new journal to match my new computer, the standard by which I compared them all was your own 99'er Home Computer Magazine. As your trademark states—Once you compare, there's no comparison. The style and thrust of the other publications was so below what I had come to expect from reading your magazine, that I practically gave up looking. Then, lo!—there you were again, adapting to the changing computer field and once again standing out from the slick fluff.

I hope that the companies that are in a position to support you (and themselves) with their advertising realize how different and valuable your magazine really is. As far as the users go, all they need is to see a copy.

Sid Lunford  
Danville, Ill.

*Thanks, Sid, we needed that. And thanks to all of our readers both loyal and new for taking the time to write and tell us we made the right decision. To produce a magazine like HCM takes a staff that is totally dedicated to excellence—even beyond the point that most folks consider reasonable. And they do it with pride.*

### A Problem of Memory

Dear Sir:

For Christmas this past year I bought the family a Commodore VIC-20 home computer. Now I am wondering if I made a mistake. It seems that there is very little in the way of support for this toy while there is lots of support for the more expensive Commodore C-64 home computer. Did I waste my money or am I looking in the wrong places?

Arnold Bainbridge  
Elk Grove Village, Ill.

*The VIC-20 was designed with only 5K of RAM. The fact that it is extremely difficult to write very sophisticated programs in so limited a memory area, has caused most current third-party Commodore developers to produce software for the bigger machine. If you are looking for programs that can be used on the VIC-20, HCM is now your best source.*

### A Question of Peripherals

Dear Sir:

I recently subscribed to your magazine and I like it very much. I own a TI-99/4A computer and would like to purchase some peripherals for it. The thing that bothers me is that there appears to be no good source of information on what peripherals are compatible with my com-

puter. I can't even find any technical information which would allow me to figure this out for myself. I would like to see you write a series of articles in laymen's language on the differences in interfaces and how they work.

Perhaps you could also help me with some questions I have concerning my computer. I would like to replace my TI computer with an IBM PC later on, and would like to buy my peripherals with this in mind. Specific questions I have are as follows: Can I use an IBM color monitor directly with my TI-99/4A? Will the TI Impact printer work with an IBM PC? Will the IBM printer work with my TI? If not, what has to be done to convert one or the other? An ad in your magazine says they are both Epson MX80s, but are they exact copies of one another? Can I put one double-density double-sided disk drive (or perhaps two half-height drives) in my TI Peripheral Expansion System box and have them work properly? Will the TI electronics work with a double-density double-sided drive? Will single-density disks run on a double-density drive?

I have not only looked extensively for magazines or books which provide this type of information, but I have asked many of my friends for the answers, and they don't know the answers either. They would like to have this type of information also.

John Paulson, jr.  
Endwell, NY

*We are aware of the many readers that are changing systems for one reason or another. The concerns that you express are shared by everyone in this group and should also be considered by anyone buying new peripherals for their machine. To boil down and paraphrase your letter, the question becomes, "If I upgrade my computer system, which peripherals can I re-use in my new system?" First, any peripheral that interfaces via the RS232 standard (supported on both the TI and IBM machines) will be something that can be kept. Generally, printers, modems, and plotters fall in this area. Certainly, the TI and IBM (Epson MX80) printers will work interchangeably (although internal switch settings may require changing due to software differences).*

*Any monitor that uses a composite color input signal will work with different computers that have this video output. The TI color monitor, for instance, works well with the IBM Pjr. (Both computers have a composite color output.) The IBM PC color monitor, however, is not a composite—but rather the RGB type—so it will not work with your 99/4A.*

*Your questions on disk drives cannot be answered quite so easily. Both the TI and IBM machines can utilize double-sided disk drives (except for the early model TI systems with stand-alone disk controllers that connected to the right side of the console). The TI disk drive controller, however, does not support double-density recording while the IBM does. You may connect a double-density drive to the TI but it will be treated by the controller as a single-density drive. Regarding the installation of two disk drives in the TI Peripheral Expansion System box, you may run into power supply problems. The system was designed to support the power requirements of only one standard disk drive. Unless specially designed (low-power) disk drives are used, or the power supply is beefed up (by rebuilding with higher-current voltage regulators), stick to one drive in the box.*

*Your search for a source of information obviously ends with Home Computer Magazine. Watch each issue for techniques and answers to*

*your computing needs. In particular, check out our Home Computer Tech Notes feature.*

### A Commodore Tip

Dear Sir:

I have a little tip to pass along to the other Commodore C-64 users that read Home Computer Magazine. Maybe you can print it in the Letters to the Editor section of your magazine.

I found that the Commodore BASIC INPUT statement works different from my TI-99/4A and maybe it is causing a problem for others. Take the following example:

```
10 INPUT "Enter string"; AS
```

If you just press the return key, the previous value of AS is retained (from the last time AS was used in the program!). I thought it would automatically be emptied when the return key was pressed. This can come in handy sometimes, but other times you can clear it in the program as follows:

```
10 AS="":INPUT "Enter string"; AS
```

which clears the variable first. This will work on numeric variables too.

Mike Adler  
Santee, CA

*Thanks for the tip, Mike. I know that will help any TI'ers out there who are trying to learn about the C-64.*

### Grounds for Trouble

Dear Sir:

I have a problem with my computer that you may be able to help with:

I have a home computer that sometimes, when I am in the middle of a program or a pre-made cassette game, will suddenly just stop and the screen will go blank or produce a mass of unrecognizable characters and sounds. What is causing this?

Ken Marshall  
El Toro, CA

*Ken, there could be any number of things going wrong to cause your computer to go "bananas" as they say. Some of the more common causes are related to heat and poor connections. First, check under, over, and around the main console to make sure there is good air flow space. Second, with the unit unplugged, clean all the connections to the computer (including plug-in cartridges) by unplugging and replugging them several times followed by carefully reseating each connection. One final suggestion that works in some cases (usually in an older home that uses two-wire AC circuits) is to run a good ground wire from a copper water pipe to the ground connection of the power plug (if you are not sure of how to identify this connection, call an electrician). If all else fails, send the unit to the repair depot closest to your home.*

### Let Your Fingers Do Debugging

Dear Sir:

I was more than pleased to receive the first issue of your renewed magazine. I just love it and as you had mentioned, there is still enough for us, users of the TI-99/4A.

In Vol 4 #1 of HCM, there is a game in Extended BASIC called *Meltdown*. I typed and checked it over and over again and I am now sure there is no typing mistake in it.

When I RUN it, right at the beginning I get "BAD VALUE IN 490." As I told you, I checked it from the first line to the very last line and there is absolutely no typing error.

I am more than anxious to read the Debugs on Display in next month's magazine to see what the problem was. Thank you for an excellent magazine.

Camille Morin  
Verdun Quebec Canada

Fully realizing that you checked your typing extremely carefully, Camille, we recommend that you recheck every character, space, and comma in lines 2020-2110 (the DATA statements). The bad value message means that the HCHAR portion of line 490 has received a value in one of its variables (either R2 or C2) that is outside its range of acceptance.

To discover what the bad value actually is, enter "PRINT C2,R2" and press [ENTER] immediately after you see the Bad value message appear on the screen. Then compare the actual numbers printed for the variables to the allowable values for the HCHAR statement. If you still can't locate the typing error, don't forget that you can get that program and several others ON TAPE™ or ON DISK™ for only \$3.95! Something to consider. . .

#### We Do Peanuts Right!

Dear Sir:

I just purchased a new IBM PCjr with 128K of memory and a disk drive. Now I am reading your Home Computer Magazine to compare it with other magazines which just cover the Peanut. It seems to me that your coverage is not trivial. By this, I mean that I found really useful information in your pages. Especially helpful was the ten-or-so-page article that got inside the Peanut's shell! I immediately went back to my dealer and bought the Cartridge BASIC package and the disk operating system.

Will you be telling readers about software packages that will work on both the PC and the PCjr? I am in a position that I would like to do some word processing at home sometimes. Can the diskettes be used in both machines or will I lose my data if I swap a disk back and forth? Thanks in advance for the help, and for a neat magazine!

J.V. Smith  
Royal Oak, MI.

Yes, Mr. Smith, you can swap diskettes between the IBM PC and the PCjr. You should not lose any data as long as you follow the manuals for using the disk operating system. We will be exploring the use of software packages on both the PC and the Junior. In an upcoming issue, we will show you how a word processor (EasyWriter II) works on the little brother of PC. There are many surprises ahead for readers as HCM ventures farther into Big Blue country.

#### Assembly Needs

Dear Sir:

I have the TI-99/4A computer and it is equipped with the expansion box that has one disk drive, the RS232 card, and the 32K memory expansion. I also have a Banana printer attached.

I want to upgrade it to use the TMS9900 Assembly Language. However, I am confused as to what I need to do this. With the peripherals I now have, would the Assembler/Editor module be sufficient or should I get the Mini-Memory or both?

I would appreciate your advise on how to upgrade my set with the appropriate software and I would also appreciate your advise on where to obtain good instructional material on learning the use of the TMS9900 Assembly Language.

I have a pretty good knowledge of TI BASIC & Extended BASIC, but I know very little about assembly language. Also is there any information of how to use the CALL LOAD, CALL INIT, CALL LINK, and CALL PEEK subroutines listed in the TI Extended BASIC manual? The material in the manual is very shallow.

Larry D. Dodgens  
Oakwood, GA.

*You've got it all, Larry! At the very least, the TI-99/4A must have a disk system with one drive and the memory expansion. Having a printer, although not a system requirement, is a practical necessity.*

*The TI Editor/Assembler package, by the way, is much more than just a cartridge. It contains a three-ring binder, a 470 page manual, and two floppy diskettes. The cartridge works with the diskettes and both are required for the Editor/Assembler to function. The manual gives*

more information on the use of the LOAD, INIT, LINK, and PEEK subroutines in Extended BASIC. The manual is designed as a reference volume, not a tutorial. Assembly language is one of the most difficult languages to learn without a solid background in computer science. There is a need to have a basic understanding of the computer's internal architecture, which often is covered as an ancillary topic when learning about assembly language. It is possible, with great dedication, for a non-computer specialist to learn assembly language, but there is no easy way.

The TI Mini-Memory cartridge may be used with the TI-99/4A by itself (with the possible addition of a cassette player). It too makes use of assembly language, although, on a much more rudimentary level (which for some folks, makes it even harder to master) and its documentation often refers to the Editor/Assembler manual for clarification.

The best information that I have seen on the TMS9900 Assembly Language for beginners is in our own magazine over the past three years. A great place to start is Chapter Five of The Best of 99'er, over thirty pages of tutorials and programs just on this subject.

#### Taping It Right

Dear Sir:

I am going to start taping programs from your articles onto cassettes and am confused as to how to do it. I understand the part about transferring the program from computer to cassette, but I don't know how much space to leave between programs. If I have a digital counter, how many counts do I leave in between programs, and how do I know when a program is at the end before adding that space? Do I have to listen to it out loud and then remember when the computer noise ends? Also, will the computer stop automatically when the program you want read is over, or do you have to stop the tape recorder manually? I am just wondering if the computer would otherwise read all the programs on the cassette before stopping. Also, approximately how many programs (in line length) will fit on a 10-minute tape? A 30-minute tape? A

Continued on p. 32

## HCM Review Criteria

Each month, HCM reviews software packages for the IBM PC and PCjr, Apple II, II+ and IIe, TI-99/4A, and Commodore 64 and VIC-20 computers. These reviews take a detailed look at the quality of commercially available third-party software for these home computers.

At the beginning of each review, a review-at-a-glance box provides the user with an instant assessment of the program. Each software item will be evaluated, where relevant, with the criteria below.

- **Performance**—how well the activity responds to the player's commands; how well the sound effects, music, or speech are integrated with the software.
- **Documentation**—the quality of the printed matter that comes with the software: whether the instructions are clear and comprehensive; whether the machine configuration requirements are spelled out. Information such as how to load the program, use the keyboard, and restart the activity contributes to the documentation rating, as do tips on performance peculiarities.

- **Engrossment**—whether the game or activity has that intangible quality that holds the player on the edge of his seat while the hours tick by unnoticed.

- **Ease of Use**—the degree to which a user can interact with the software without outside help; the ease and effectiveness of error-handling features; whether the actual reading level of the activity is appropriate for the suggested audience.

#### Education-Specific Criteria

Educational software may also be evaluated in the following areas:

- **Concept Presentation**—whether the concepts are presented clearly, in logical order, and in enough depth for the learner to be able to apply the learning to other situations.
- **Rewards**—whether the audio-visual rewards are motivating and whether they are appropriate to the activity.
- **Graphics**—rates the quality of the graphics and whether they enhance or detract from the educational purposes of the activity.

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

*T'was early Superbowl Sunday  
And all through the house,  
Not a creature was stirring,  
Not even a mouse.*

*Came time for the game,  
And America tuned in—  
To an annual tradition,  
Watching the better team win.*

*Beer, cars, and computers  
Were part of that day,  
As costly commercials  
Entered the fray. . .*

*Suds for the thirsty,  
Major motion for the driven,  
Less paper-work to drown us,  
And happier times to live in. . .*

*When all of a sudden  
There arose such a clamor,  
As the runner in red shorts  
Flung her mean hammer.*

*And shattered the big screen  
For all America to see  
that 1984 would  
A revolutionary year be. . .*

The now-famous "Big Brother" commercial which marked the debut of Apple's Macintosh computer started me thinking...Not about "a computer for the rest of us" or Apple's alternative to an IBM-dominated world, but to the revolutionary year, 1984, itself.

Revolutions come in all shapes and sizes. They are, however, all characterized by an upheaval from within. The personal computer industry will experience a "soft upheaval" during the remainder of 1984—rapidly transiting from its seven-year "infancy cycle" to its next seven-year "adolescence cycle." The rest of the decade should indeed be an interesting time as we watch the industry grow to maturity.

1984 is the year that the "productivity home computer" finally emerges. With the entrance of the PCjr, the repositioning of the expanded Apple II family, and the announcement of a new Commodore standard (IBM-compatible or otherwise), the home segment of the personal computer market is now being populated by an ever-increasing number of 128K-byte machines. These more expensive systems will probably overtake the installed base of 64K-and-under machines by the end of 1985. This increase in resident memory, coupled with smaller and denser mass storage devices at lower prices, means more sophisticated and easier-to-run programs for home users.

The first phase of software's new adolescence has begun. We've already seen entertainment software virtually explode in 1982, education software in 1983, and now productivity software in 1984. In terms of product development, we're witnessing the abandonment of the "hit title syndrome." Instead of scrambling for the microcomputer rights to



"The personal computer industry will experience a "soft upheaval" during the remainder of 1984—rapidly transiting from its seven-year "infancy cycle" to its next seven-year "adolescence cycle."

blockbuster arcade and movie titles, savvy players are concentrating on building up stables of less flashy software packages that have been designed for longevity—to produce sales month after month, and year after year.

For the most part, changes in the status quo during 1984 are coming from major product *refinements* rather than product *breakthroughs*. We are already seeing a steady stream of new software products that are both more powerful, and easier for beginners to use. These refined packages allow you to "paint" the screen, so what you see is what you

get. Packages with windows, icons, and keyboard-alternates such as the mouse, touch-pad, and light-pen will increasingly find their way into systems used in the home. And as 256K RAM chips become available toward the end of 1984, the memory environment necessary for major software breakthroughs will finally materialize.

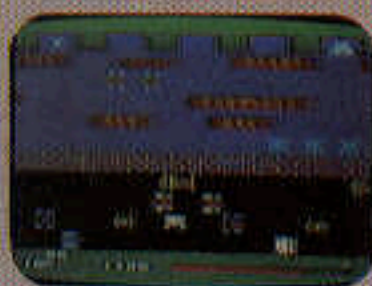
In the manufacturing, marketing, and distribution of home computer products, 1984 is already manifesting itself as the year of focussed operations, shake-outs, and consolidations. Many of the firms who used to "do it all"—develop, manufacture, and market their own software lines—have now, by economic necessity, chosen to be either a development house (designing, programming, and documenting the software), or a publisher (handling the manufacturing, marketing, and arranging for distribution).

It is also the pivotal year for product distribution. The industry is undergoing a cross-pollination of delivery channels—with computer specialty stores and chains supplementing the mass merchandisers, and electronic delivery systems gaining in acceptance. And as broader distribution dynamics and a higher ante for playing the game take effect, watch for some smaller firms to band together (sharing marketing and distribution expenses), and for more of the larger firms to buy up their cash-strapped competitors.

For companies who find themselves locked out from one or more of the new distribution channels, mail order advertising in computer publications will be crucial. And we at *Home Computer Magazine* feel proud to be contributing to the growth of this dynamic industry by providing a premium medium for advertisers and consumers alike.



# THE STARS OF THE ARCADE SHINE ON TI99/4A.<sup>TM</sup>



Your TI99/4A is a great computer system. And one of the things that's great about it is it can play three of the greatest Arcade Action games ever. Frogger,<sup>TM</sup> Popeye,<sup>®</sup> and Q\*bert,<sup>TM</sup> from Parker Brothers.

The award-winning FROGGER is one of the top selling Arcade Action games of all time. With graphics that are nothing less than ribbiting and game play that gets tougher as you get better.

And POPEYE has you running through three screens of non-stop action, where you try to capture Olive Oyl's heart while avoiding untold dangers, including Brutus and the Sea Hag.

As for Q\*BERT, he's irresistible. Jumping from cube to cube, trying to avoid an army of nasty critters, he's jumped into the hearts and minds of millions.

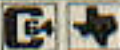






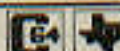



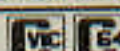




Frogger, Popeye, and Q\*bert, from Parker Brothers' Arcade Action Series. They make your TI99/4A computer feel as close to the arcade as you can get.

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# HOME COMPUTER<sup>TM</sup> magazine










## FEATURES




- 12. Sea of States**    
Match states and capitals while diving for sunken treasure. *by Joseph Phillips*
- 17. San Francisco Tourist**   
A country tourist negotiates some urban curves. *by the HCM Staff*
- 20. Building Your Character: A Graphics Editor for the VIC-20**   
Give your characters some personality. *by John P. Thrasher*
- 20. Quick Pixel Tricks: A Graphics Editor for the C-64**   
Throw away your paper graphs and create on the screen. *by John P. Thrasher*
- 34. Follow the Bouncing Ball**   
On the rebound with graphics fundamentals. *by Randy Wilson*
- 39. 3D-III: Apple Graphics in Three Dimensions, Part II**   
Create your own 3-D shapes with last month's display program. *by M.D. Brownsworth*
- 42. Double Your Color, Double Your Fun**    
Sprites try on the layered look. *by W.K. Balthrop*
- 51. Musical Mystery Words**    
No instruments necessary for this music lesson. *by the HCM Staff*
- 100. Matrix Muncher**    
Simultaneous equations are a snap, even with numerous unknowns. *by the HCM Staff*
- 113. Elementary Addition and Subtraction**   
Basic math skills for youngsters. *by Mark DeWese and HCM staff*
- 116. IBM Animation: Controlling the Pallet on the PCjr**   
Drawing circles around the competition. *by W.K. Balthrop*
- 126. Jr. Sounds Off**   
Access the Peanut's special sound enhancements. *by W.K. Balthrop*

- 132. The Electronic Home Secretary**      
Its applications possibilities are endless. *by Malladi Subbala and the HCM Staff*

## LOGO TIMES<sup>TM</sup>

- 81. Files in LOGO**       
Muller's last challenge is answered. *by Roger Kirchner and the HCM Staff*
- 83. LOGO Spans the Generation Gap: A Review of Commodore LOGO**   
Perspectives from a neophyte teen and a professional programmer. *by Richard and Sarah Haller*
- 84. FROGO: LOGO Invades the Arcade**   
FROGO helps with tiles, sprites, and recursive procedures. *by Ted Barnicoat*

## PRODUCT REVIEWS

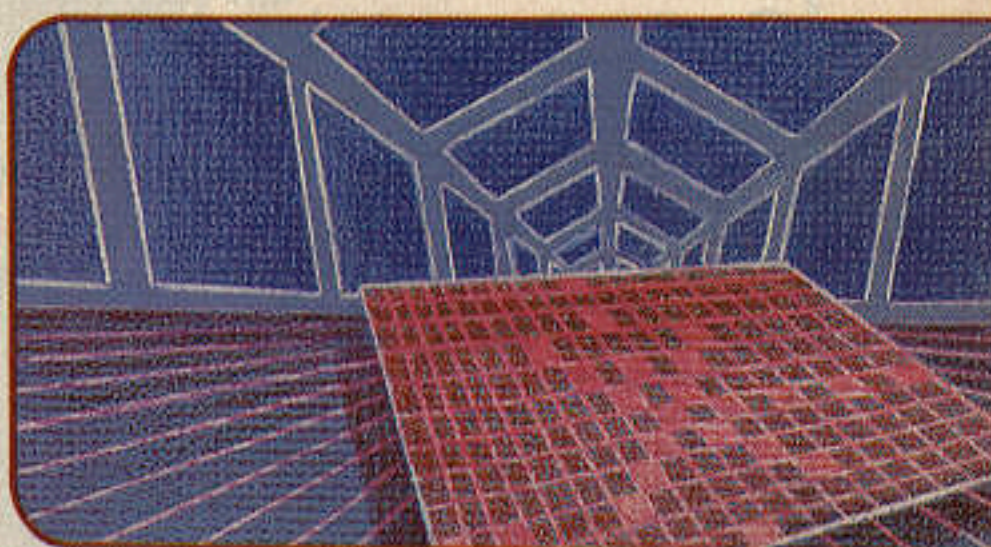
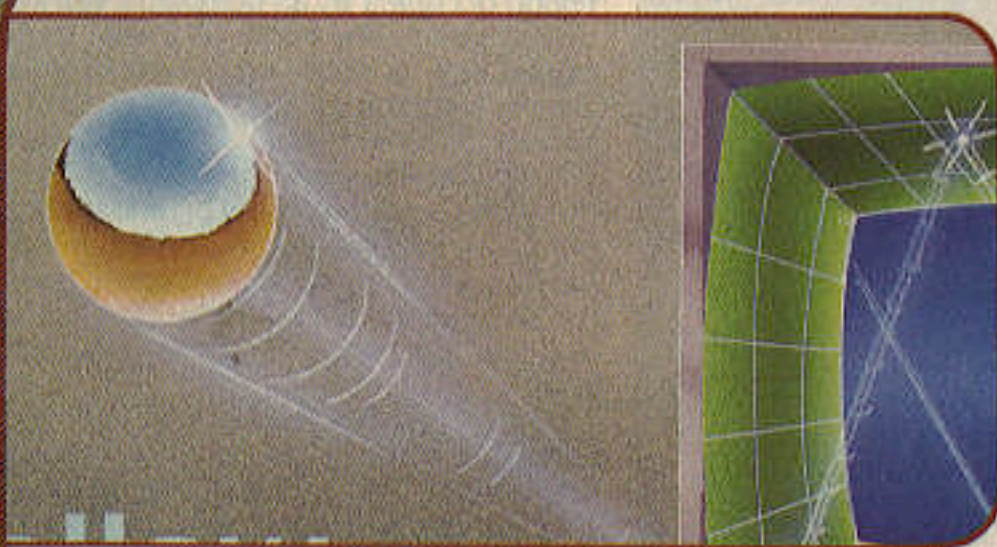
- 26. Pinball Construction Set**    
Pinball wizards can literally fine-tune their game. *A Review*
- 33. Spritemaster 64**   
Animation brings your imagination to life. *A Review*



























# CONTENTS










VOLUME 4 NUMBER 2



57. **Miner 2049'er**    *A Review*  
Trapped in a radioactive mine.
65. **Mouser**  *A Review*  
A challenge to build a better mousetrap.
66. **Attack of the Mutant Camels**  *A Review*  
Cosmic cameloids at their best.
67. **Computer War**  *A Review*  
Save the world from thermonuclear destruction.
68. **Castle Wolfenstein**   *A Review*  
Steal the Nazis' plans and escape their castle prison.
73. **Zork**     *A Review*  
Let your mind wander with this classic adventure.
74. **Donkey Kong**  *A Review*  
Get ready for gorilla warfare—in your home.
74. **Tag Tom and Fire**  *A Review*  
Finally, games for preschoolers.
75. **Q\*bert**     *A Review*  
This little guy keeps the action hopping.
76. **TI-Maze**  *A Review*  
An amazing 3-D game.
97. **Animation Creation**  *A Review*  
Creating video flip-cards for motion.
115. **Adventures in Math**   *A Review*  
Who says math drills have to be dull?

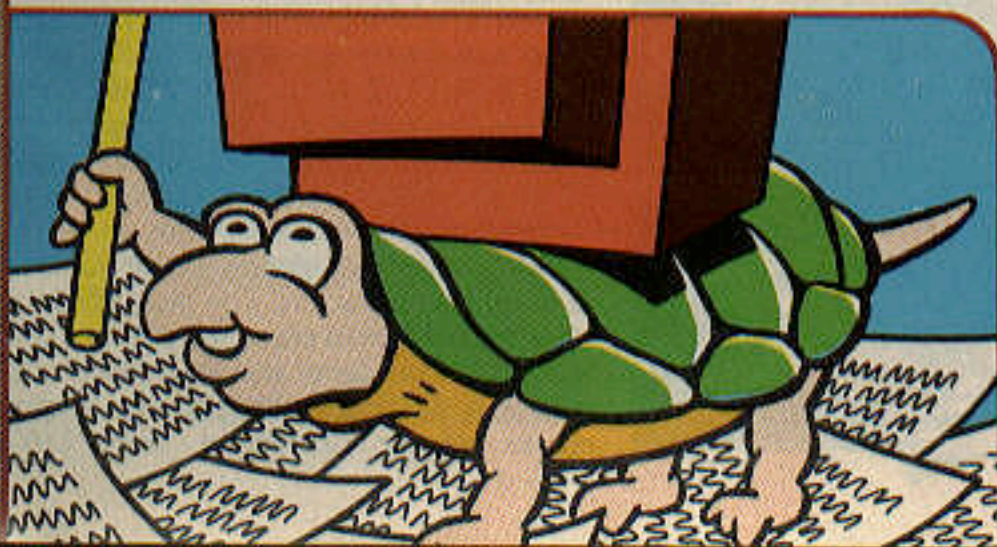
122. **Spellakazam**     *A Review*  
Race through an alphabetical maze of color and letters.
129. **Let's Get Graphic: Reviews of Graphics Code Generator and Graphics Designer**  *A Review*  
Modern day canvas and paintbrush.
154. **PowerPad**      *A Review*  
Staying in touch with the touch-tablet market.
155. **A Conversation with Robert Ransom**  
HCM Interviews the maker of PowerPad

## GAMEWARE BUFFET™

58. **Tablut**      *A Review*  
A 14th-century lapboard game reappears on your computer screen.  
*by James J. Mulligan and the HCM Staff*
59. **Cannibals**     *A Review*  
If the sharks don't eat you, the natives will.  
*by Carl Carrozza and the HCM Staff*

## DEPARTMENTS

- |                                |                           |
|--------------------------------|---------------------------|
| 4. Inside / Outside HCM        | 161. DeBUGS On DISPLAY    |
| 5. How to Type in HCM Programs | 161. Index to Advertisers |
| 6. Letters to the Editor       | Home Computer Tech Notes: |
| 8. On Screen                   | 90. Commodore             |
| 30. Group Grapevine            | 91. IBM                   |
| 107. HCM Product News          | 98. TI                    |
| 146. HCM Classifieds           | 99. Apple                 |



# HOME COMPUTER™

News and Happenings in the Home Computer World  
Bound in between Pages 66 & 67

# Sea of States



by Joseph Phillips  
and the HCM Staff

**S**ea of States is an educational game that tests your knowledge of states and their corresponding capital cities. You play a world class scuba diver who has inherited a map from your uncle, an old sea captain. The map shows two quadrants where several Spanish galleons, laden with treasure chests full of gold, floundered and sank off the coast of Bermuda. With this knowledge, you lead an expedition to reclaim this long-forgotten treasure.

Once you arrive at quadrant 1 (level 1), you make your first dive. You can find your position in the quadrant at any time by pressing the M key, which displays an 8 x 8 grid and your relative position within that grid. This function is very useful because it lets you keep track of where you are, and allows you to make a systematic exploration of the search area. The map also helps you to avoid dangerous areas you encountered previously (where sharks abound) and to remember where you found important items, such as diving bells.

You move about in the search area by pressing the keys: N = north; S = south; E = east; and W = west. When the M option is selected, the top of the displayed map is labeled N, and other directions are labeled relative to N.

When you move from one position to another within the search area, you will encounter a number of different sea creatures, along with sunken wrecks and diving bells. Some of these creatures will be harmless and serve only to make you expel a unit of oxygen. Others, however, are quite treacherous. Sharks, for example, will force you to lose large amounts of oxygen, along with some of the gold you may have salvaged. Sunken wrecks, on the other hand, provide opposite results. When you happen upon a sunken wreck, you may receive extra units of oxygen and add to your cache of gold.



## Beware the Octopus

The slyest of all the undersea creatures are the octopi. The first time you enter a region occupied by an octopus, it will ask you to match the name of a state to its capital city, or vice versa. Type in your answer and press the [RETURN] key. If the answer is correct you will be rewarded with gold and oxygen. If you are incorrect, the dark creature will become annoyed, grab you, and shake you, forcing you to lose oxygen and gold. If you happen upon the same octopus's lair more than once, you will lose more of your oxygen and gold.

Once you have answered at least five questions correctly on the first level you will need to find a diving bell, which is your passage to the second level. Once in the diving bell you need to press the U key to indicate "UP." If you have answered at least five questions correctly, you will be carried to the second level. On the second level you will need to increase your number of right answers to at least ten before you can use the diving bell again. If you have answered at least ten questions correctly throughout the game you can enter a diving bell and press U again. This time you will be carried to the surface where a helicopter will pick you up. If at any time during the game you try to go up by pressing U without being in a diving bell, you will acquire the bends and be eaten by sharks. Not a pretty fate.

The amount of oxygen remaining, number of gold pieces collected, number of questions answered correctly, and total number of questions asked are tabulated after each encounter and displayed at the top of the screen. If you run out of oxygen, you automatically lose the game. To successfully complete *Sea of States*, you must answer at least five questions on level one, find a diving bell and go up, increase your score to at least ten correct answers on level two, and again resurface in a diving bell.

## Sea of States for the TI-99/4A

The TI-99/4A version of *Sea of States* uses the sprite capabilities of Extended BASIC to bring animation to your screen. Almost all of the graphics used in this program are made up of sprites. At sprite magnification 4, each sprite is composed of four characters, and each character is twice its normal size. This results in sprites 32 pixels wide and 32 pixels high.

Because *Sea of States* uses so many sprites, you have to define a large number of graphics characters. The most efficient way to do this is to place the pattern data in DATA statements and then READ the data into variables, which can be assigned to specific characters. Lines 1160

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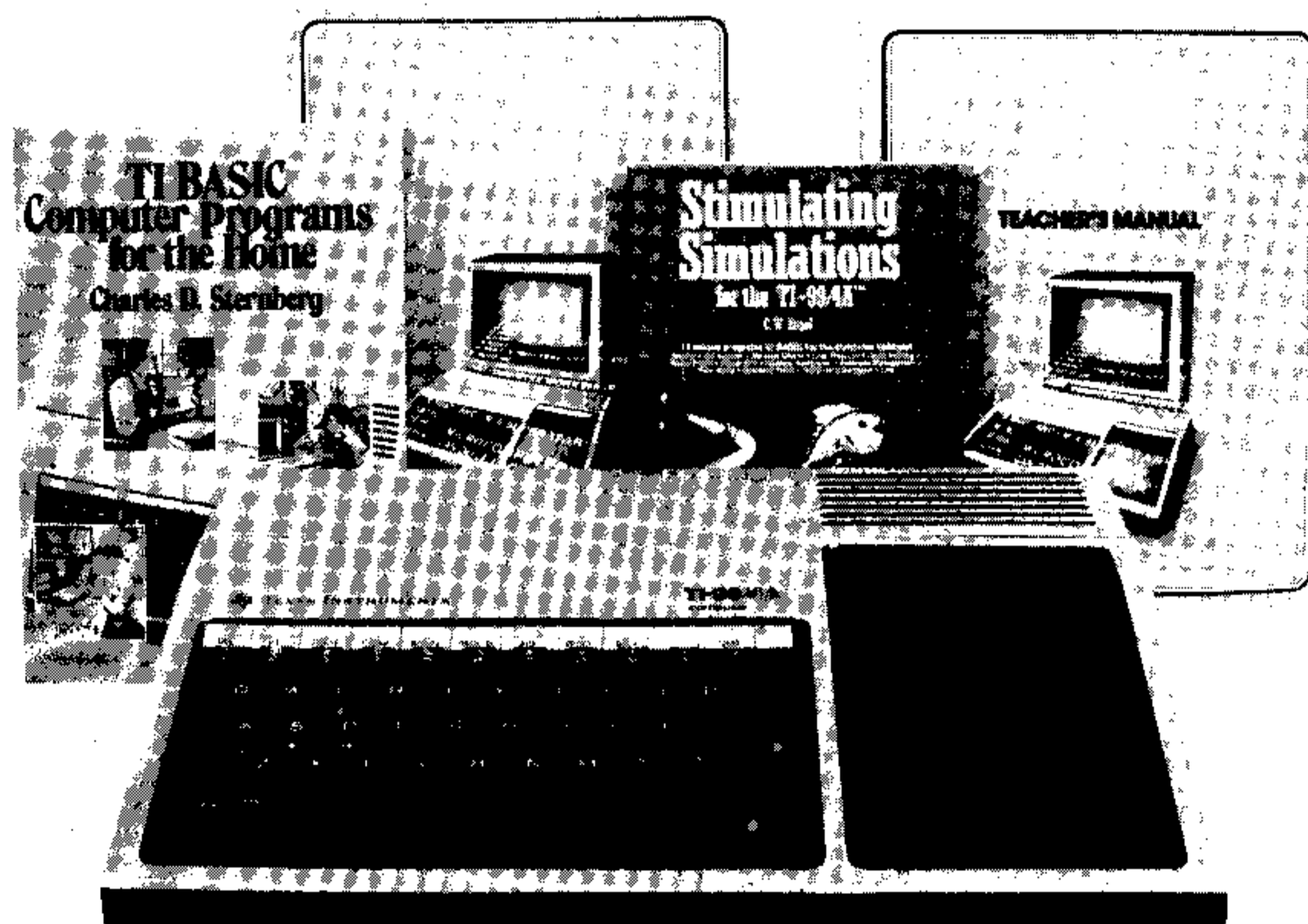
(Jones) New in the widely acclaimed **I Speak BASIC** Educational series, this provides an excellent introduction to BASIC programming & operation of the TI-99/4A.

The Student Text is an excellent at-home instruction manual, including dozens of programming examples and exercises. Educators can order Teacher's Manual or Classroom Sets. Order on school letterhead. **Student Text #6173, \$9.75**

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# Sea of States . . . from p. 12

through 1310 contain the data for the graphics characters. The number preceding each line of character data specifies the character to which that pattern data is to be assigned. Lines 1250 through 1270 do not have this number because they are special cases in which the pattern of a character must be changed later in the program. In these situations it is easier to fix the character code within the program segment that loads the pattern, rather than write a subroutine to read both pattern and character number, as was done for the other patterns.

Several of the pattern descriptions for the sprites are approximately 64 characters long. In Extended BASIC you can define more than one graphics character with a

single CALL CHAR statement. You will notice that some lines define the four patterns for a sprite separately. This is done when the majority of the sprite pattern is blank. A blank character is represented by all zeros. Any trailing zeros in a pattern description can be dropped, and if the whole character is to be blank, a single zero will suffice to assign zeros to the whole character. You can see this in characters 108, 109, 110, and 111 in line 1280. Character 108 is the only character with a pattern. The leading zeros must be included in its pattern description, but the next three characters can be defined with a single zero, because they are all blank. You could have put all four characters into the same definition, but you would have had to fill each of them with zeros,

creating longer data statements that would waste a lot of memory.

The flexibility of placing the character number before the pattern definition makes this code very efficient. Line 200 contains a subroutine that reads most of the patterns. The loop FOR D=1 TO 18 . . . NEXT D reads the data and places it into the character pattern table with the CALL CHAR statement.

The three-dimensional array SEA( , , ) is used to keep track of the contents of the sea bottom. The first two dimensions keep track of the 8 x 8 grid that makes up the sea floor map area. The third dimension specifies the level you're on. This lets the computer keep accurate records of the contents of each section of the sea floor on both levels.

## SEA OF STATES (TI-99/4A) Explanation of the Program

Line Nos.	Explanation
100-170	Program header.
180-200	Initialize program variables and graphics characters.
210-250	Display the title screen.
260-290	Initialize a new game; input player's name.
300-310	Start a new game.
320	Branch to appropriate subroutines, depending on what is on the sea bottom.
330-360	Subroutine to update the amount of oxygen used and display the score. Input the next command.
370-390	Subroutine to draw map.
400-430	Check to see if diver is at edge of the map area.
440-470	Subroutines to handle minor encounters with starfish, sea shells, and coral reefs.
480-500	Adjust oxygen and gold found or lost.
510-610	Octopus catches player. If it's the player's first time in the area, the octopus asks a question.
620-630	Encounter sharks.
640	Find a diving bell.
650	Find a sunken wreck.
660-690	Subroutine to move the objects that the diver encounters to the center of the screen.
700-780	Diver makes attempt at going up to the surface without a diving bell.
790-830	Diver goes to the second level.
840-940	Diver successfully finishes the game and surfaces from the second level; sequence to control helicopter rescue.
950-1000	End of the game; option to play again.
1010-1060	Subroutine to handle the diver when he reaches the edge of the map area.
1070	Time delay subroutine.
1080-1150	Data containing the states and their capitals.
1160-1310	Data containing graphics character patterns.

### TI-99/4A

```

100 REM *****
110 REM ** SEA OF STATES **
120 REM *****
130 REM BY JOSEPH PHILLIPS
140 REM HOME COMPUTER MAGAZINE
150 REM VERSION 4.2.1
160 REM TI EXTENDED BASIC
170 REM
180 CALL CLEAR : RANDOMIZE : DIM SEA(
  8,8,2),ST$(50,2),S(7) : CALL SCREEN
  (5)
190 DEF SB=SEA(S(5),S(6),S(7))
200 RESTORE 1160 : FOR D=1 TO 18 : RE
  AD A,AS : CALL CHAR(A,AS) : NEXT D
  : CALL COLOR(9,8,8) : CALL HCHAR(
  1,1,96,192) : CALL MAGNIFY(4)
210 CALL SPRITE(#1,132,12,20,48,#2,140,
  15,23,60) : GOSUB 1
  070 : CALL SPRITE(#3,136,15,40,70,
  2,2)
220 CALL SOUND(100,-6,0) : RESTORE 1080
  : CALL MOTION(#1,0,-1,#2,0,-1) :
  DISPLAY AT(10,6) : "THE SEA OF STATES

```

### TI-99/4A

```

230 FOR A=1 TO 18 : READ D : ST$(A,1)=
  SEARCH OF GOLD : BOTTOM OF THE SEA
  IN
240 GOSUB 1070 : CALL DELSPRITE(#1,#2)
250 DISPLAY AT(16,1) : "YOU WILL ALSO
  FIN
  UNDER WATER WRECKS : "HATED" : "
  VERY SMART" : OC
  TOPIA : "AND MUCH MORE" : "
  SEA
  (A,B,1)=INT(TAN(RND*1.37)) : SEA(A,
  B,2)=INT(TAN(RND*1.35)) : NEXT B
270 CALL DELSPRITE(#3) : SEA(INT(RND*8)
  +1,INT(RND*8)+1)=4 : SEA(INT(RND
  +8)+1,INT(RND*8)+1,2)=4
280 CALL HCHAR(10,1) : "YOUR NAME?" :
  ACCEPT AT(1
  0,12) : SIZE(8) : NS(RND*8)+1 :
  S(7)=1 : S(1)=3
290 S(6)=INT(RND*8)+1 : DISPLAY AT(15,
  1) : "YOU'RE DIVING" : GOSUB 1
  070 : CALL CLEAR : CALL COLOR(9,2)
300 DISPLAY AT(2,1) : "OXYGEN GOLD #RIG
  HT : #QUES. 36 0"
  0 : "LEVEL = 1" : CALL HCHAR(24,1)
310 RESTORE 1250 : READ AS : CALL CHA
  R(140,AS) : CALL SPRITE(#2,136,15,1
  60,100)
320 CALL DELSPRITE(#1,#3,#4) : CALL HCH
  AR(15,1,32,256) : ON INT(SB+1) GOTO
  440,450,640,650
330 IF SB<4 THEN CALL DELSPRITE(#1)
340 S(1)=S(1)-1 : IF S(1)<1 THEN 950 E
  LSE IF S(1)<10 THEN DISPLAY AT(19,5)
  BEEP : "LOW OXYGEN!"
350 FOR A=1 TO 4 : DISPLAY AT(3,A*8-7)
  : S(A) : NEXT A : DISPLAY AT(5,7) : S
  (7) : DISPLAY BEEP AT(20,1) : "WHAT
  OWL" : "N?" : "N" : "N" : "N" : "N"
  : CALL KEY(0,A,B) : IF A>87 OR A<69 T
  HEN 360 ELSE ON A-68 GOTO 420,360,3
  60,370,400,360,360,430
370 REM DRAW MAP
380 CALL HCHAR(13,1,32,288) : FOR A=1 T
  O 8 : CALL HCHAR(7,A*2+8,A+48) : A
  +NEXT A : A+64) : CALL HCHAR(24,
  17,78) : CALL HCHAR(6,1,32,544) :
  GOSUB 1070 : GOTO 350
400 IF S(5)<8 THEN S(5)=S(5)+1 : GOTO
  320 ELSE 1010
410 IF S(5)>1 THEN S(5)=S(5)-1 : GOTO
  320
420 IF S(6)<8 THEN S(6)=S(6)+1 : GOTO
  320
430 IF S(6)>1 THEN S(6)=S(6)-1 : GOTO
  320 ELSE 1010
440 IF SB=0 THEN ON INT(RND*3+1) GOTO 45
  0,460,470 ELSE ON SB*10 GOTO 450,46
  0,470
450 AS="THERE IS NOTHING HERE BUT SAN
  D AND SEA SHELLS." : C=16 : SH=11
  : GOSUB 660 : GOTO 330
460 AS="SMALL STARFISH ATTACK YOU." :
  SH=104 : GOSUB 660 : GOTO
  330
470 AS="THE CORAL IS ATTRACTIVE BUT THE
  RE IS NOTHING OF VALUE." : C=10 :
  SH=108 : GOSUB 660 : GOTO 330
480 IF SB=5 THEN GOSUB 2 ELSE D=1/SB
  : THEN INT(RND*10)+1 : B=INT(RND*10)
  : A=INT(RND*10)+1 : GOSUB 1070 : DIS
  PLAY AT(15,1) : "TURNS OF OXYGEN
  AND" : B : "GOLD
  PICES" :

```

Continued on p. 102

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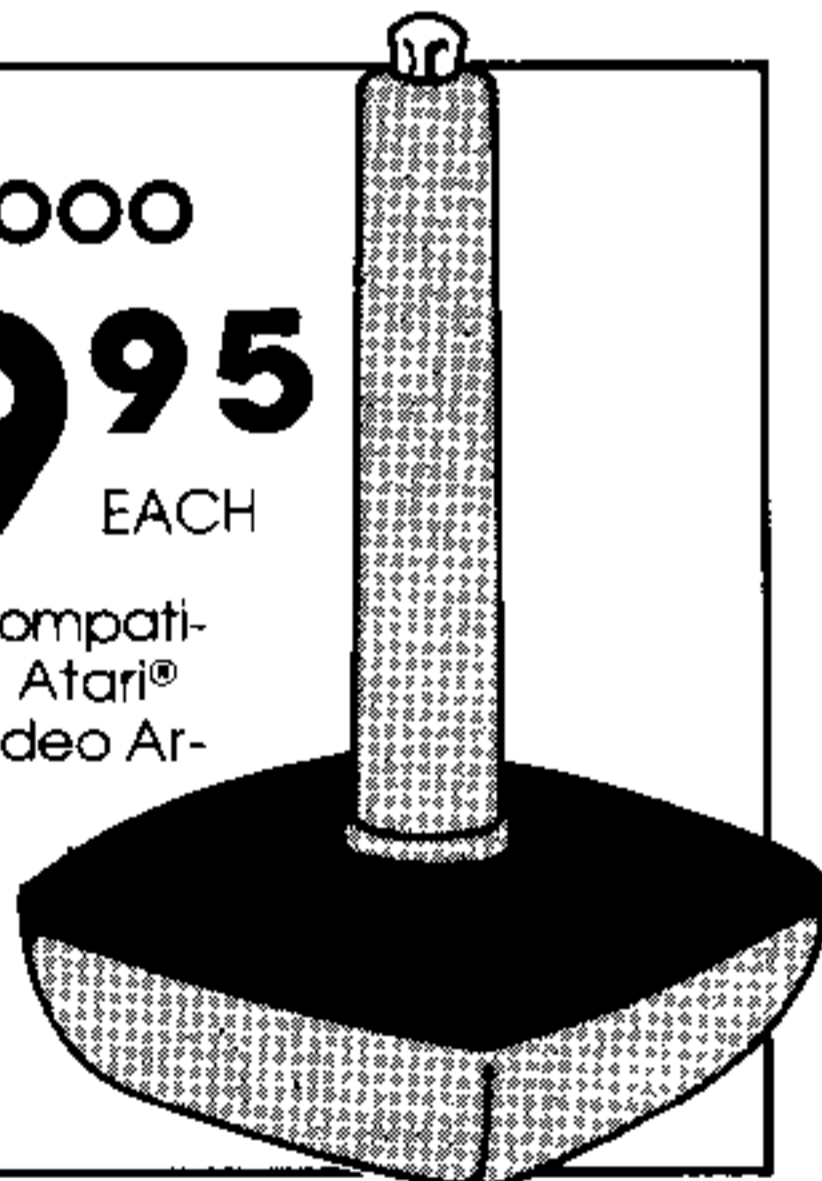
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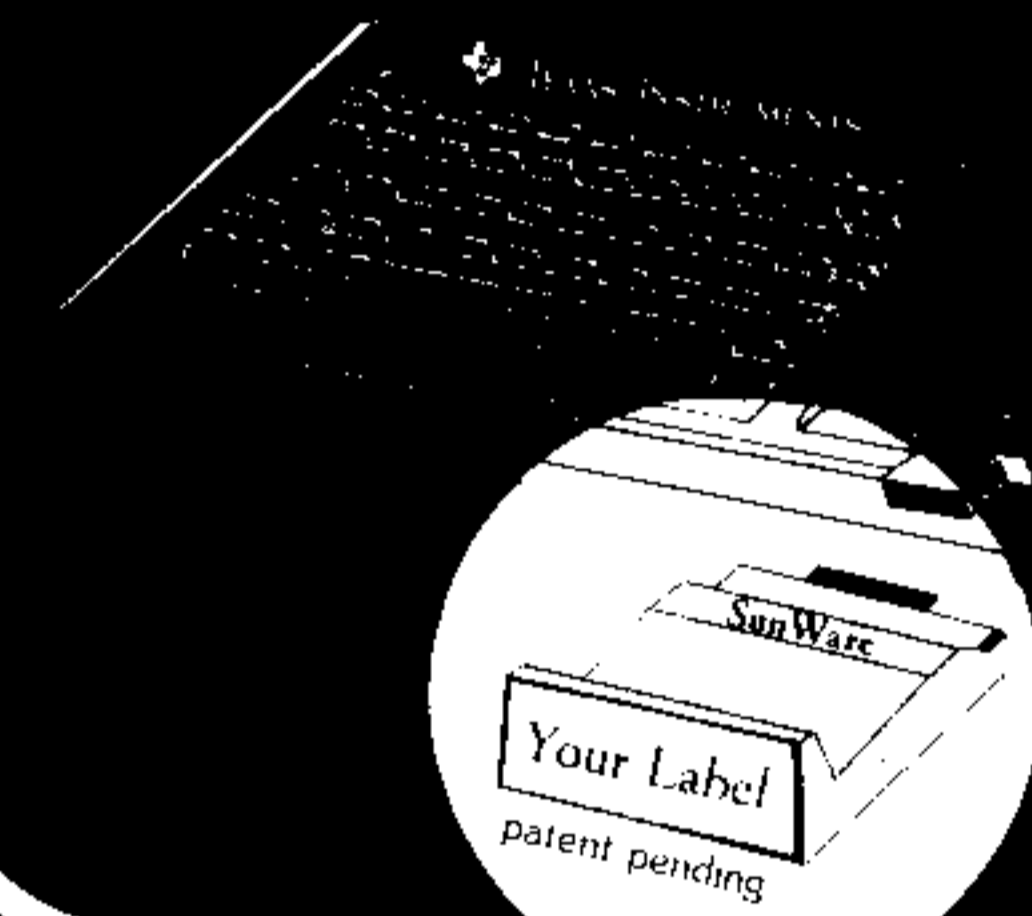
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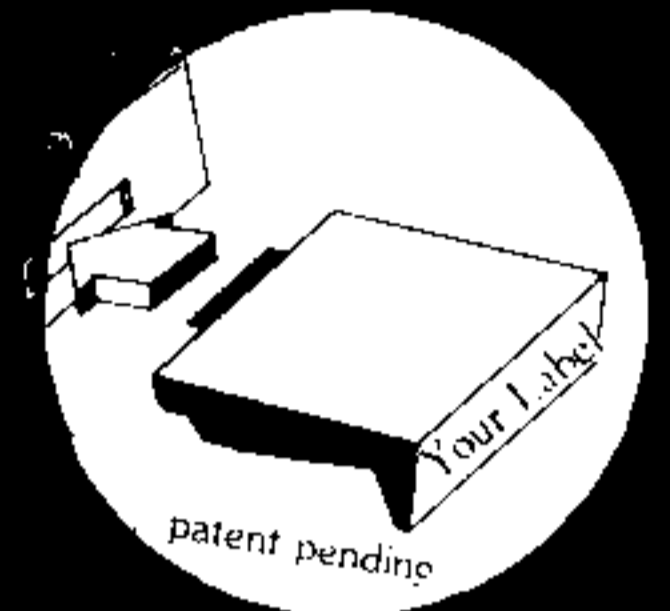
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## MODEL I

SunWare's Model I is a Peripheral Port Cartridge designed for 8KB to 48KB ROM requirements in 8KB increments. In addition, Model I has a **Solid State Disk** (SSD) version that allows up to 2KB RAM.



TEXAS INSTRUMENTS



## MODEL II

SunWare's Model II is a Command Port Cartridge designed for 10KB ROM or 8KB ROM and **2KB RAM**. Model II offers the software developer who has already developed his program for a Command Port Cartridge a speedy entry into the **TI99/4A** installed base.

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## Building . . .

tor. When I've finished developing all the special characters I need, I press the Q key to enable me to SAVE the DATA statements as a program file. I then SAVE the DATA statements as I would SAVE any BASIC program on the VIC-20, i.e., SAVE "filename", devicenumber. The filename I select is the name of the program that will use the special characters. At this point it contains only the DATA statements.

Once I have SAVED the DATA statements as a program file, I must reset the VIC-20 before I can go any further. This is because the Character Editor program changed some very critical Operating System pointers when I pressed the Q key; they must be reset to allow normal operation. To reset the VIC, just turn it off and back on again.

Next I LOAD the program file I just SAVED. The program in memory now contains only the DATA statements, and I just build on to it as I would any BASIC program I'm typing in.

## Using Programmable Characters in Your Program

Many VIC-20 users don't realize that it's possible to generate displayable characters other than those available from the keyboard. The users manual that accompanies most VIC-20's doesn't mention it, but it's possible, and actually quite simple, once you understand the method.

The VIC-20 normally gets all the character description information from ROM (Read Only Memory). This ROM can't be changed, so the only way we can program our own characters is to tell the VIC to get its character information from somewhere else—from an area of RAM (Random Access Memory). Then we have to figure out where in RAM we want to store the character definitions. On the VIC-20 with no memory expansion, there is only one reasonable place to put them, and that is in a 512-byte area of RAM beginning at address 7168. We can tell the VIC-20 where to find its character definitions by POKEing 36869 with 255.

When we use this 512-byte area of RAM, we actually do two more things that we must be aware of. We reduce the BASIC programming area by 512 bytes, meaning we have less room in which to build our program; and since we now have only 512 bytes of storage for character definitions, we have a maximum of only 64 characters available for display. This is because each character definition requires eight bytes, and 512/8 equals 64.

Reducing our BASIC programming area by 512 bytes may seem unreasonable to VIC-20 owners, who climb mountains to save every possible byte, but if you want programmable characters, it is absolutely necessary. Because we are taking this area away from the BASIC Operating System, we must notify it of our plans so that it will not try to write over our program-

mable characters. We do this with the following command:

**POKE 52,28:POKE 56,28**

Finally, we must POKE valid character definitions into this 512-byte area of RAM. Remember that we can use only 64 characters. (For most programs this should be plenty.) I usually copy the first 64 characters from the ROM into my area of RAM. These are the characters displayed when you POKE a value between 0 and 63 to screen memory (this includes all the alphabetic and numeric characters), and they are adequate for most programs. To copy these definitions, use the following BASIC lines:

**FOR I=7168 TO 7679 POKE I,PEEK (I+25600):NEXT**

The last thing we need to do is put the character definitions contained in the DATA statements created by the *Character Editor* program into this 512-byte area of RAM. When we POKE these definitions into RAM, we will be writing over the definition of one of the first 64 POKE characters, so we must be sure to write over only those characters that will not be used in our program. This usually means that we will not want to change any of the alphabetic or numeric characters. Consequently, we have a selection of some 28 characters left that we can change. As an example of how this might be done, consider the next few lines of BASIC code:

# TI-99/4A

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tools. There's no complicated code to decipher, no x-y coordinates for screen positions to figure out, no tedious shape definitions to generate, no interminable menus to run through. Pick up a part. Move it across the screen. Pick up a tool. Work on the part. Simple and straightforward. After you've put things together to your satisfaction, you can then make your computer simulate the action of the pinball game you've devised. The graphics are good, but the resolution of the computer you're using determines their sharpness. They seem to be somewhat better on the Apple than on the Commodore C-64. You'll notice that the parts change color if you move them just one pixel, due to the color resolution of the computer.

The response of the simulated pinball machine is very like the real thing. After a ball caroms off a bumper, it slows as it hits the apogee of its flight, hesitates slightly, and picks up speed as it falls again towards the bottom of

the playing field. In the Commodore version of PCS, however, the balls sometimes had a tendency to hang up on the parts. By choosing the world icon, you can alter all of those responses. You can make the playing field seem like a pool of molasses, with cotton balls bouncing off tissue paper walls onto slo-o-o-w motion flippers.

The documentation for the game is surprisingly good. It is, first of all, informative, but beyond that it is clear and lively, without lapses into the technospeak that fills so many manuals. And in a world of manuals with paragraph 4.1.2.a followed by column after column of dull grey text, the layout and color artwork in this booklet are a delight. (One quibble: It doesn't have an index, and finding out how to set a game up for more than one player took some determined searching.) The irony is that you hardly need any documentation to develop and play games with this software. The in-

tent here is to encourage participatory learning, with the DEMO games serving as scratch sheets on which to practice moving parts around, altering the world, changing the connections—all without having to invent a complete game from scratch.

As with all programs, this one does have its flaws. The lack of a tilt switch or ball reset button seems like an unfortunate oversight. This is especially noticeable when the ball gets stuck mysteriously between two parts on the playing field without allowing you to do anything but a full reset of the game. But you can always go into your game and redesign it. The default sounds of the various bumpers and slingshots leave something to be desired, too. Fortunately, you can change from one preset sound to another if it irks you. All in all, PCS is something more than a video game, something less than a software development tool, and thoroughly engrossing.

HCM



# Group Grapevine

News, information and upcoming events of home computer users groups around the world.

Looking to join a users group, exchange newsletters or software, increase your users group's membership or pep up your next meeting's agenda? For the latest users group news, put your ear to the Group Grapevine. And if you have a message to put out to other groups, if you are starting a new group, or have an interesting item to share, send a note or picture—or better yet, a group newsletter—to the Users Group Editor, Home Computer Magazine, 1500 Valley River Drive, Suite 250, Eugene, OR 97401, (503) 485-8796.

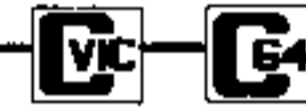


Raines Cohen started the **Newton Apple Kids** because the adult Apple users groups in his area were too business-oriented. What kinds of things do the Apple Kids do? Well, at their last meeting they had an arcade game competition—squaring off into two teams and battling through trials of several games. (Sounds like more fun than your last meeting, doesn't it?) That's probably why the Apple Kids now count a few older "kids" among their members. But the NAK is not just a fun-and-games organization. They also discuss programming questions at their meetings. They are developing an electronic bulletin board (to be called sNAK Bar), publish a quarterly newsletter, and run a special interest group on Assembly Language. And now the 100-member group is embarking on an exciting new venture: They have formed a group called **Computer Kids International** that is to include other young computer users groups all over the world. This will not, incidentally, be limited to Apple computer users. Any groups of young computer enthusiasts who would like to correspond with the group can contact Peter Fishman at 77 Rockport Rd., Weston, MA 02193.

The FBI showed up at the last meeting of the **Fort Wayne Apple Computer Users Group**. No, the group wasn't logging onto the MasterCard data base or playing war games with the Pentagon. Their only crime was an interest in computer criminals, and they provided a captive audience to the FBI representative who spoke on the topic. According to group spokesman Joe Kucharski, the speaker described what type of individual was most likely to commit computer crimes (no references to specific machine users were allowed) and mentioned some staggering amounts of dollars that are lost to foul-computer-play. This 4-year-old, 200-member group has special interest groups on machine language, Pascal, and educational software. You can reach them at 5233 Hampstead Lane, Fort Wayne, IN 46815.

The **Crescent City Computer Club** is one of many Apple groups who enjoyed demonstrations of the Macintosh this month. According to Dr. Jim Abbott,

the group was quite favorably impressed with the Macintosh's ability to jump from operations in one mode to another—allowing you to slip from your word processor program into a statistics program into a graphics mode without skipping a beat. The Crescent City Computer Club is a conglomerate organization of several machine-specific users groups. The group has been around since the "old days," 1976. As Abbott says, "I can remember how excited we were when we saw our first memory dump." Among the many projects the group has undertaken are the development of an intelligent keyboard and assisting a young computer whiz who is constructing his own robot. Contact the group in care of Dr. Abbott at the Department of Mathematics, University of New Orleans, New Orleans, LA 70148, (504) 283-3819.



Standing room only is the description we received of a typical meeting of the **Compucats' Commodore Computer Club** of Aberdeen, MD. This large and active group draws in the crowds with its dynamic programs and demonstrations. At each meeting there are as many as 10 machines up and running for demonstrating and trying out software. Recent presentations include: a demonstration of *Solo Flight* (for the C-64) by MicroProse, a lecture and demonstration of how to integrate your home computer with your videocassette recorder to superimpose captions and subtitles on the screen, and a presentation on using program characters to simulate the space shuttle take off. The group is located near the Aberdeen Proving Grounds military facility so there is an international flavor to its membership. This leads to an interesting exchange of ideas, and exposes members to such exotic creations as a program to print the Greek alphabet. In addition, these computing felines are justifiably proud of their newsletter **Compucat Chronicles** which has, according to them, managed to scoop some of the "big magazines" (please, no names) on such stories as the Commodore disk drive problem. To reach these crazy compucats, contact Betty Jane Schueler at 680 W. Bel Air Ave., Aberdeen, MD 21001, (301) 272-0472.

The **Kankakee Hackers** saw a demonstration of the Executive 64 at their last meeting. According to Rich Westerman, this suited the business-oriented hackers just fine. Future projects for the group include an electronic bulletin board. You can reach this group at RR#1, Box 279, St. Anne, IL 60964, (815) 933-4407.

According to Jim Mather of the **Westmoreland Computer Users Group**, a users group must have a "generic" title in order to qualify for non-profit status (and all the special privileges that includes)—hence the non-specific title of this distinctly Commodore-ic group. At their last meeting, members enjoyed a

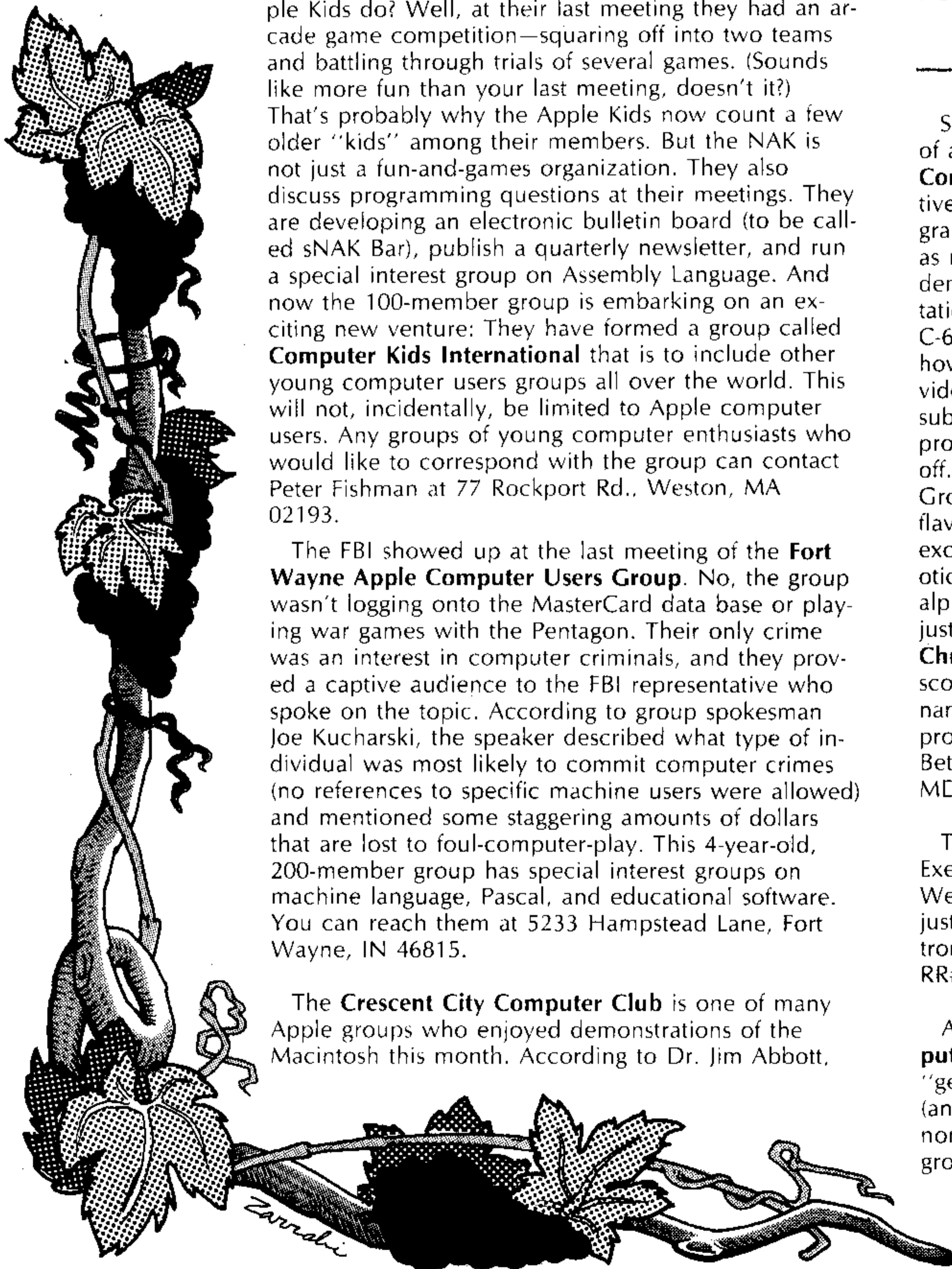
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demonstration and talk on disk maintenance by a representative from *Verbatim*. Disk drive maintenance is the topic of their upcoming meeting. This 230+ member group has held workshops on such topics as machine language, spreadsheets, and even building your own computer. Contact them at 3021 Ben Venue Dr., Greensburg, PA 15601, (412) 836-2224.

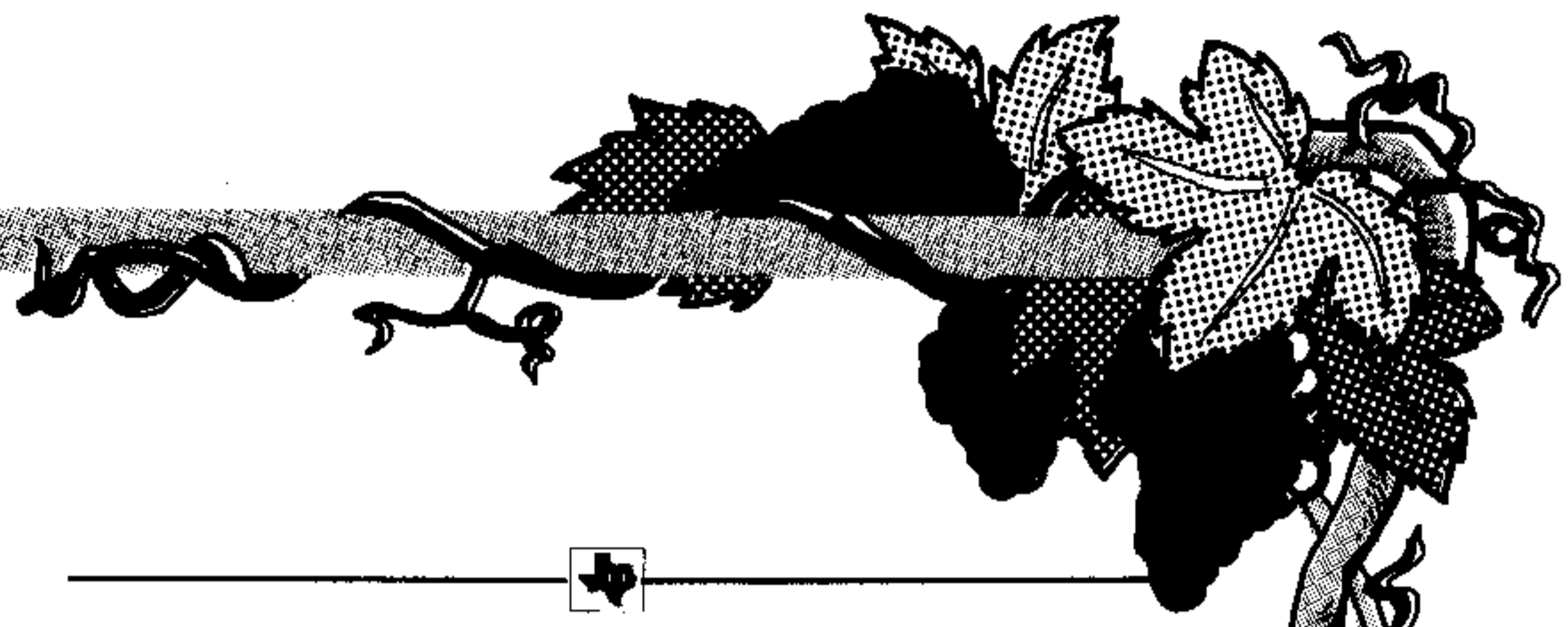
The Koala Pad was the focus of the last meeting of the **Mid-Missouri Commodore Club**. A local artist was on hand to demonstrate how the popular pad could assist in illustrating several nursery rhymes for children. At their next meeting, the group will see a demonstration of a machine language music program that displays musical notes on the screen as it plays. You can reach this group in care of Jim Bishop at 1804 Vandiver Dr., Columbia, MO 65201, (314) 474-4511.

The **Commodore-64 Users Group** in Clearfield, Utah, got down to basics at their last meeting with a lecture on binary numbers. They also enjoyed a presentation by Bruce Carver of Access software (the developer of such programs as *Beach Head*, *Neutral Zone*, and *Spritemaster 64*). Their next meeting will be centered on the theme of data bases. Demonstrations of Mirage Concepts' data base manager, *Flex File*, *Omni File*, and *Info Base 64* are bound to get this theme party off to a rousing start. Those interested can contact the group through Rodney Keller at 652 West 700 North, Clearfield, UT 84015, (801) 776-3950.



With regard to the PCjr, Gary Wilcox, of the **IBM PC Users Group** in Des Moines, Iowa, is typical of the PC users group people we have heard from. He is taking a wait-and-see attitude as to whether or not his PC group will incorporate PCjr users. There are many pros and cons: First of all, most PC owners are perfectly happy with their machines and not especially enthusiastic about allotting meeting time to the PCjr—except to discuss such topics as whether or not PCjr software will be compatible with the PC. Second, as a member of the **Modesto-Turlock PC Users** pointed out, most PC users are home users who are fairly savvy about using their machines. She doubts they will have much in common with the many neophyte computer users the PCjr is bound to draw in.

On the other hand, it *will* draw them in, and an influx of many, many members can mean exciting things for a user group. Do PC groups want to miss out on an influx of new, eager-to-learn IBM users? After all, they are members of the same family. It remains to be seen whether the PCjr will find a place on the PC groups' agenda or spawn its own network of users groups. We haven't heard of any PCjr-specific groups yet, but we will report on them here as soon as we do. Any PC groups with new insight into the matter are encouraged to write or call. We'll be happy to report your viewpoint in the next installment of Group Grapevine.



How is your group's library doing? Do back issues of *HCM* seem to periodically disappear? How about that guy who keeps promising—and forgetting—to return your only copy of *Hopper*? And your vice president seems to be writing the Great Nebraskan Novel with your communal *TI-WRITER* cartridge.

Software libraries are an important component of most users groups. They provide a strong incentive for new members to join and are a substantial money-saver for everyone in the group. But like wayward children and tomato plants, user group libraries require structure and limitations in order to thrive.

Don Veith of the **TEX-BUG** users group (3535 So. H St., #93, Bakersfield, CA 93304) writes that he has managed his group's library quite successfully using his Software Loan Agreement form. Don's form spells it all out: loan period, condition of materials, and penalties (which are stringently enforced). He reports that items are now consistently returned on time in TEX-BUG country. Incidentally, Don's other group, **WRUGA** (the national association of TI users groups), has changed its name to **99 U.G.A.**, the **99'ers Users Group Association**. Don reports that their newsletter, which reports on software available for the 99/4A (among other things) is now reaching 80% of TI users groups.

Back on the subject of libraries, the **Nine T Nine** users group in Toronto has a practical policy for managing (and enlarging) their library. For every program members submit to the library, they receive two free. Also, like many groups, the 9T9'ers have a special "cut-rate" membership fee for those who can't attend meetings but just want to use the library (and receive the newsletter). A handy reference list of each item in the library (with a short description) appears on the back page of their newsletter. You can reach this group at 55 Cordella Ave, Toronto, Ontario M6N 2J7, (416) 743-3868.

The **Mid-Hudson 99/4A Home Computer Users Group** takes its meeting presentations seriously. They are recording their meetings on videocassette so members can improve their presentations. This means members who can't attend meetings can enjoy the proceedings at home (and make fun of their friends' oratorical styles). It also provides an indisputable record of who volunteered for what, and a reference library of presentations by outside speakers. The group's address is RD 1 Box 359-5, Kingston, NY 12401.

Finally, a major event is in the works for the large and powerful **Cin-Day Users Group** in Cincinnati. They are preparing to hold the first annual *Midwest Computer Fest* in the fall. Group president Ed York is inviting all dealers, distributors, and manufacturers of products for the 99/4A to contact him about showing their wares at the show. And if they will be unable to attend, he will try to arrange for a "substitute rep" to show their product for them. Ed is expecting a big (2000 or more) turnout, so contact him for details at P.O. Box 519, West Chester, OH 45069, (513) 777-0110.



# Letters

to the Editor ... from p. 7

60-minute tape? Do you also know what the equivalent would be on the tape counter, how many lines of a program would take up a count of 50 on the counter or vice-versa? I know this sounds confusing and may actually have a simple answer but I cannot find any of this information.

Mrs. Dawn Gorsuch  
No. Ridgeville, OH

*The simplest answer to your question, Dawn, is to take advantage of our new ON TAPE<sup>TM</sup> offer and leave the recording to us... But for the cases where you want to save programs you have written, we will try to answer your questions more specifically.*

*First, the space you leave between programs is not critical. Generally, 5 seconds or a count of 3 or 4 on the tape counter is sufficient. Next, your tape deck will automatically stop at the end of each program if the remote motor control of your deck is compatible with the remote control from your computer. If your deck is not compatible, you'll either need to purchase a TEX-SETTE<sup>TM</sup> adapter [see page 125] to insure compatibility, or operate your deck manually. Regardless of the mode of operation, your computer knows when it has reached the end of a program and will ignore any subsequent data.*

*Because the length of program lines vary greatly, it's difficult to estimate how much time a number of lines would take to record. A program can be almost 3 minutes (or a count of 70) long. Usually, feature programs which appear in HCM will average about 2 minutes in length. It is a good idea not to use a cassette tape that is larger than size C-30 (15 minutes per side). The longer playing tapes may be made with thinner material which can stretch with time and possibly cause data errors.*

## A Home Convert

Dear Sir:

You've got to be reading my mind! I've been using the 99/4A for two years, but in December I purchased an Apple IIe, and I've been both searching for a magazine that would help me with the Apple as the old 99'er Magazine did with the TI, and wondering why I wasn't receiving 99'er.

Needless to say, I am delighted with the new Home Computer Magazine, which speaks to both my needs.

Now, if you'd do one more thing for me, I'd really be in byte heaven. Please do some of your excellent articles showing how to translate from TI BASIC and Extended BASIC into Applesoft and Integer BASIC. I have a load of TI programs (many of them from your magazine) that I'd like to translate, but I need help.

Again, thanks for your newest metamorphosis.

George Perrine  
Louisville, KY 40243

*George, you are not the only reader with more than one home computer. We have heard from many users who own either Commodore or Apple and TI. To produce HCM with its in-depth coverage of all these machines costs a bit more, but you're worth it!*

*To help you in translating TI BASIC to AppleSoft BASIC, we recommend the language conversion article AppleSoft to TI BASIC which appears in chapter three of our new book Best of 99'er Vol. 1 (see page 73). This article describes the major differences between the two languages, and how to resolve those that can be resolved. It will put you well on your way.*

*Translating programs from one machine to another is always a challenge. In some cases,*

*where special machine features are utilized (such as sprites), direct translation may be impossible. Good luck and don't forget to enjoy the many Apple programs we will be publishing right here in HCM.*

## A BASIC Need

Dear Sir:

Why did IBM put all of those nice graphics and sound capabilities in the PCjr and not supply a BASIC language resident in the system that can access them. Do I need to spend another \$75.00 on Cartridge BASIC just to use the system's capabilities? Is there any way to get around this limitation? I would really appreciate any help you can offer in this area.

Albert Rice  
Seattle, WA

*The reason IBM chose Cassette BASIC as the resident system language was to keep compatibility with its big brother, the IBM PC. There are ways to get around the need for Cartridge BASIC, however, and access the system's capabilities. In this issue, there is an article which shows how to access the TI sound chip from Cassette BASIC using the OUT statement. The OUT statement is to I/O ports what POKE is to a memory address. Many other features are accessible with this statement, and in future issues we will be covering some of these areas. There still is no replacement for Cartridge BASIC though. The powerful commands offered in Cartridge BASIC would take a lot of code and programming time to simulate in Cassette BASIC.*

## Support Comes Forth

Dear Sir:

I recently read about something called an AP Modular Pak that was supposed to convert a Commodore 64 to a completely Apple-compatible machine. This may be of interest to your C-64 readers, but it is of little use for my TI-99/4A. I was wondering, however, if there was something similar available or in the works for the TI. Also, I have been considering adding Forth to my TI and I noted several versions for the 99-4A in your latest issue (one from Wycove Systems and the TI version from Tex-Comp). How about a review of the different versions available for the TI and an article on this very fast computer language.

Finally, I would just like to say how much I enjoy your new magazine format and that I'm glad to see you back. I enjoyed reading about computer systems other than my own, and, as you promised, there is no loss of TI material from HCM. I'm glad to see third-party distributors fill in the gap left by TI's departure. I hope that the market place will now be more open for new third party software and especially hardware for the TI, and I hope that your new advertisers that specialize in Apple, Commodore and IBM will bring their expertise to bear on products for the TI-99/4A.

Stephen Foley  
Lexington, KY 40502

*Thank you for your kind words, Stephen. We too share your hope for increased third-party support. Watch for future language reviews.*

## Support Needed Down Under Too

Dear Sir:

I am writing on behalf of the TISHUG (TI Sydney Home Computer Users Group). We have just heard from TI Australia that they shall keep up service for at least 5 years. We know that TI

depends on its customers, so we have put together a petition and got it signed by all our members and given it to TI to make sure that they keep their promise of keeping up service. Getting to the point of this letter, we would like to see other users groups send petitions to TI in the USA.

Now writing on behalf of myself, I would like to compliment you on the outstanding standard of this magazine. I have read a back issue I had lying around and saw the listing of the "Poor Man's Program Loader." I found it very useful.

As you might probably notice, this letter has been printed with the TI-WRITER and my newly bought FX-80 printer. I was wondering if you could tell me how to access some of the printer's special functions such as proportional spacing with the TI-WRITER.

Again I would like to commend you for your wonderful magazine.

Steven Shraibman  
Sydney Australia

*Steven, we have found TI to be good with support for all of their products, and have no cause to think otherwise with the Home Computer. On the other hand, it can't hurt to let them know that the support is needed and appreciated.*

*The TI-Writer does not support proportional spacing directly, but the printer's special control codes could be added to the file to be printed, indirectly producing proportional spacing. Study the "transliterate" command in the Text Formatter section of the manual. Greetings to all the members of TISHUG down under!*

## Guns of Navarone Blast Us

Dear Sir:

In your recent review of "Henpecked," Navarone Industries was listed as the distributor, but the address is not our address. Please let your readers know that our correct address is:

Navarone Industries  
510 Lawrence Expressway 800  
Sunnyvale, CA. 94086

*In the credits you state a System Requirement to be assembly language, but later in the review mention that "the program is a good example of the stunning graphics that can be achieved with a self-contained ROM cartridge which requires no additional memory packages, disk drives, or expensive peripherals."*

*Henpecked is now also available through our new "RENT n' PLAY" Club.*

Chuck Humphrey, President  
Navarone Industries

*We stand corrected, Chuck. Thank you for bringing the two errors to our attention. Indeed, Henpecked is provided in a cartridge that will work on the TI-99/4A without any other attachments (except optional joysticks).*

## A LOGO Source

Dear Sir:

Concerning your article in the LOGO Times section on Lyrical LOGO (Volume 4 Number 1). Would you please tell me how I can obtain the TI version.

Mary Presley  
Nowata, OK

*Mary, the back issues of 99'er Magazine that continued the original 99/4A version are collector's items now, but you can find the TI LOGO Poet in The Best of 99'er (page 113) along with other great LOGO programs as well. Look in some of the larger chain book stores for a copy or see the ad in this issue of HCM to order directly from us.*

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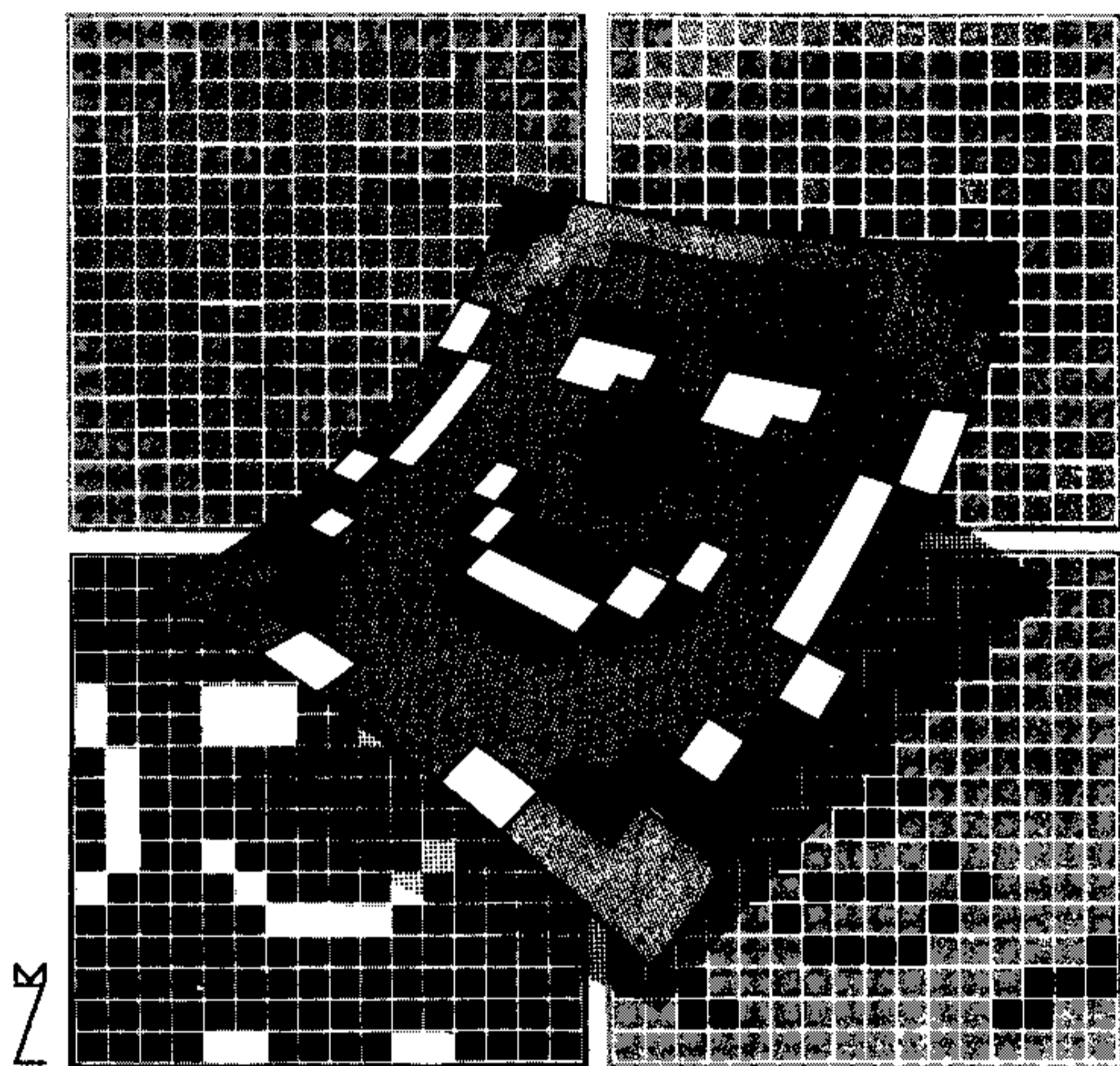


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## A Sprite Tutorial

by W. K. Balthrop  
HCM Staff

If you've ever tried to design your own graphics, you may have been frustrated by the limited number of colors you can display in a small area of the screen. This tutorial will show you how to get more color into your screen displays by overlapping sprites and screen graphics. And our *Sprite Color Graphics* program lets you create a colorful face by layering sprites and using sprite priorities to create animation.

Sprites are graphics shapes that move with the highest resolution of movement possible so that they appear to glide across the screen. The video processor will allow only a set number of sprites to be placed on top of each other without disappearing. (The TI-99/4A allows four, and the Commodore 64 allows eight; the TI video processor, however, will allow up to 32 sprites to appear on screen if the four-in-a-row constraint isn't exceeded.) If more than the allowable number of sprites occupy the same horizontal line on the screen, the sprite with the lowest priority will disappear, until only the allowable number of sprites with the highest priorities remain. The lower the sprite number, the higher that sprite's priority. Sprite #1 has the highest priority on the 99/4A, and sprite #0 the highest priority on the Commodore 64. These disappearing sprites don't create much of a problem and can even be used to your advantage, as you will see in the program below.

At the heart of the TI-99/4A's graphics prowess is the Texas Instruments TMS9918A video processor. One of the most powerful features of the 9918A video chip is its sprite capabilities. Unfortunately, the TI-99/4A computer allows you to use only two colors within a single character position (unless you use assembly language). That restriction, however, does not apply to sprites, which brings us to the point of this tutorial: It is possible to get a wide range of colors in a small area by overlapping sprites and screen graphics. The TI version of *Sprite Color Graphics* will draw a face on the screen using five different colors.

A maximum of six colors can be placed in a single character simply by laying sprites on top of each other. We used only one background color in this program, so our face has only five colors. Had we put a second background color behind the sprites, we would have had a sixth color.

Line 180 of the TI program clears the screen with the CALL CLEAR command and sets it to dark yellow with the CALL SCREEN command. There are no sprites on the screen yet, though it should be noted that CALL CLEAR does not erase existing sprites: Only the *characters* on the screen are erased. CALL SCREEN sets the screen color. The default background color for all of the characters is color #1, which is clear, so that when anything is printed or displayed, only the foreground color will show up.

You can change the foreground and background colors for each of the characters. When the screen is blank, it is actually full of the blank character (#32). If you gave the character set containing character #32 (set #1) a background of dark yellow, then the screen would become dark yellow, except for the borders. The borders would retain their original color. This color is changed by the CALL SCREEN command.

Lines 190 and 250 define the sprites' shapes and assign those shapes to characters. In Extended BASIC it is possible to assign a shape to more than one character with only one statement. Each of the CALL CHAR statements here assigns a shape to four characters. Line 190 assigns a shape to characters 96, 97, 98, and 99. The characters within quotes contain the graphics shape information in a *hexadecimal* representation. This is a numbering system that the computer uses, which counts to 16 in the same way as we count to 10. Think of the computer as having 16 fingers to count on instead of ten. The letters A through F represent those new numbers between 10 and 15. F represents 15, not 16, because the counting starts at 0, not 1. Counting from 0 to 15 takes 16 numbers.

### Shape Definition

It takes 16 of the characters in the quotes to make the shape for one graphics character. There are 64 characters in each of the statements that makes four characters. The only exception to this is in lines 240 and 250, which have only 62 characters in each statement. This is because the last two characters would have been 00. Whenever there are trailing zeros in the CALL CHAR statement, you can leave them

off. However, you need at least one zero to assign a shape to the character. For example, if line 190 had only 48 characters in the definition, then the fourth graphics character would not be defined. If a 49th character were added, then the fourth character would be defined with its upper left corner defined to the shape prescribed by the 49th character in the statement.

Line 260 sets character set #12 to a black foreground and background. Character set #12 includes characters 120 to 127. All of these characters will now be displayed as a solid black block. Character 120 is then placed in the center of the screen in line 270. The CALL HCHAR statement has a fourth, optional parameter, which lets you repeat the character any number of times you wish. Here we repeat the character four times and use the CALL HCHAR statement four times to produce a 4 x 4 black block. The sprites we create later will be placed on top of this block.

Line 280 sets the magnification of the sprites to 4. At this magnification each sprite will be made up of four characters and will also be double its normal size. This makes the sprite four characters high and four characters wide. Try experimenting with different values (from 1 to 4) in this statement to see the effects of the CALL MAGNIFY command.

Line 290 places the four highest-priority sprites at the edge of the screen. With these four sprites at the edge, any sprites with lower priorities placed on the same horizontal line will be invisible. Remember, the 99/4A computer displays only the four sprites with the highest priority. The next four sprites we place on the screen (in lines 300-330) will not be visible yet because the four sprites at the edge have lower sprite numbers, which gives them higher priorities. Line 340 will wait for you to press [ENTER] and then set one of the four sprites at the edge in motion upwards. As this sprite moves up, in the center of the screen one of the sprites that makes up the face gains priority and starts becoming visible. If you press [ENTER] again, a second sprite at the edge will start moving up, giving priority to a second sprite in the face. This continues until all four sprites at the edge of the screen have moved away. To make sure the last sprite moves all the way to the top of the face, the time delay loop in line 350 will wait and then delete all four of the sprites that were used at the edge.

The last part of this short program adds a bit of animation to the face by changing the pattern of the sprites. You may have noticed that in lines 190 to 250 we defined enough shapes for seven sprites, but we used only four in the face. The other three shapes will be assigned to the sprites that make the face appear to change. Lines 370, 380, 400, and 410 will cause the eyes to roll back and forth. Lines 390 and 420 will make the mouth open and close. Notice that when the mouth opens, it's black inside. Remember the black characters we put down under the sprites? That black was there all along.

To lend a little more excitement to the face, line 430 contains a variable time delay loop. After each shape has been updated in lines 370 to 420, the variable for the time delay loop is set. A GOSUB takes the program to the subroutine temporarily, to help slow things down. You may want to experiment with the delay times by changing the value assigned to the variable D. The larger the number, the slower the response. You might also want to alter the sequence of changes, or even make them random. There are all sorts of exciting things you could try. Have fun, and happy computing!

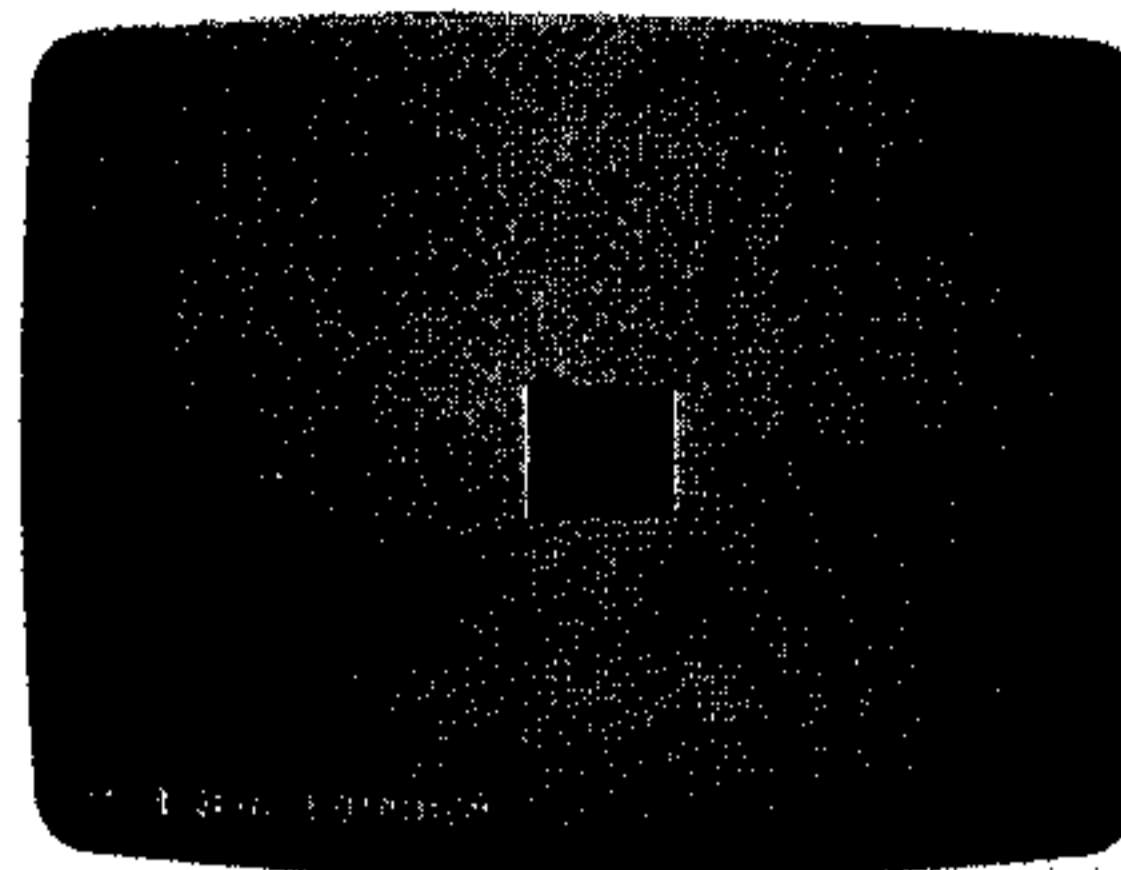
Continued on p. 45



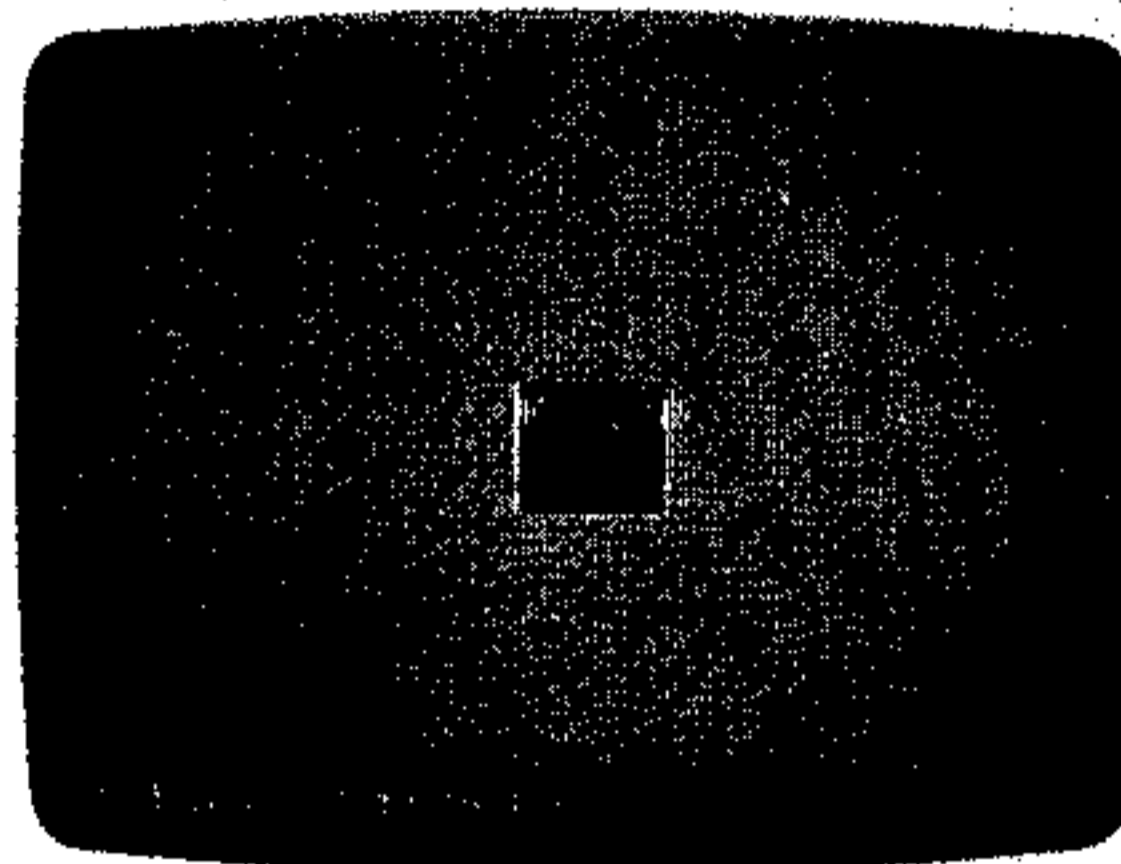
The Commodore 64 home computer offers BASIC programmers a number of methods for creating spectacular graphics. You can use the resident character set, or you can define graphics characters of your own. In the normal graphics mode, you can assign any one of the sixteen colors to a character, but you are limited to one color for the background. In the multicolor mode, you can choose any one of four colors to assign to a pair of pixels (a pixel is the

Continued on p. 44

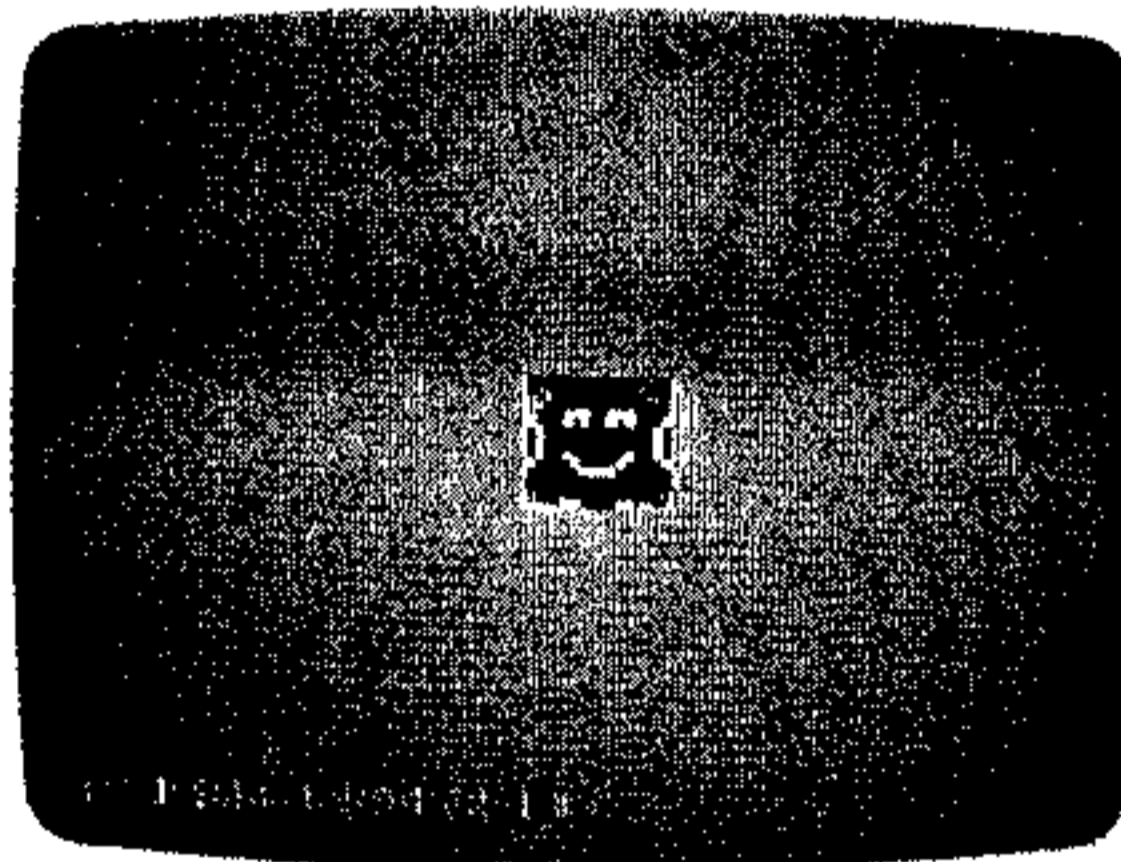
**Photo 1:** The black square is placed on the screen to help make the face construction more visible. Here you see the first sprite, colored red, placed over the box. At this point all four sprites are on the screen. They are kept invisible by the four higher priority sprites at the edge of the screen. Press [ENTER] to see the second sprite appear.



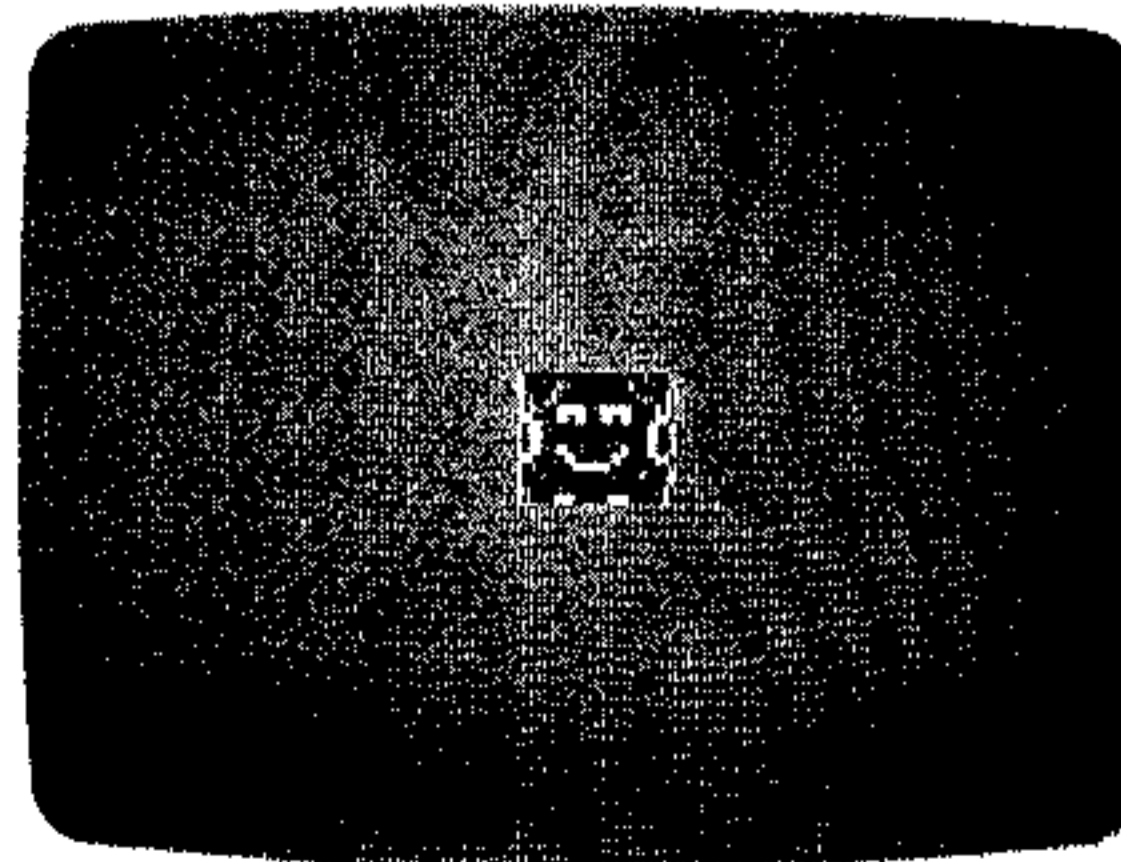
**Photo 2:** The second sprite is blue and is used to create the hair, the center of the eye, and the collar. Later in the program this sprite's shape will be changed so that the eyes appear to move from left to right and back again. Press [ENTER] to have the next sprite displayed.



**Photo 3:** The third sprite is white and is used to finish the eyes, fill in the mouth, and make the ears. Press [ENTER] to see the last sprite appear on the face.



**Photo 4:** The last sprite to make up the face is light red. This sprite is used to fill in the rest of the face. You will not need to press [ENTER] anymore. From this point the program goes into an animation sequence which moves the eyes and mouth.



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490	DATA	0	0	0	0	0	0	0	0	0	0
500	DATA	0	0	0	0	0	0	0	0	0	3,12
510	DATA	1	255	128	0	126	0	0	0	0	0
520	DATA	0	0	0	0	0	0	0	0	0	0
530	DATA	0	0	0	0	1	129	128	0	0	0
540	DATA	0	0	0	0	0	0	0	0	0	0
550	DATA	0	0	0	0	0	0	0	0	0	0
560	DATA	0	0	0	0	0	0	0	0	0	0
570	DATA	0	0	3	195	192	7	231	224	3	195
580	DATA	0	0	0	0	0	0	0	0	0	0
590	DATA	0	0	0	0	0	0	0	0	0	0
600	DATA	0	0	0	0	0	0	0	0	0	0

COMMODORE 64											
610	DATA	0	0	0	0	0	0	0	0	0	24,0,0
620	DATA	0	0	60	0	60	0	0	126	0	0,0,0
630	DATA	0	0	0	0	0	0	0	0	0	0
640	DATA	0	0	0	0	0	0	0	3	255	192,15
650	DATA	255	240	31	248	60	60	60	56	24	28,60,6
660	DATA	60	63	231	252	63	231	195	252	63	1
670	DATA	29	252	31	255	248	28	126	56	7	255,224
680	DATA	3	255	192	0	255	0	0	0	0	0
690	DATA	0	0	0	0	64	0	2	192	0	3,192,0
700	DATA	3	0	0	0	0	0	0	0	0	0
710	DATA	0	0	0	0	0	0	0	0	0	0
720	DATA	9	2	3	1	7	10	13			

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### Double Your Color . . . from p. 43

#### SPRITE COLOR GRAPHICS (TI)

Line Nos.	Explanation of Program
100-170	Program header.
180	Clear the screen.
190-250	Define sprite shapes.
260-270	Make the characters for the box black and place the black box in the center of the screen.
280	Set sprite magnification to 4.
290	Place the four blocking sprites on the screen.
300-330	Display the four sprites which make up the face.
340	Scroll the blocking sprites off the screen.
350-360	Delete the blocking sprites when the scrolling is finished.
370-420	Recursive routine to move the eyes and the mouth.
430	Time delay loop.

#### TI-99/4A

100	REM	*****
110	REM	* SPRITE COLOR GRAPHICS *
120	REM	*****
130	REM	BY WILLIAM K. BALTHROP
140	REM	HOME COMPUTER MAGAZINE
150	REM	VERSION 4.2.1
160	REM	TI EXTENDED BASIC
170	REM	
180	CALL	CLEAR :: CALL SCREEN(11)
190	CALL	CHAR(96,"000F1F3F7171FFFFFFF37
200	CALL	CHAR(100,"3F70E0C0800200000000
210	CALL	CHAR(108,"3F70E0C0800400000000
220	CALL	CHAR(112,"00000008E8E40404048

#### TI-99/4A

230	CALL	CHAR(116,"3F70E0C0800800000000
240	CALL	CHAR(124,"0000000E000101030104
250	CALL	CHAR(132,"0000000E000101030104
260	CALL	COLOR(12,2,2)
270	CALL	HCHAR(11,15,120,4)::CALL HCHA
280	CALL	MAGNIFY(4)
290	CALL	SPRITE(#1,32,1,81,255,#2,32,1,
300	CALL	SPRITE(#5,124,7,81,113)
310	CALL	SPRITE(#6,108,6,81,113)
320	CALL	SPRITE(#7,112,16,81,113)
330	CALL	SPRITE(#8,96,10,81,113)
340	FOR	X=1 TO 4::DISPLAY AT(24,1)BEE
350	FOR	X=1 TO 1000::NEXT X::CALL D
360	DISP	LAY AT(24,1)::
370	CALL	PATTERN(#6,100)::D=70::GOSU
380	CALL	PATTERN(#6,108)::D=20::GOSU
390	CALL	PATTERN(#5,132)::D=10::GOSU
400	CALL	PATTERN(#6,116)::D=70::GOSU
410	CALL	PATTERN(#6,108)::D=20::GOSU
420	CALL	PATTERN(#5,124)::D=10::GOSU
430	FOR	ID=1 TO D::NEXT ID::RETURN

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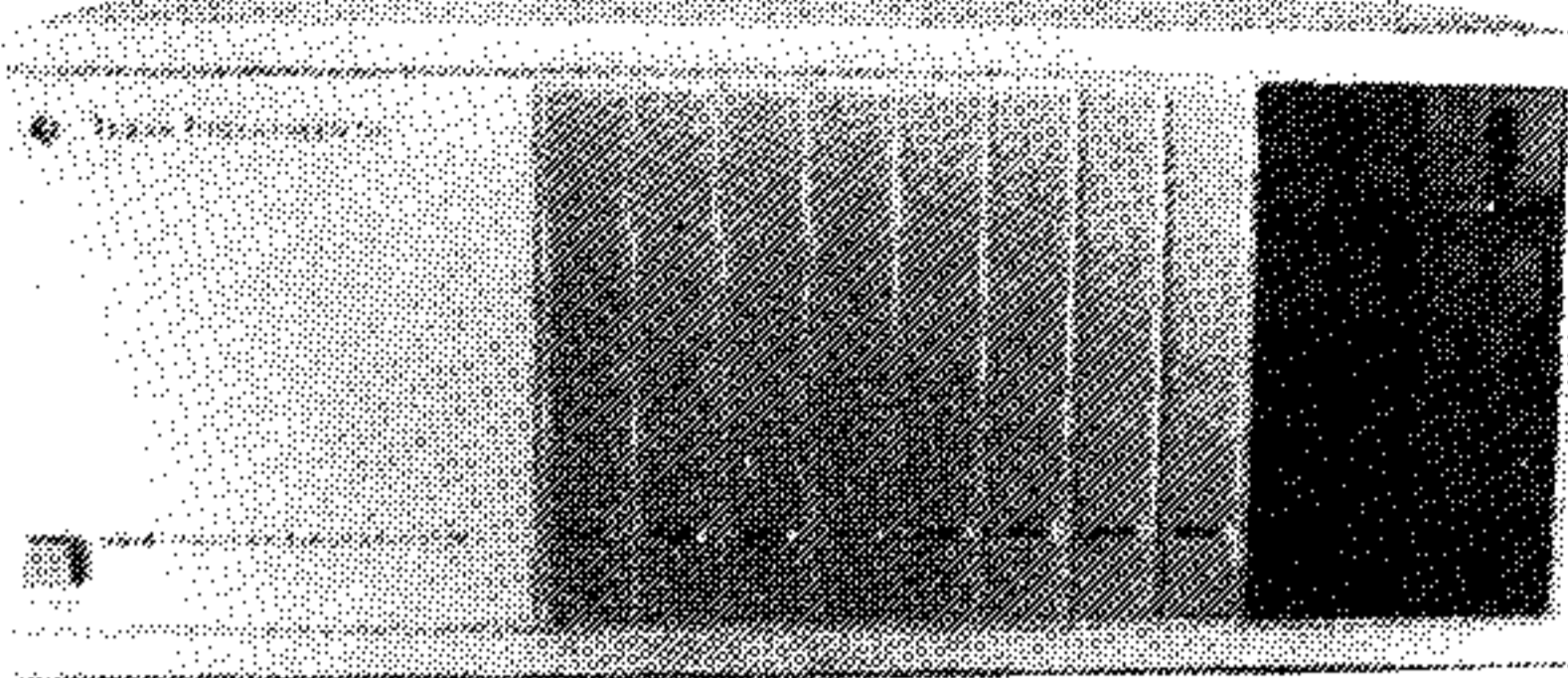
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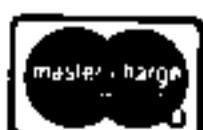
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Building . . . from p. 23

## VIC-20 CHARACTER EDITOR (VIC-20)

Explanation of the Program

Line Nos.	Explanation of the Program
100	Lowers BASIC programming area.
110	Copies ROM characters to RAM.
120-130	Reads in special characters.
150-260	Main program loop.
270-390	Subroutine to input cursor direction information.
400-450	Moves cursor.
460-550	Updates character behind cursor and character above assembly grid.
560-570	Subroutine to print decimal codes on screen.
580-600	Part of End of Program routine.
610-650	Subroutine to put assembly grid on screen.
660-690	Subroutine to flash cursor.
700-750	Initialization routine.
760-950	Converts character definitions to DATA statements.
960-990	End of program routine.

*DON'T type in lines 30 to 90. The title of the program is required for copyright purposes, but its inclusion will make the program too big for the VIC-20's memory.*

### VIC-20

```

30 REM ** ** ** **
40 REM ** CHARACTER EDITOR **
50 REM ** ** ** **
60 REM BY JOHN THRASHER
70 REM HOME COMPUTER MAGAZINE
80 REM VERSION 4.2
90 REM V20 BASIC
100 POKES 52, 27: POKE 56, 27: CLR: PRINT "SHIFT"
110 FOR I=7168 TO 7679: POKE I, PEEK(I+25600)
120 FOR I=7376 TO 7376+(2*8)-1: READ A: POKE I
130 DATA 255, 129, 129, 129, 129, 129, 129, 25
140 INPUT "CONTROL BLK"; C: CRSDOWN "2"
150 PRINT "SHIFT"; CLR: GOSUB 700
160 DIM CR(1, 2): S=30720: CL=0
170 GOSUB 620: GOSUB 610
180 GOSUB 660
190 GOSUB 270
200 GOSUB 400
210 X=PEEK(197): IF X=64 THEN 180
220 IF X=28 THEN 560
230 IF X=51 THEN 170
240 IF X=20 THEN 760
250 IF X=48 THEN 580
260 GOTO 180
270 X1=0: Y1=0: FB=0: POKE 37154, 127: XT%=PE
EK(37152) AND 128: POKE 37154, 255
280 IF J$="N" THEN 330
290 XT%=XT% OR (PEEK(37137) AND 127)
300 X1=SGN(XT% AND 16) - SGN(XT% AND 128)
310 Y1=SGN(XT% AND 4) - SGN(XT% AND 8)
320 FB=1 - SGN(XT% AND 32): RETURN
330 KY=PEEK(197): IF KY=64 THEN RETURN
340 IF KY=41 THEN X1=-1: RETURN
350 IF KY=18 THEN X1=1: RETURN
360 IF KY=49 THEN Y1=-1: RETURN
370 IF KY=26 THEN Y1=1: RETURN
380 IF KY=32 THEN FB=1
390 RETURN
400 IF X1=0 AND Y1=0 AND FB=0 THEN RETURN
410 IF CR(1, 1)=8 AND Y1=1 THEN Y1=0
420 IF CR(1, 1)=1 AND Y1=-1 THEN Y1=0
430 IF CR(1, 2)=1 AND X1=-1 THEN X1=0
440 IF CR(1, 2)=8 AND X1=1 THEN X1=0
450 CR(1, 1)=CR(1, 1)+Y1: CR(1, 2)=
X1
460 IF FB=0 THEN RETURN
470 NP=7820+(CR(1, 1)*22)+CR(1, 2): GC=PEE
K(NP)
480 IF GC=27 THEN GC=26: GOTO 500
490 GC=27
500 POKENP, GC: POKES+NP, 0
510 CT=0: XY=0
520 FOR X=7 TO 0 STEP -1
530 Y=PEEK(7821+(CR(1, 1)*22)+X)
540 Y=Y-26: XY=XY+(2*CT)*Y: CT=CT+1: NE
X
550 POKE 7391+CR(1, 1), XY: RETURN
560 PRINT "CTRL BLK HOME"; CRSDOWN
570 N1=PEEK(X): PRINT "SHIFT CRSD
UP": PRINT "3 CRSR RIGHT"; N1: NEXT: GO
TO 180
580 IF SD=D THEN 990
590 IF D$="N" THEN 990
600 GOTO 960
610 FOR I=0 TO 7: POKE I+7392, 0: NEXT: POKE 77
8, 28: POKES+7758, 0: RETURN
620 PRINT "CTRL BLK SHIFT CRSDOWN"
630 FOR I=1 TO 8: GOSUB 650: NEXT

```

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**VIC-20**

```

640 CR(1,1)TAB(9)CR(1,2)=1:RETURN
650 PRINT#4,":CLOSE#4:GOTO1960
660 FORI=0TO7:POKEI+14864,0:NEXT:POKE11
670 CS=PEEK(AD):CC=PEEK(AD+S):POKE AD,3
680 FORX=1TO8:GOSUB2370:NEXT
690 POKEAD,CS:POKES+AD,CC:RETURN
700 PRINT"SHIFT CLR CTRL BLK DO YOU W
710 INPUT"ENTER DATA STATEMENTS?"
720 IFDS=0:GOTO730
730 INPUT"ENTER RETURNING LINE NUMBER"
740 INPUT"ENTER INCREMENT VALUE"2CRSRDO
750 WNW7CRSRRIGHT:IV=DS:RETURN
760 SL=SL+IV:EA=6913:SD=DS:RETURN
770 DP=SD+2:SL=SL+IV:PRINT"HOME";SL
780 LH=INT(SL/256):LL=SL-(256*LH)
790 POKE DP,LL:POKE DP+1,LH:POKE DP+2,D
800 T:POKE DP+3,32:DP=DP+4
810 FORX=1TO8:SN=PEEK(SA):CT=2:IFSN=0THEN CA(CT)=
820 CA(CT)=INT((SN+.0001)/10|CT):SN=SN-
830 (CA(CT)*10|CT):CT=CT-1:IFCT>-1THEN
840 CT=2
850 IFCA(CT)>9THEN2530
860 IFCA(CT)=0THENCT=CT-1:GOTO2510
870 CA(CT)=CA(CT)+48:POKE DP,CA(CT):DP=
880 DP+1:CT=CT-1:GOTO2540
890 POKEDP,48:DP=DP+1:GOTO2550
900 IFCT>-1THEN2520
910 SA=SA+1:IFSA>EATHENX=8:GOTO2570
920 NEXT
930 POKEDP,0:DP=DP+1
940 SH=INT(DP/256):LS=DP-(SH*256)
950 POKESD,LS:POKESD+1,SH:SD=DP
960 POKEDP,0:POKEDP+1,0:GOTO1960
970 GETA$:IFA$<" THEN 2620
980 RETURN
990
1000
  
```

**Quick Pixel . . . from p. 47**

**COMMODORE 64**

```

2310 CT=CT+1:PRINT#4,"":NEXT I
2320 PRINT#4,":CLOSE#4:GOTO1960
2330 FORI=0TO7:POKEI+14864,0:NEXT:POKE11
2340 PRINT"CTRL BLK SHIFT CLR 5CRSRDO
2350 FORI=1TO8:GOSUB2370:NEXT
2360 CR(1,1)=1:CR(1,2)=1:RETURN
2370 PRINTTAB(14)8SHIFT"RETURN
2380 AD=1237+(CR(1,1)*40)+CR(1,2)
2390 CS=PEEK(AD):CC=PEEK(AD+S):POKE AD,8
2400 FORX=1TO8:GOSUB2370:NEXT
2410 POKEAD,CS:POKES+AD,CC:RETURN
2420 SA=14864:EA=14871:DT=131:CM=44
2430 DP=SD+2:SL=SL+IV:PRINT"HOME";SL
2440 LH=INT(SL/256):LL=SL-(256*LH)
2450 POKE DP,LL:POKE DP+1,LH:POKE DP+2,D
2460 T:POKE DP+3,32:DP=DP+4
2470 FORX=1TO8:SN=PEEK(SA):CT=2:IFSN=0THEN CA(CT)=
2480 CA(CT)=INT((SN+.0001)/10|CT):SN=SN-
2490 (CA(CT)*10|CT):CT=CT-1:IFCT>-1THEN
2500 CT=2
2510 IFCA(CT)>9THEN2530
2520 IFCA(CT)=0THENCT=CT-1:GOTO2510
2530 CA(CT)=CA(CT)+48:POKE DP,CA(CT):DP=
2540 DP+1:CT=CT-1:GOTO2540
2550 POKEDP,48:DP=DP+1:GOTO2550
2560 IFCT>-1THEN2520
2570 SA=SA+1:IFSA>EATHENX=8:GOTO2570
2580 NEXT
2590 POKEDP,0:DP=DP+1
2600 SH=INT(DP/256):LS=DP-(SH*256)
2610 POKESD,LS:POKESD+1,SH:SD=DP
2620 POKEDP,0:POKEDP+1,0:GOTO1960
2630 GETA$:IFA$<" THEN 2620
2640 RETURN
  
```

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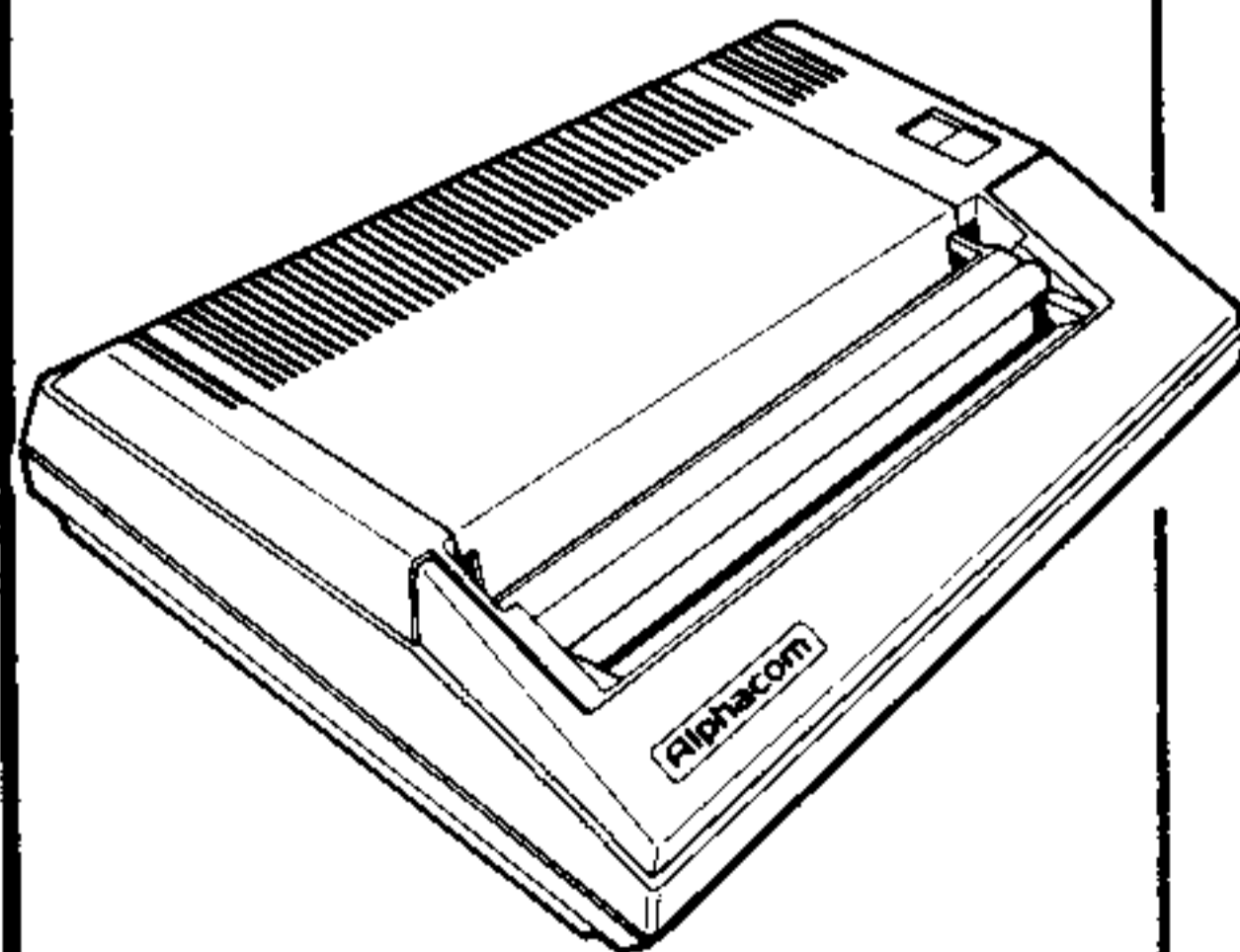
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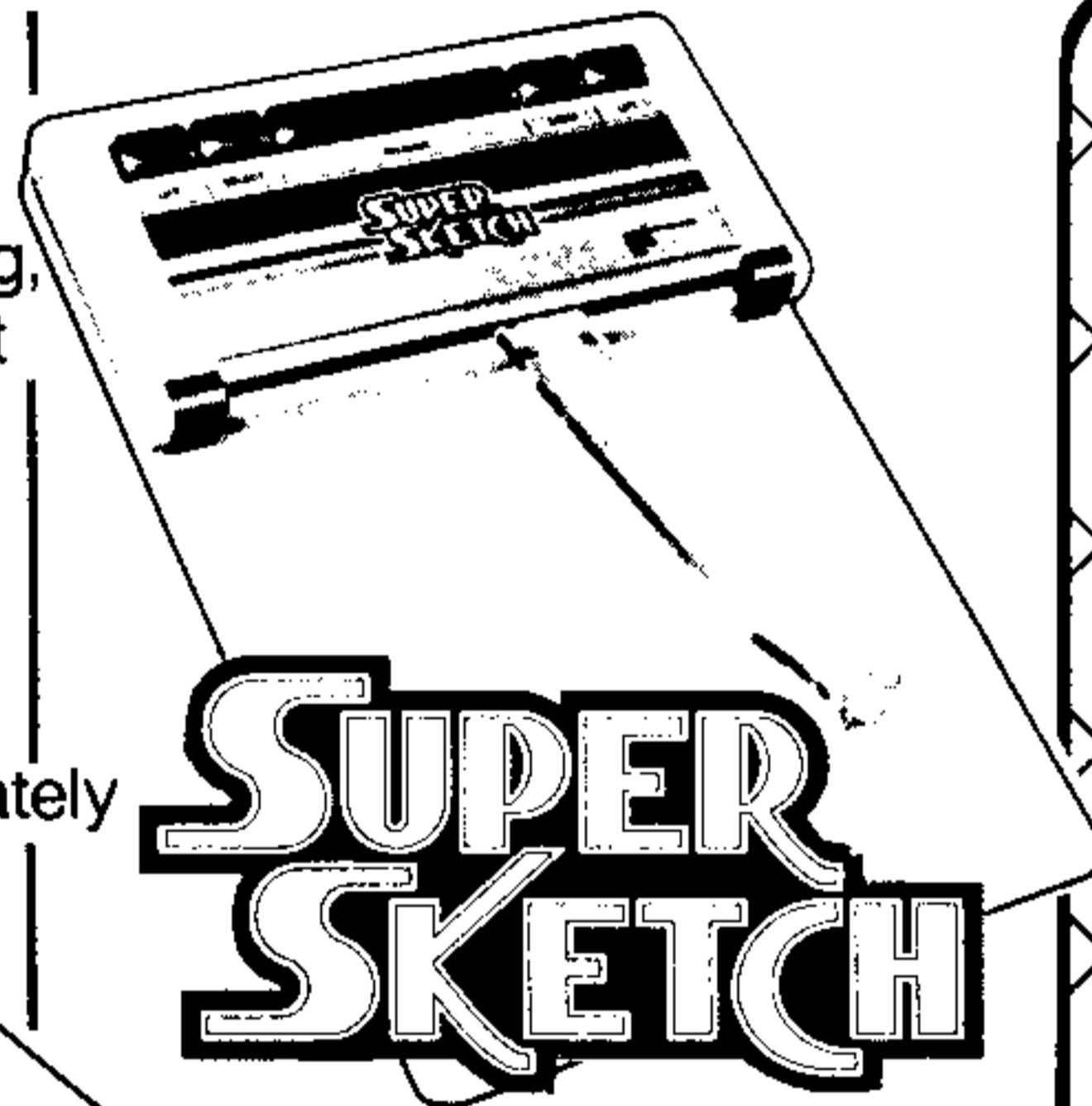
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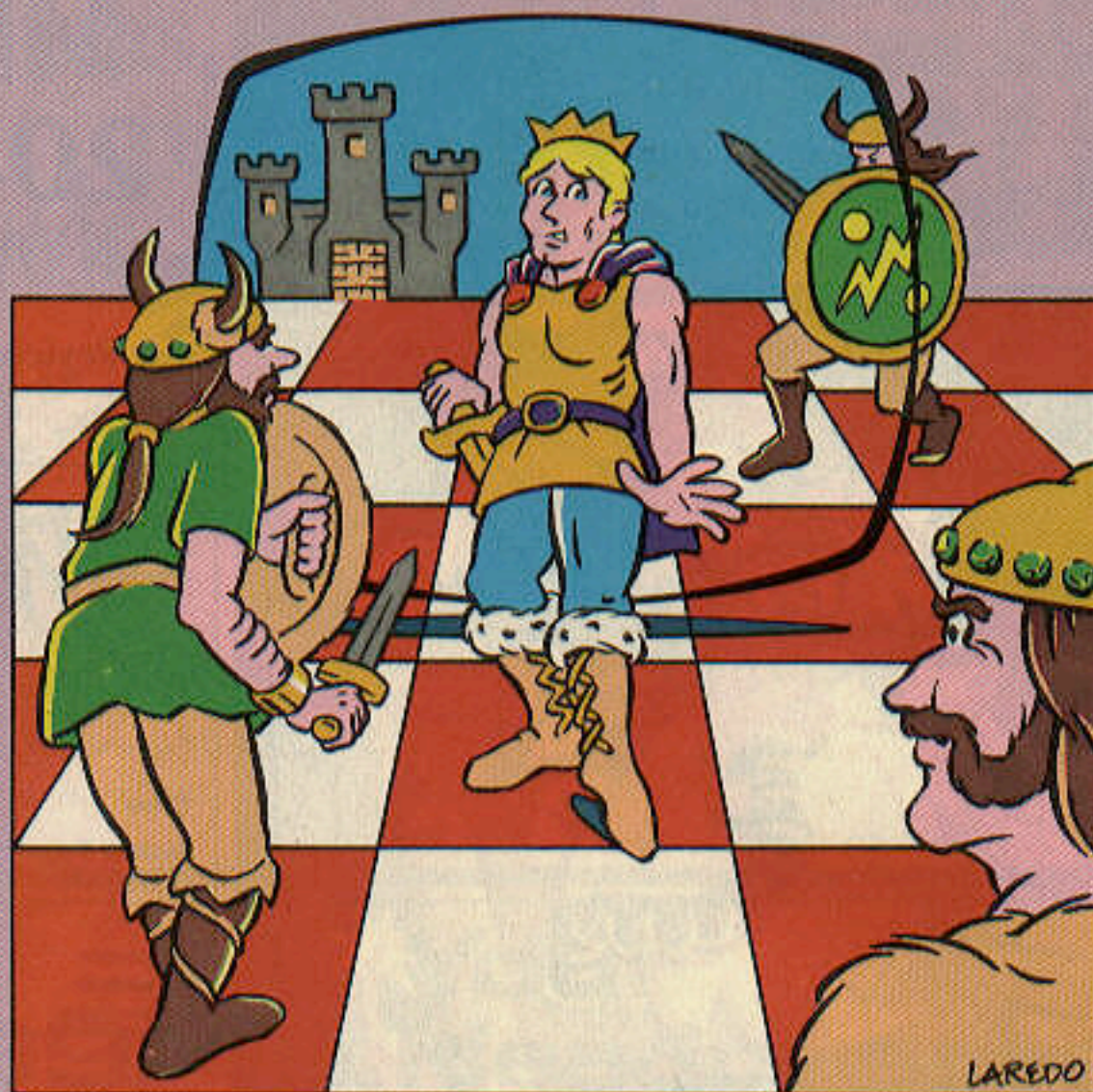
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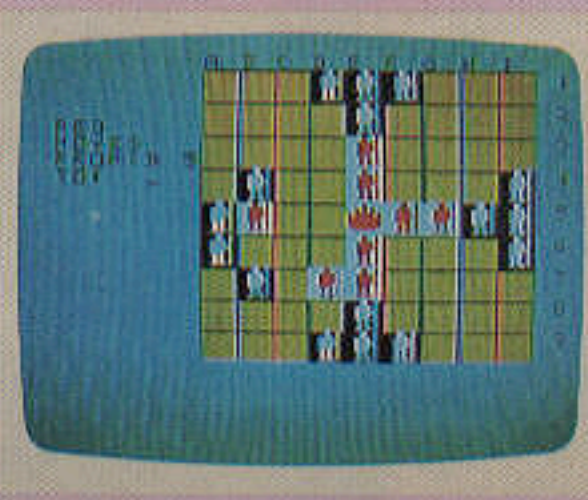
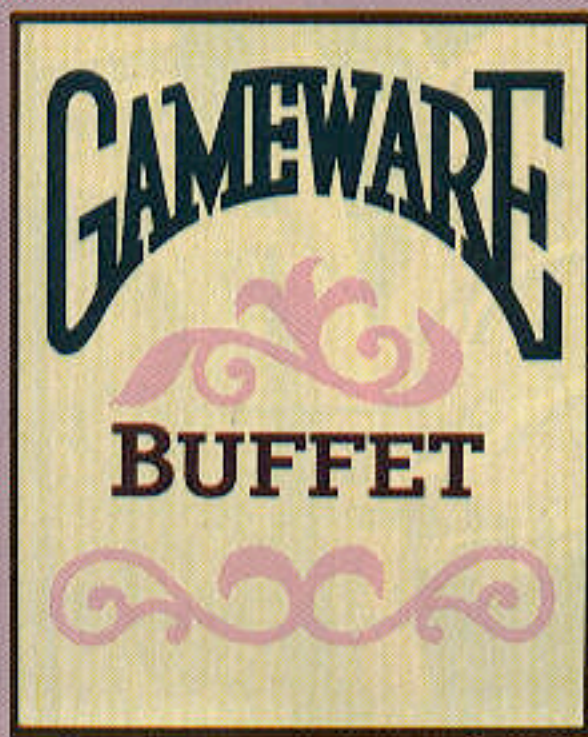
# TABLUT

by James J. Mulligan  
and the HCM Staff

**T**ablut is a game from Lapland which may have originated as far back as the fourteenth century. It is played by two opponents, each of whom has different strengths and different objectives. As in many good games, its rules and moves are quite simple and easy to learn, but the strategy can become more complex as one learns to play it.

*Tablut* is played on a 9x9 board. The pieces all move in the same manner as rooks in chess; any distance either vertically or horizontally, but never diagonally. All pieces are confined to this vertical or horizontal movement, even the king. However, unlike the rook, a piece cannot capture by entering an enemy square.

One player has a king, who begins on the center square. Only the king is allowed to occupy or move through that square. This player also has eight pieces to guard the king. His object is to get the king to an end space of any row or column. As soon as the king reaches the edge of the board, the game is over and that player wins. The second player has sixteen pieces, which start the game near

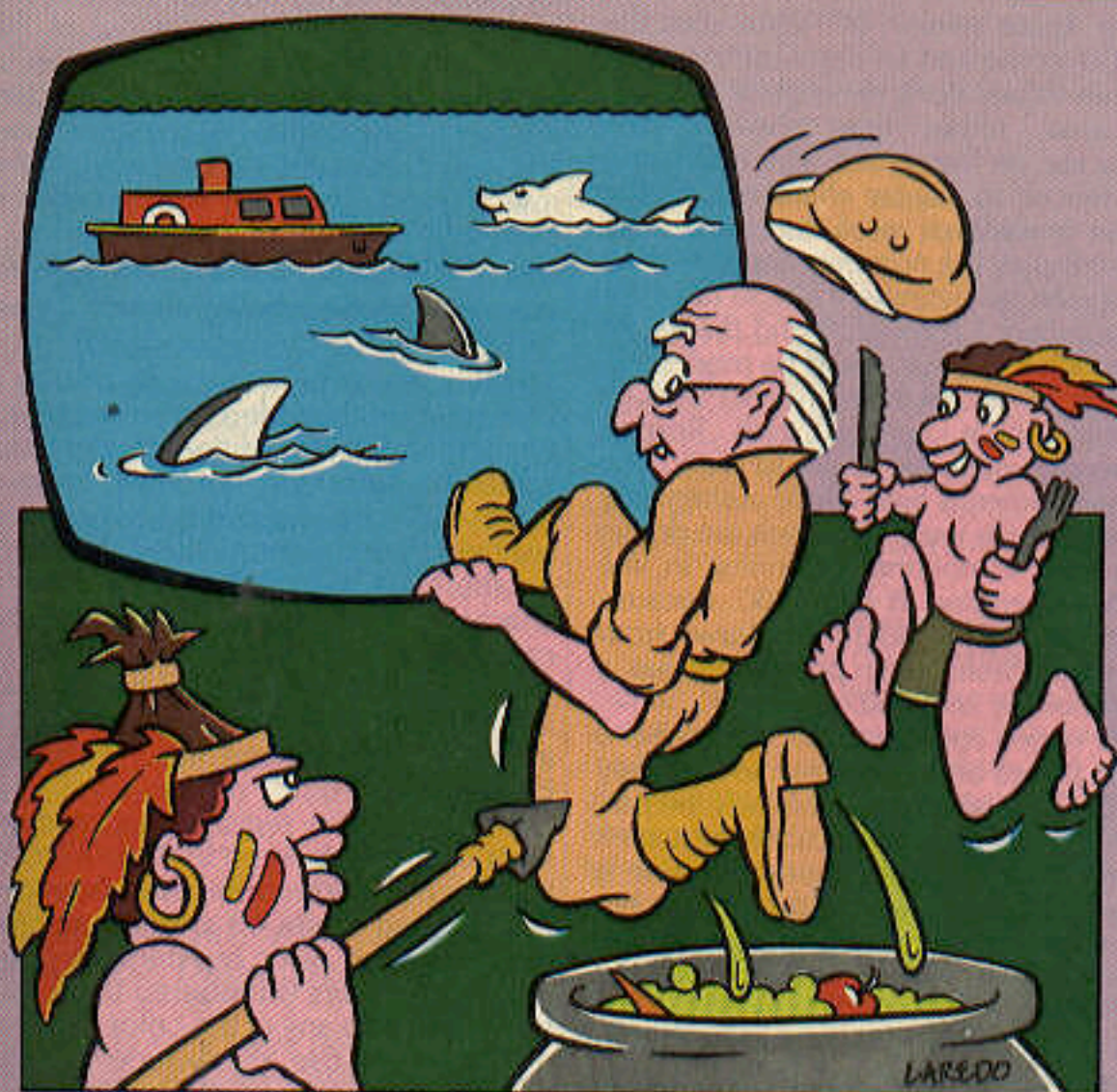


the edges of the board. His object is to capture the king. If he succeeds, the game is immediately over and the second player wins.

All pieces are subject to capture. To take any piece (except the king), a player must move one of his pieces adjacent to the enemy piece. If there is another friendly piece on the opposite side of the enemy (in the same row or column), then the enemy is removed from the board. This is called capture by "containment." The king cannot capture a piece. If he moves adjacent to an enemy, he has no effect. The king can be captured only if surrounded by four enemy pieces, or by three enemy pieces and the center square. It should be noted that a piece can move into a space between two enemy pieces or can move through such a space without being captured. The king, however, cannot make a move into a surrounded square next to the center since he would then be captured.

On each player's turn, the program first checks to see that the proper input has been given. It then checks the legality of the move and the status of the king, and then tests for captured pieces. Then it updates the board by moving pieces and removing captured ones. If there is a winner at the end of any move, the program proceeds to the conclusion, announces the winner, and asks if the player would like another game.

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# CANNIBALS

by Carl Carrozza

I had two reasons for naming this game *Cannibals*. The first will be obvious when you see the scenario. You play Dr. Livingstone exploring a remote island to study the inhabitants' unique culture. You find out that unfortunately, their latest fad is *le haute cuisine homo sapiens*. And you are the only one on the island who is not invited to dinner.

My second reason for choosing the name *Cannibals* has to do with my design method. Inventors and mechanics are notorious for *cannibalizing*—taking parts from one machine to build another. I cannibalized shamelessly in creating this game. I borrowed the logic that enables the cannibals to "sense" your position and give chase from David Bojekian, one of my seventh grade students. The graphics were adapted from other games, and you might recognize the ship and man-eating sharks from *Counting Lesson (99'er HCM, Vol. 1, No. 4)*. I also used some tips from "Fun and Games" (in the same issue of *99'er*) for programming the joystick/arrow keys option.

The object, of course, is to get Dr. Liv-

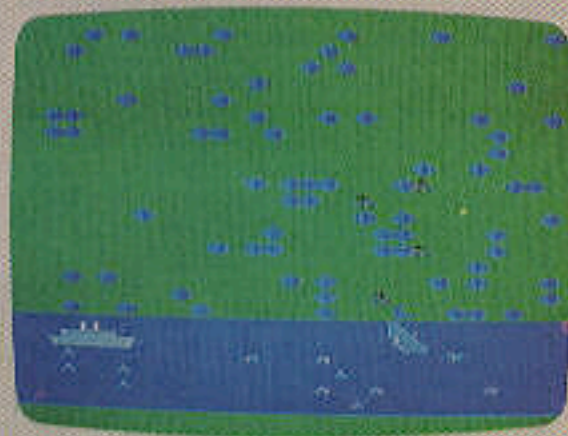
ingston to his ship before he is caught and slow-cooked by the natives to the strains of "Smoke Gets in Your Eyes." If the good doctor decides to swim for the ship, the man-eating sharks will devour him with a quick gulp to the tune of "Mack the Knife." In the lower levels of play, swamps with pits of quicksand appear on the screen. Dr. Livingstone may not enter these areas; fortunately, the natives can't either and must find their way around them in order to get to the doctor. Dr. Livingstone's advantage is that he can wrap around the screen to avoid the natives; the natives can't wrap around in pursuit of him. Each time the doctor reaches the ship he will be safe. But it's hard to make an adventurer like Dr. Livingstone stay put. He keeps returning to explore the jungle. Each time the doctor reaches the boat, the level of difficulty increases, and there aren't as many swamps to slow the natives down. You will have to be very cunning by the time you reach the tenth level, where there are no swamps or obstacles of any kind to keep the natives from coming straight for you.

This version of *Cannibals* is written in TI BASIC but will also run in Extended BASIC. The game plays the same in either BASIC except that Extended BASIC is a little faster. You can use either joysticks or the four arrow keys (ESDX) to move Dr. Livingstone. The fact that Dr. Livingstone can run faster than the natives (thanks to the adrenal gland) coupled with his ability to wrap around the screen may be all that keep the doctor out of the bellies of the natives. To get him in the boat, you need only move the doctor to the bank opposite the boat. The boat is four characters long, and any part of it can be used for boarding. Because the program is written in TI BASIC, it does not use sprites to move the doctor and the natives. Instead they are moved whole characters at a time. Each character is redefined and then located on the screen with the HCHAR command.

Continued on p. 63

When we program a game that requires a player to move a character on the video screen, we like to give the player the option of using either joysticks or the keyboard. Joysticks are usually preferred because more indications may be monitored simultaneously, whereas only one key at a time may be read from the keyboard. Unfortunately, not everyone has a joystick, so we will provide a dual method.

In the C-64 version of *Cannibals* we use the subroutine from lines 890 through 1010 to detect a direction input from either the joystick or the keyboard.



Let's look at each line in some detail.

Line 890 initializes the x and y coordinate variables to zero.

Line 900 works in conjunction with the input statement of line 450. If you're not using joysticks, the program skips over the next five lines (those that check the joystick) and checks only the keyboard.

Continued on p. 61



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## Tablut . . . from p. 58



The Apple version of *Tablut* uses the H PLOT command to draw the row and column values along the edge of the playing area, rather than showing the characters on the screen. This is because it is difficult to display characters on the screen in the high resolution mode. We could display the numbers and letters on the screen by defining a shape table for the numbers 1 through 9 and the letters A through I, but that would be more complicated. Instead of the numbers 1 through 9, the Apple version uses Roman numerals, which are easier to draw. The Roman numerals lend a little authenticity to the game as well. The labels are drawn by a long subroutine, beginning in line 1220 and ending in line 1500. Because the pieces on the board are drawn from the shape table, their positioning has a resolution of 280x160.

The screen coordinates for the positions of the pieces are in an array so that they can be indexed quickly. This way the program doesn't need to calculate the screen position of the shapes every time one is moved, which speeds up the game a bit. The data for this array is located in line 1650. Only two shapes are defined in the shape tables in lines 1700 to 1830. The king is represented by a crown-shaped figure. Both of the players share the same shape, and are distinguished by their colors. This is done initially when the screen is set up in lines 340 to 390. During play, lines 780 through 800 make sure the right shape and color are placed on the screen.

Continued on p. 118



The TI Extended BASIC version of *Tablut* is simplified by the use of the HCHAR command to redefine characters and place them on the screen. The program is made even simpler by an extremely short control loop that is used for both players. This two-line control loop, which consists of only GOSUBs, checks the game status with the variable KING. If KING is equal to 1, then the king has made it safely to the border; if KING is equal to 2, then the king has been captured.

Two subroutines (at lines 1130 and 1140) make it simple to enter the coordinates. The first routine allows entry of only the letters A through I and gives a little beep when the correct response has been entered. The second routine allows entry of only the numbers 1 through 9. At no time do you need to hit [ENTER]. The error checking starts when you enter the first coordinate. If the first set of coordinates is not an occupied square, a warning flashes on the screen, and you are re-prompted for an input.

The initial screen display is created with DATA statements containing characters that represent the board. You will notice that the characters in the DATA

statements are not the ones that have been redefined for the graphics. This is because it is difficult to print characters that do not appear on the keyboard. The loop in lines 440 to 460 takes care of this by plucking each character out of the DATA, reading it, and adding an offset to its ASCII value to generate the characters needed for the display. At the same time, line 450 checks for an even row. If the row is even, then the row number is placed to the right of the board.

Continued on p. 121



Have you ever wanted to display a character on the video screen against a background color different from the screen background color? If so, you may have run into frustration when you realized that the normal graphics mode on the C-64 assigns all off pixels in a character definition to the background color of the screen. The C-64 version of *Tablut* utilizes an important feature built into the powerful VIC II video chip that allows us to obtain an "Extended Background Color" mode.

There are five registers (or memory locations) that concern us. One is a control register that turns the Extended Background mode on and off, and the other four are color registers. Any one of sixteen colors (numbered 0-15) may be POKEd into any of the color registers.

When we use this mode we are limited to the first 64 characters in the character set. This is because the upper two bits of a value POKEd or PRINTed on the screen are used to select one of the four background color registers. The color assigned to the color register selected will be the background color of the character. The following example will make this clearer: If you POKE a 1 onto the screen, you would expect to see the letter A displayed, and indeed you would. The change becomes apparent when you POKE the number 65 onto the screen expecting to see the graphic symbol that looks like a spade, but instead you get the letter A again, this time with a different background color. Congratulations! You have just used Extended Background Color mode.

The following table illustrates the association of character codes to background color registers:

Character Codes	Background Color Register Address
0-63	53281
64-127	53282
128-191	53283
192-255	53284

Extended Background Color mode is turned on by the following BASIC command:

**POKE 53265,PEEK(53265)OR 64**

Here is the BASIC command to turn the Extended Background Color mode off:

**POKE 53265,PEEK(53265)AND 191**

Extended Background Color mode is implemented in lines 320-330 of *Tablut*.

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**Cannibals . . . from p. 61**

One tricky aspect of translating *Cannibals* to the Apple is getting the various music themes to play at the right times without excessive code. Because there is no sound generating chip on the Apple, all music is produced by "plucking" the speaker with the machine language routine POKEd in at the beginning of the program by the subroutine in lines 1700-1760. This routine is then CALLED each time one note is played by line 2000 after values are assigned to the two variables D (Duration) and P (Pitch). Because each melody is at least 16 notes long, and there are 4 different melodies, using individual assignment (LET) statements for each variable would be wasteful of memory and more difficult to code.

The TI-99/4A uses a FOR-NEXT loop coupled with READ and DATA statements to accomplish this task. Applesoft BASIC includes all of these features; however, the key to the TI approach is the RESTORE statement that lets you set the *pointer* to the DATA statements from BASIC. For example, the line

**RESTORE 2000**

in a TI-BASIC program means that the next READ statement would start READING from the first DATA statement in the program in line 2000 or greater. Applesoft BASIC, on the other hand, can only RESTORE to the first DATA statement in the program.

In order to use the READ-DATA method from Applesoft, we wrote a machine language program that we could CALL whenever we wished to RESTORE to a particular line number. It resets the DATA pointers used by Applesoft so that the next READ statement uses the correct DATA statement. This routine is POKEd in at lines 190-210 to address locations 36096 through 36231. Notice that line 190 also resets HIMEM to protect the routine from being overwritten by STRING variables. (String variables are stored starting at HIMEM and working downward in memory; see the *Applesoft BASIC Programmer's Reference Manual* for details.)

Whenever we need to RESTORE to a particular line number in the program, we branch to the linking Applesoft subroutine in lines 2020-2060, passing the line number as a parameter in the variable LN. This linking subroutine uses LN to calculate the values needed by the machine language routine to find the line number, POKEs them into memory, then CALLs the routine (lines 2030-2040). This machine language routine (which RESTOREs by line number) not only resets the proper pointers, but also checks to be sure that the line number in LN exists in the program and that it is indeed a DATA statement. If either of these conditions is not satisfied, then a flag is set by the machine language routine. The Applesoft section then checks the flag (identified by the variable ST) and halts the program,

displaying an error message to identify the incorrect LN value.

If you wish to use this routine in your own programs, you should be aware that if you use the RENUMBER utility to resequence your program, the value of LN will *not* be changed. You must update the values of LN after you have RENUMBERed. If you don't do this, the error checking routine will determine an incorrect LN value. It is a good idea before RENUMBERing to note where each GOSUB to the linking program is, so that the LN values can be updated.

Continued on p. 78



The TI-99/4A version of *Cannibals* is a studied, measured game, almost like chess, with four cannibals jockeying around the bogs and advancing slowly. The PCjr version, on the other hand, is more hell-bent-for-leather, with cannibals streaming after you from every direction.

Some home computers (and the TI-99/4A is a good example) achieve remarkably good graphics speeds under certain circumstances by using a hardware chip, usually called a "sprite" chip, to handle the drawing and movement of shapes. A "dedicated" chip like this will be limited in what it can do, however, and it's somewhat isolated from the busy activity of the rest of the program. The sprite chip can't help much in a game like *Cannibals*, which involves a lot of



logic and coincidence checking when an object moves, so the computer is thrown back on the resources of its central processing unit, where these operations are carried out. Thus IBM, which has by far the fastest central processor in the home market, has the quickest cannibals.

In many applications, speed is all-important, but *Cannibals* seems to work well as either a deliberately paced strategy game or a frantic chase.

### Some Notes on the Game

You'll be queried at the start about whether you want the program to play through the console or the monitor. The console has a tiny speaker in it, so use your monitor's sound unless it has no speaker, as is the case with the IBM Personal Computer Color Display.

You'll also be asked to choose between using the keyboard arrow keys or a joystick. If you're using a joystick, you should know that some joysticks will

return different values when read by BASIC's STICK command. To cope with this, the program reads STICK(0) and STICK(1) at an early stage, before the joystick is in play, and uses these values as base constants for the rest of the program. This program was developed using a WICO Computer Command analog joystick and tested with an IBM stick, so you should be all right if you have one of these.

STICK(0) returns the value of the x coordinate of the stick (used to move back and forth), and STICK(1) returns the y coordinate (to move up and down). If your joystick decreases STICK(0) when you move to the right instead of increasing it as the WICO stick does (and increases instead of decreases when you move left, etc.), then you'll find your controls reversed. There may be some joysticks on the market that depart even further from the WICO stick, so you may need to modify your program. Don't feel shy about jumping in and making changes... Just remember to save the original version first.

The WICO is an analog stick, which means that the value it outputs will change smoothly and constantly as you move the stick one way or another. (It would be ideal for smoothly varying the speed of an object in a program.) A digital joystick, by contrast, outputs only discrete values. At the center position it might output 0; moved to the right, it might output +1 or perhaps +5. Because it was written for an analog stick, the code in this program looks for a range of values when it is trying to determine if the stick is in the center position. It reads the WICO's position at the beginning and knows what it ought to be (say, 56), but later, from jostling or handling or just being there, the WICO might be returning 57 or 55 or 54. A digital stick, however, will always return its discrete value... In other words, analog is wiggly and changeable.

One final note: Make sure that you aren't leaning on your stick when the program reads it at the very beginning, or you'll be able to run only one way.

Continued on p. 69

## Cannibals... from p. 59

CANNIBALS (TI-99/4A)	
Explanation of the Program	
Line Nos.	
100-190	Program header.
200-370	Initialization and input option for joysticks or keyboard.
380-550	Display the title screen.
560-590	Time delay loop and clear the screen.
600-720	Define graphics and color for characters.
730-760	Display ocean.
770-820	Display ship.
830	Clear the jungle area of the screen.
840-870	Create swamps.
880-980	Place the cannibals and the doctor on the screen.
990-1020	Branch to read the keyboard or the joystick.
1030-1200	Move the cannibals.
1210-1290	Doctor makes it to safety on the boat.
1300-1330	Check to see if the doctor made it to the boat or the shark.
1340-1620	Shark makes a meal of the good doctor.
1630-1770	Cannibals place Dr. Livingston on the menu when they catch him.
1780-1820	Subroutine to wait for a key response.
1830-1920	End of the game messages and restart the game.
1930-2070	Display the score.
2080-2200	Subroutine to scan the keyboard for Dr. Livingston's movement.
2210-2370	Move Dr. Livingston.
2380-2410	Subroutine to scan the joysticks.
2420-2450	DATA containing graphics pattern information.
2460	DATA containing character set color information.

```

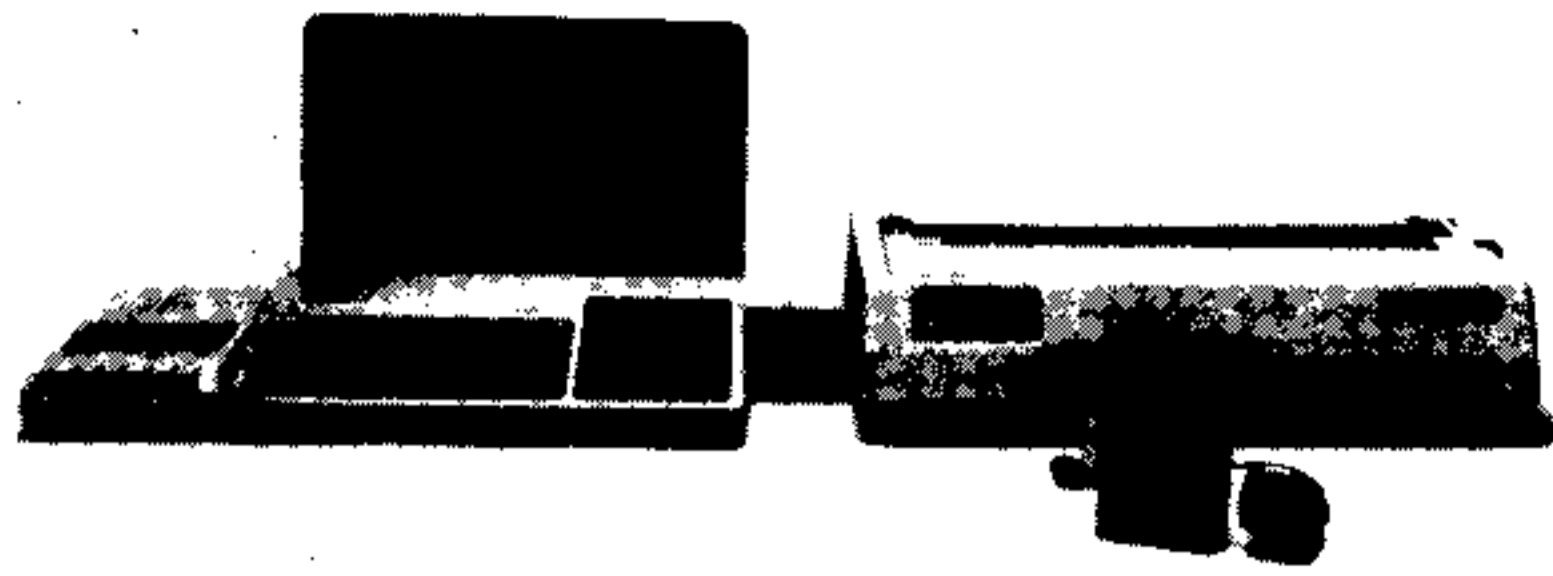
TI-99/4A
100 REM *****
110 REM ***** CANNIBALS *****
120 REM *****
130 REM BY CARL CARROZZA
140 REM HOME COMPUTER MAGAZINE
150 REM VERSION 4.2.1
160 REM
170 REM TI BASIC, OR
180 REM TI EXTENDED BASIC
190 REM
200 GOSUB 380
210 DIM D(6,2)
220 CALL CLEAR
230 PRINT "TYPE 1- FOR JOYSTICK.":
: "TYPE 2- FOR ARROW KEYS.":
:
:
:
240 CALL KEY(0,K,S)
250 IF S=0 THEN 240
260 IF K=49 THEN 290
270 IF K=50 THEN 340
  
```

```

TI-99/4A
280 GOTO 240
290 AA=1
300 CALL CLEAR
310 CALL SCREEN(7)
320 PRINT "PLACE ALPHA LOCK UP."
330 GOTO 350
340 PRINT "PRESS ALPHA LOCK DOWN."
350 FOR DEL=1 TO 200
360 NEXT DEL
370 GOTO 560
380 CALL CLEAR
390 PRINT "*****"
400 PRINT "*****"
410 PRINT "*****"
420 PRINT "***** CANNIBALS *****"
430 PRINT "*****"
440 PRINT "*****"
450 RESTORE 490
460 FOR NOTE=1 TO 29
470 READ NA,B
480 PRINT
490 CALL SOUND(200*A,B/2.7,0)
500 DATA 1,1109,1,1661,1,1397,5,1245,
5,1397,2,1109,2,831,1,1397,5,1245,
5,1397,2,1109,2,831,1,44000
510 DATA 1,1109,1,1397,5,1245,5,1109,
2,1245,2,1661,1,44000
520 DATA 1,1109,1,1397,5,1245,5,1109,
2,1245,2,831,1,44000
530 NEXT NOTE
540 RANDOMIZE
550 RETURN
560 FOR T=1 TO 100
570 NEXT T
580 LI=0
590 CALL CLEAR
600 REM DEFINE GRAPHICS AND COLOR
610 RESTORE 2320
620 FOR X=1 TO 19
630 READ A,AS
640 CALL CHAR(A,AS)
650 NEXT X
660 FOR X=9 TO 14
670 READ A,B
680 CALL COLOR(X,A,B)
690 NEXT X
700 CALL COLOR(1,6,4)
710 CALL CLEAR
720 CALL SCREEN(4)
730 CALL HCHAR(19,1,128,192)
740 FOR X=1 TO 20
750 CALL HCHAR(RND*5+19,RND*28+3,129)
760 NEXT X
770 REM LOCATE SHIP
780 M=INT(24*RND+3)
790 CALL HCHAR(20,M,96)
800 CALL HCHAR(20,M+1,97,3)
810 CALL HCHAR(20,M+4,98)
820 CALL HCHAR(19,M+2,99)
830 GOSUB 1840
840 CALL HCHAR(1,1,32,576)
850 FOR X=1 TO INT(ABS(10-SAFE))*10
860 CALL HCHAR(INT(RND*18)+1,INT(RND*28
)+3,33)
870 NEXT X
880 FOR R=1 TO 6
  
```

Continued on p. 64

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## Cannibals. . . from p. 63

TI-99/4A	
890	D(R,1)=INT(17*RND+1)
900	D(R,2)=INT(28*RND+3)
910	CALL GCHAR(D(R,1),D(R,2),CH)
920	IF CH<>32 THEN 890
930	IF R=5 THEN 980
940	IF R=6 THEN 970
950	CALL HCHAR(D(R,1),D(R,2),112)
960	GOTO 980
970	CALL HCHAR(D(R,1),D(R,2),104)
980	NEXT R
990	IF AA=1 THEN 1020
1000	GOSUB 1980
1010	GOTO 1030
1020	GOSUB 2280
1030	ZZ=ABS(ZZ-1)
1040	IF ZZ=1 THEN 990
1050	FOR X=1 TO 4
1060	MCX=(D(X,1)<D(6,1))-(D(X,1)>D(6,1))
1070	MCY=(D(X,2)<D(6,2))-(D(X,2)>D(6,2))
1080	IF (D(X,1)-MCX>18)+(D(X,2)-MCY<2) THEN 1190
1090	CALL GCHAR(D(X,1)-MCX,D(X,2)-MCY,CH)
1100	IF (CH=104)+(CH=32) THEN 1140
1110	MCX=INT(RND*3)-1
1120	MCY=INT(RND*3)-1
1130	GOTO 1080
1140	D(X,1)=D(X,1)-MCX
1150	D(X,2)=D(X,2)-MCY
1160	IF (D(X,2)=D(6,2))*(D(X,1)=D(6,1)) THEN 1630
1170	CALL HCHAR(D(X,1)+MCX,D(X,2)+MCY,32)
1180	CALL HCHAR(D(X,1),D(X,2),112)
1190	NEXT X
1200	GOTO 990
1210	REM MADE IT TO BOAT
1220	RESTORE 1270
1230	FOR I=1 TO 11
1240	READ P,N
1250	CALL SOUND(300*P,N,0)
1260	NEXT I
1270	DATA 1,932,1,932,2,1047,1,1047,1,1047,2,1,44000,1,1397,1,1245,1,1175,2,93
1280	SAFE=SAFE+1
1290	GOTO 1610
1300	REM CHECK FOR WIN
1310	FOR WIN=0 TO 4
1320	IF D(6,2)=WIN+M THEN 1220
1330	NEXT WIN
1340	REM SHARK EAT
1350	Z=D(6,2)+(D(6,2)=30)+(D(6,2)=31)*2
1360	CALL COLOR(9,16,5)
1370	CALL HCHAR(19,Z,137)
1380	CALL HCHAR(19,Z+1,139)
1390	CALL HCHAR(20,Z,138)
1400	CALL HCHAR(20,Z+1,140)
1410	CALL HCHAR(21,Z+3,141)
1420	FOR J=1 TO 6
1430	CALL HCHAR(20,Z,136)
1440	CALL SOUND(250,-5,0)
1450	CALL HCHAR(20,Z,138)
1460	CALL SOUND(250,44000,30)
1470	NEXT J
1480	RESTORE 1520
1490	FOR SHA=1 TO 18
1500	READ A,B
1510	CALL SOUND(300*A,B/2,0)
1520	DATA 1,1109,1,1319,1,1480,1,44000,3,1480
1530	DATA 1,1109,1,1319,1,1480,1,44000,3,1480
1540	DATA 1,1109,1,1319,1,1480,1,44000,3,1480
1550	DATA 1,1661,1,1661,2,1480
1560	NEXT SHA
1570	DEAD=DEAD+1
1580	CALL HCHAR(21,Z+3,128,4)
1590	CALL HCHAR(20,Z+1,128,2)
1600	CALL HCHAR(19,Z+1,128,2)
1610	CALL HCHAR(19,1,128,64)
1620	GOTO 780
1630	CALL HCHAR(D(6,1),D(6,2),120)
1640	CALL HCHAR(D(6,1),D(6,2)+1,121)
1650	CALL HCHAR(D(6,1)+1,D(6,2),122)
1660	CALL HCHAR(D(6,1)+1,D(6,2)+1,123)
1670	RESTORE 1720
1680	FOR SMO=1 TO 11
1690	READ A,B
1700	CALL SOUND(400*A,B/2,0)
1710	NEXT SMO
1720	DATA 2,1109,1,1047,1,1245,1,1109,1,932,2,1480
1730	DATA 1,1397,1,1661,1,1480,1,1245,2,2218
1740	DEAD=DEAD+1
1750	CALL HCHAR(D(6,1),D(6,2),32,2)
1760	CALL HCHAR(D(6,1)+1,D(6,2),32,2)
1770	GOTO 1610
1780	REM SUB TO CONT.
1790	CALL KEY(0,K,S)
1800	IF S=0 THEN 1790
1810	CALL CLEAR

Continued on p. 69

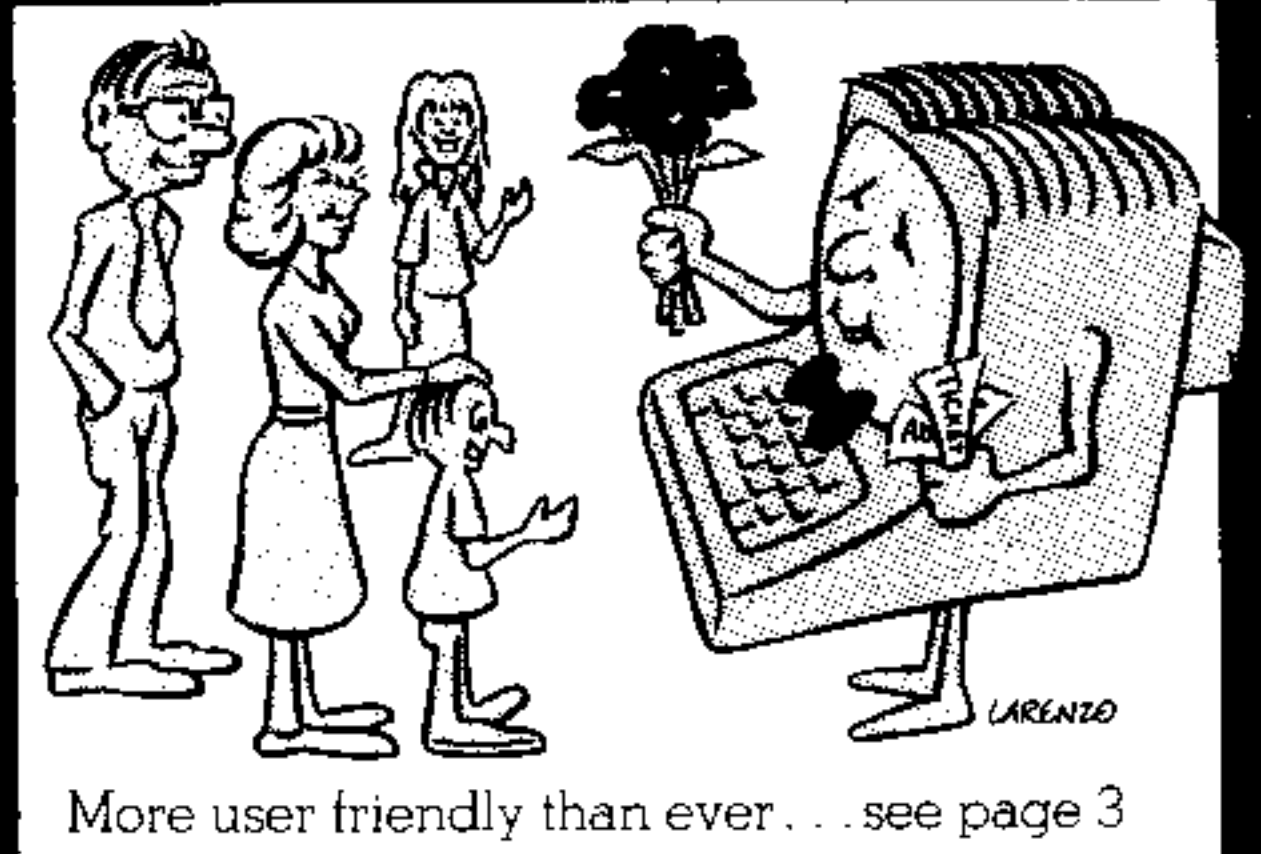
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# HOME COMPUTER DIGEST

News and Happenings in the Home Computer World

- **Computer Peripherals: Small is Beautiful**
- **Techno War: Truth or Myth?**
- **Crystal Ball Market Gazing**
- **Big Mac Attack on Campus**
- **Summer Olympics Go Digital**



More user friendly than ever... see page 3

## CONTENTS

- 3**  **Wooing the Home Computer Family** .....by Sharyn Lyon  
The family that computes together...
- 5**  **Why Smaller Disk Drives?**.....by Roger Wood  
Just when you thought 5¼" was the industry standard!
- 8**  **Preview of Summer's CES**.....by David Brader  
What's going to happen next?
- 12**  **Computers Enable the Disabled**.....by Joan Killough-Miller  
New technology offers new independence.
- 16**  **On the Road to Computer Literacy**.....Digest Staff  
Man's marvelous math machines.
- 24**  **Celebrity Software and Software Celebrities**...by Erin O'Connor  
The famous and near-famous shine in the limelight.

### DEPARTMENTS

- |                              |                            |                                  |
|------------------------------|----------------------------|----------------------------------|
| <b>2</b> On Line             | <b>6</b> Any Questions?    | <b>10</b> Software Trends        |
| <b>14</b> New Tech News      | <b>22</b> Industry Watch   | <b>26</b> Computers in Education |
| <b>28</b> Novel Applications | <b>30</b> Gameware Updates |                                  |

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## On Line

**H**ave our science fiction fantasies come true? Is society speeding towards a head-on collision between computer technology and the needs of people? This month, *Home Computer Digest* explores the dynamic interface between those marvelous machines and their all-too-human users. Our features focus on a diverse group who are making computers a part of their lives.

*Wooing the Home Computer Family* explores what's behind the hardware and software industry's heightened pitch to Mom, Dad, and the kids. *Computers Enable the Disabled* reports on what electronic technology can do for people with special needs. Our look at *Celebrity Software and Software Celebrities* turns the spotlight on another group of special people who are making industry news. And the latest installment of *On the Road to Computer Literacy* brings you one step closer to a close rapport with the new machines in your future.

What's in store for us? *Why Smaller Disk Drives?* ventures some predictions on the emerging industry standards, and our *Preview of Summer's Consumer Electronics Show* takes a peek into the future of the home computer industry. And, as always, our regular features continue to bring you the last word on the present state of the home computing world.

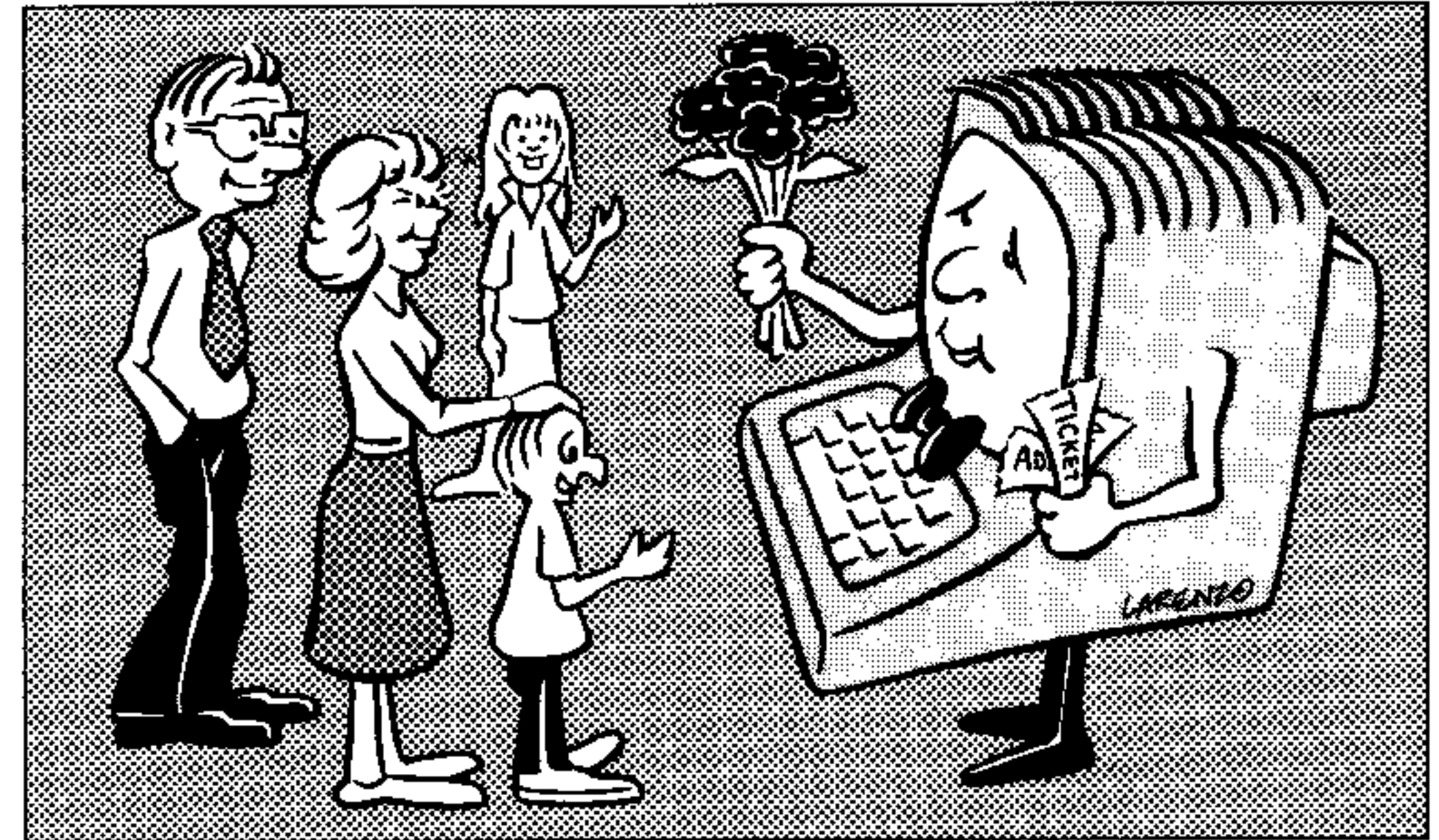
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# Wooing the Home Computer Family



**T**he time is now! Soon we'll all be needing a home computer. And just in time—computer makers from Apple to Zenith are providing us with a hardware horn of plenty. New home computers are coming out of the woodwork, and each one hits us with a new promotion angle. Ads using price slashing, rebates, guilt-trips, and even appeals to Motherhood and Apple Pie parade before us. The Home Computing Family is definitely being courted, and each suitor claims to be smarter, better-looking, more modern, and more compatible with our interests than its predecessors. All this attention from industry honchos—who hope that theirs will be the most at-home home computer—is having unexpected results that will benefit home users as much as the industry itself.

### You Don't Bring Me Flowers

Although computers are not being delivered to our doors by FTD, they are turning up on the backs of cereal boxes, on discount store sales flyers, and even in mass market magazine ads and TV commercials. Look at the way the PCjr was recently introduced by IBM. The first ad that ran in a general audience publication read like a birth announce-

ment, complete with an old-fashioned baby carriage rocked by Big Daddy IBM (the Charlie Chaplin character). Below this compelling portrait (designed to grab the attention of the elusive female consumer?) was the clincher phrase, "Announcing A Proud Addition To Your Family." The magazine ad, like its television counterpart, takes you through Junior's life cycle, linking the growth of IBM's junior with the family's own flesh and blood Junior. Under the heading "GROWING UP WITH JUNIOR," the ad tells how easily you can expand the PCjr as your child's need for "a powerful tool for home, school or college" expands.

### Seeing Is Believing?

With carefully selected props—overstuffed chairs, foot stools, and assorted cozy-looking antiques—IBM's TV ads visually communicate how comfortably junior fits into any home environment. These homey TV ads first aired during Super Bowl XVIII and have continued to fill prime-time slots surrounded by family-oriented specials, network news, sports, and morning talk/news shows. *Advertising Age* claims that IBM will spend about \$40 million acquainting the American family with the PCjr. Why in-

vest so much time and money in one computer? Afraid that their "big business" image will turn away PCjr purchasers, IBM hopes, by the end of the third quarter, to establish the equation: Modern Family + Computer = You + PCjr.

### It Followed Her To School One Day

Along with these family-oriented magazine/TV ad campaigns, IBM and Apple are entering the home through the back door—the schools. Plans to donate 2,000 PCs and PCjrs to private and public elementary and secondary schools in more than 25 US cities will increase consumer awareness of IBM in the private sector, an important market that has been long-dominated by Apple. IBM seems to be counting on the marketing axiom that each computer placed in our schools will ultimately be responsible for selling four or five additional machines to home users.

Both IBM and Apple have commitments from universities across the country. Apple recently formed the Apple University Consortium [see "Computers In Education" in this issue.—Ed.], giving discounted equipment to member institutions in return for software research and development. IBM has fielded a new strategy to counteract Apple's consortium campaign. Many of their computers are already in place at the university level. In fact, some business and technical schools are now requiring all students to have an IBM PC. Hardware retailers have mixed reactions to the low prices. Dealers in college towns are angry with Apple for discounting its machines because none can match a 60% discount. Nevertheless, some dealers predict that the larger user base will spur software sales among students and their families.

### Superior Software for Students

Not to be outdone by college software R&D, commercial educational software producers have gotten serious about creating higher quality programs. The Learning Company is field testing programs in schools and homes throughout northern California. Their testing includes observation of play, in-school interviews and questionnaires, and in-home interviews with children. The re-

vised programs then undergo a second round of testing with different children. With such extensive pre-marketing trials it is no wonder that IBM turned to The Learning Company to develop the first software for the PCjr.

While educational programs make inroads, producers of personal productivity software are kicking themselves for not anticipating the needs of home computer users sooner. But much catch-up work is underway, and we should start seeing many more home-sized versions of the popular accounting packages that were originally designed for business use. It appears that the line separating home computer from business computer concerns is fading. The cross-over is underway on both sides, as home users demand more sophisticated utility packages and business demands educational software—like the PLATO courseware—for on-the-job training and re-training programs.

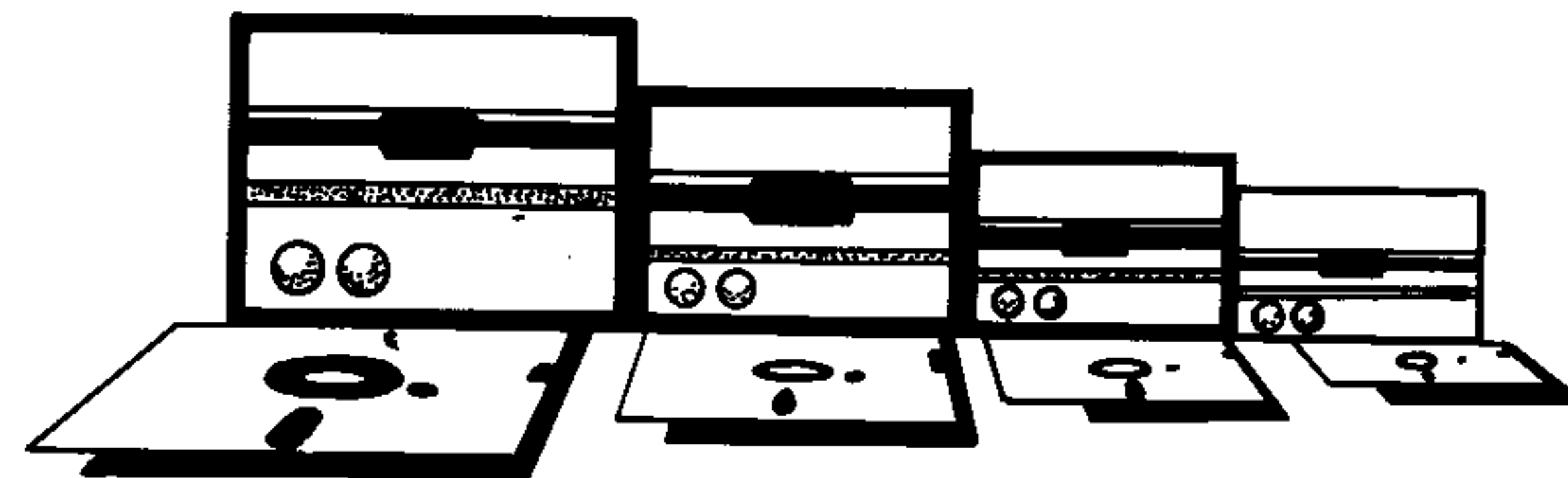
### The Cycle Continues

The Home Computing Family shops for hardware and software to meet its many needs in an anxious marketplace. With weighty goals like a child's future in mind, the home computer consumer is a thorough collector of information. Hardware and software producers who are genuinely proud of their products are working to create a loyal and well-informed following.

Some manufacturers, like IBM, are trying to change their image of big business impersonality. Whether the motivation is genuine pride in their products or just profits and bigger market shares, the result is a more technologically receptive public. Ads that portray computers as friendly—even cuddly—inspire the consumer to think of the computer as more of an ally than an enemy. If the results of this careful courting of the home computing family are the demystifying of the computer, lower prices, higher quality software, better inter-industry communication, and easier access to technological information, then we have very little to lose—and much more to gain—from this new-found high-tech attention.

—Sharyn Lyon

# Why Smaller Disk Drives?



In the past few years floppy disks have become the standard mass-storage medium in the computer industry. In the late 70's, the 8" floppy disk was the most common storage medium for mini- and micro-computers. But the 5 1/4" floppy quickly superseded the 8" as the principal storage device for microcomputers, both in business and in the home. The smaller physical size makes the 5 1/4" drive far more convenient for most applications, even though it holds less data than the 8". The 5 1/4" systems are capable of storing anywhere from 90K to 320K-bytes of data per disk, depending upon whether they support single-sided or double-sided disks, and whether data is stored on the disk using "single-density" or "double-density" encoding techniques. The 8" disk can store from 360K to more than one megabyte, depending upon the same considerations mentioned above.

More recently, "hard disk" drives (known as Winchester drives) have also come into their own. They are being used increasingly in situations where large amounts of data need to be regularly accessed. These drives are capable of storing 5 to 10 megabytes of data on a single 5 1/4" disk, but the disks are quite different from the 5 1/4" floppy. Generally, they are permanently installed in a computer system and are best suited to large data bases. Also, while ready-to-use floppy disk systems can be obtained for as little as \$300, a hard disk system can cost \$1500 or more.

Now, just as drives were becoming standardized, Apple's Macintosh comes equipped with a Sony 3 1/2" drive. Hewlett-Packard chose the same Sony disk for its HP-150 business computer, and many other manufacturers have introduced 3" and 3 1/4" drives as well. Why the change? Won't the smaller disks hold less data than the 5 1/4"? Is there really any advantage to the new smaller drives?

### Smaller Drives Stack Up Well

Surprisingly, the smaller drives have quite a few advantages over their 5 1/4" big brothers. First, the smaller physical size of the drive provides a more compact package, thus allowing the computer itself to be more compact (witness both the HP-150 and the Macintosh). Another big advantage of the new, smaller disks is that they are not floppy. Instead, they are encased in a light plastic housing, making them far less susceptible to the damage that often befalls floppy disks. The smaller size and sturdier packaging also provide a more transportable medium for programs and data. The disk fits easily in a shirt pocket, or in a regular envelope for mailing (hand cancel, please). In addition, its small sliding metal shutter protects the storage medium when it's not in use, so you don't have to worry about an ill-placed fingerprint destroying this month's sales records, (as you might with the exposed medium of the larger disks). With all this

cont. on pg. 25

# Any Questions?

*The present global ignorance of computing may come, in part, from our natural aversion to asking simple questions—for fear of revealing only a shallow knowledge of vital topics.*

*Why not let someone else ask the questions while we sit back and benefit from the reply? That's the purpose of this column.*

## **Q. What is an operating system?**

A. An operating system is a program in the computer's memory that is responsible for controlling the basic functions of the system. A computer may use several kinds of operating systems, the most common of which is the Disk Operating System or DOS. It controls all interfaces with the disk drives, whether from programs or as user input. Another common operating system is known as the BIOS or Basic Input/Output Operating System. This one controls all I/O operations of the computer, including links to printers, modems, color graphics video circuitry, and other hardware.

## **Q. Why do some people bother with computer monitors when they can get the same picture on an ordinary television set?**

A. The picture quality of a television set can't compare with that of a good monitor. This is, in part, because the TV must convert the video signals from Radio Frequency (RF) into video signals that represent the actual picture. With a monitor there is no need for a channel selector because it does not convert an RF signal. The signal supplied to the monitor is a direct video signal from the computer, with no messy frequency conversions necessary. Another performance advantage of the monitor is its ability to accept signals of a much broader bandwidth. In other words, the picture will have brighter and more definable

colors and there will be less color bleed from one screen pixel to the next. The monitor doesn't offer non-computer entertainment, but the improved video image is easier on the eyes.

## **Q. I'm trying to decide which storage system to use—tape or diskette. Is the price of a disk operating system justified?**

A. As the price of disk operating systems continues to drop, the lowly cassette player seems less and less attractive. Now that disk drives for some home machines are approaching the \$200 mark, it is easy to justify that amount in time saved, not to mention tape costs. In order to be truly convenient, taped programs are best stored on individual cassettes, and that is a more expensive method than keeping multiple files on a diskette.

## **Q. Why buy more than one disk drive?**

A. Most computer users can get by very well with one drive. However, there are many applications that require two drives, or operate much better with two. Many programs which handle data bases, such as word processors, or accounting software, need to have a program disk in one drive and the data disk in the other drive. Those programs that allow you to use one drive may have you swapping disks so often that you start wondering who's controlling whom. Dual drives are also very con-

venient for maintaining backup copies of an entire disk without having to copy the files individually.

## **Q. I have heard that the new remote keyboards used with the PCjr can only be used singly, not with several in one place, such as in a classroom. What is the problem, and what can be done about it?**

A. When you place several keyboards in the same room, all using the infrared link to the main unit, you will probably run into an interference problem. This occurs when two people type on two different keyboards at the same time. The signals become mixed, and therefore unreadable at the computer. There are two solutions to this problem. If only one person were allowed to enter anything on a keyboard at any one time, then there would be no interference problem. But, there are definite logistical problems with this approach in a classroom. The second solution would be to use IBM's optional keyboard cable. The cable supplies a direct link to the main unit and turns the infrared transmitter off. The disadvantage here is that each keyboard will need a separate system unit. For group participation, the infrared keyboard will work quite nicely. It can be passed around from student to student as each one takes a try at the problems.

## **Q. Can I still get a disk drive for the TI-99/4A?**

A. Several hardware makers are doing very well by continuing to support the two million or so 99/4A's now in use. Disk drives, 32K and 128K expansion cards, and other peripherals are described and reviewed in the pages of *Home Computer Magazine*.

## **Q. Would you recommend my buying a computer through a discount mail-order outfit?**

A. If you are computing on a budget, you may find that the price variance between your neighborhood shop and a large mail-order house can mean the difference between owning the machine or going without. Mail order discount stores are usually reliable, in spite of the horror stories you may have heard about them. Remember, however, that your relationship with a discount house will usually last only as long as it takes them to cash your check and ship the box. You sacrifice the sort of dealer support you can get from a home-town shop—often crucial to a new computer owner. Then again, there are always users groups to help you learn to use the machine. In summary, there are good reasons for purchasing from either source. It just depends on your needs.



Gazing into the crystal ball of last winter's Consumer Electronics Show reveals a clear vision of what to expect at this summer's product-introduction extravaganza.

Texas Instruments is on the sidelines. Commodore is changing course, IBM is gaining market share, and Apple is moving into the home. What's going to happen next? Will window technology become the predominant human/computer interface? Is entertainment software on the way out? Where is computer-aided instruction headed? Are computer prices going to come down even further?

Many of these questions will be answered at the Summer Consumer Electronics Show (CES) to be held in Chicago the first week in June. For now, by looking at the events of recent shows, we may be able to spot some trends and speculate on the future.

At the 1982 Summer CES, the home computer was beginning to be recognized as a desirable consumer product. Texas Instruments had paved the way with new people-friendly technology never before offered to consumers. And while TI had been concentrating on advanced work in the elec-



The Learning Company was one of the first software companies to market programs for the IBM PCjr. Their popular education series is targeted to this new home user.

## PREVIEW OF Summer's Consumer Electronics Show

tronics lab, Atari, Commodore, and others had not been idle—they were busy planning intensive marketing campaigns to scoop up their share of the new market. The airwaves soon filled up with the celebrity-inspired sounds of the "new tech" advertising.

A year ago, CES was full of start-up third-party developers promoting their software for the various home computers. Manufacturers of both hardware and software began to ramp up production, and store shelves began to fill. In a battle for market share, prices



Competition is really heating up in the home education market. DesignWare has offerings in this area for Apple, Commodore, and IBM.

of the home machines were repeatedly slashed, rebates became the norm, and a full-scale price war catapulted the market into a state of confusion.

Then, on October 31, 1983, TI announced its withdrawal from the home computer market. One day later, IBM "unshelled" its PCjr (code-named "Peanut"). In the six months since then, we've seen Mattel and Timex pull the plug, Coleco run into quality control and shipment trouble, Commodore announce—then put on "indefinite hold"—a new line of machines, and Apple

begin to posture in the home market while unveiling its long-awaited Macintosh.

Beginning at this summer's CES we can expect to see some interesting marriages between home computers and other high-tech devices such as laser disks. There should also be evidence in abundance that home computers will be used more as tools, not toys. The maturing software industry is hard at work developing home productivity packages for the most popular computers. In the past, home computer software development centered mainly around arcade gaming. Now



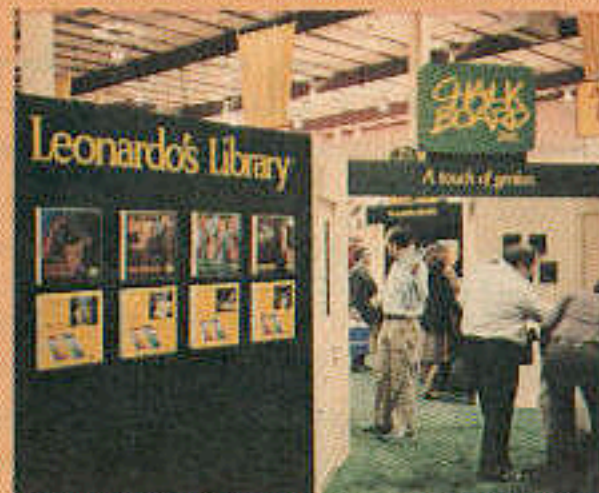
First Star Software, Inc., is one of the many new vendors now competing at the low end of the home market with several titles for Commodore and other machines.

the trend is towards entertaining educational programs and productivity tools.

The first productivity packages have, in fact, already arrived in the form of scaled-down office tools (word processors, spreadsheets, and the like). But the home environment demands its own set of productivity tools. Areas such as energy management, dietary and menu planning, physical conditioning, wardrobe coordination, and security await the creative genius of today's software developers. The Summer CES will shed light on new software that is more supportive of the home user's needs.

Industry watchers expect a continued explosion in Commodore add-on products and an abundance of new software for the IBM PCjr and the Apple Macintosh. There will also be more consumer-friendly software for the Apple IIe as a drop in price causes its user base to skyrocket.

New networking options will make these machines more attractive to schools and small businesses. Much of the latest productivity software really needs the speed and storage capacity of a "hard" disk drive (also called a Winchester) to be effective, but the



The world of home computer art is being enhanced by the light pens, mice, and touch pads offered by companies like Chalk Board, Inc. Adequate software support for new peripherals is crucial.

cost of putting one on each computer is too expensive. Networking with four or five computers that can share a printer and hard disk will provide an effective solution for small businesses and schools.

Prices on both computers and software should continue to drop during the remainder of 1984, though not as fast as during the recent price wars. Instead, look for more advanced products at prices close to those for earlier versions. We expect to see 128K-byte machines with a single disk drive start to become the *de facto* standard for the productivity home computer by year's end—with 64K-byte machines dominating the entertainment/educational niche.

Will all this come to pass? The answer lies in Chicago, where the Summer CES will set the stage for the final act of this year's home computer drama.

—Digest Staff



Entertainment software is certainly not dead, just more sophisticated and flashy. Adventure International has been producing challenging games for several years.

# Software Trends

## HOME-TRIAL OR PIRACY?

Software companies have resorted to paying for the consulting expertise of former pirates who help them devise ways to thwart program theft. Now that software rental companies threaten to cut into sales, the companies are more concerned than ever to develop un-copyable software. The software lease outfits argue that it makes sense for customers to rent software and try it out in its home setting before they buy it, and they'll give the customer a discount on the purchase price if the software works out. Outraged software companies counter that giving customers the opportunity to rent software doesn't create later sales. They say they're losing those sales altogether as the customers make their own copies of the software before they return it to the rental company.

## FEMINIST NON-VIOLENCE

Elizabeth Stott and Lucy Ewell of Rhiannon believe personal and home computer software has always been designed and targeted with a male audience in mind. They're out to rectify the situation with a series of four adventure games designed expressly for girls. Addison-Wesley will publish the non-violent adventures—*Jenny of the Prairie*, *Chelsea of the South Sea Islands*, *Cave Girl Clair*, and *Lauren of the 25th Century*—for the Apple II, II+, and IIe this spring. Each game will retail for \$39.95.

## A MARRIAGE MADE IN JAPAN

TV and computing finally have more than a monitor in common. Sony Corporation has developed the technology for locally transmitted games and data—including still pictures—over cable TV lines. Cable companies in Japan will be the first hardware customers this summer. Not much is scheduled here yet, with most U.S. companies just in the "interested stage," but Broderbund has granted cable rights to their software to The Games Network of Orange County, CA.

## SOFTWARE HARDESELL

Software companies are adopting the aggressive marketing strategies that characterized the home computer hardware wars of last year. Sierra On-Line offers \$5.00 rebates on its educational programs and will give away a free game for every purchase of two; a coupon from their *Quest for Tires* nets the buyer a free "B.C." poster. Spinnaker will give away a free program for every purchase of four; and Parker Brothers offers a \$15.00 rebate for every purchase of two games. Epyx offers its "preview disks" of program excerpts at \$2.50, and K-TEL courts dealers with budget-priced software (\$10.99 for cassettes, \$12.99 for diskettes) for guaranteed sale or exchange and offers to freshen dealers' wares every 90 days.

## DIVISION OF LABOR: THE GOOD, BAD, & UGLY

The costs of maintaining programming staff have convinced CBS Electronics and Sirius Software that they should focus on marketing and buy programming designs from outside firms. Others have decided the reverse: Imagic will focus on program development and leave the marketing to other firms, and Synergistic will stop publishing and concentrate on developing software. Such neat divisions of labor don't always work out, though, especially when one or both of the parties continue (or decide later) to both produce and market software. A case in point is the bitter feud between Software Arts, developers of *VisiCalc*, and VisiCorp, the firm that has marketed the program since 1979. Software Arts claims that VisiCorp is marketing *VisiCalc* much less energetically now that VisiCorp's own windowing integrated spreadsheet, *VisiOn*, is out. It's now up to the courts to measure marketing "energy levels."



# Computers Enable the Disabled



The day is coming when personal computers will be as important to handicapped people as their wheelchairs, hearing aids, and seeing eye dogs are now. Computer technology holds an exciting potential to allow handicapped people to participate freely in the mainstream of life. Unique applications of hardware and software can actually become the eyes, ears, voices, and hands of those who cannot use their own.

The concept may seem a bit strange to most home computer users, who depend on the conventional route of keying in programs, viewing monitor displays, and reading hard copy from a printer. How can a person with cerebral palsy who can't type, or a blind person who can't respond to screen prompts, use a computer? And what good is a personal computer to a quadriplegic, whose movement may be limited to nodding the head, raising the eyebrows, or even just breathing?

Handicapped users can take advantage of a computer's ability to receive and generate information in many forms. The computer doesn't really "read" the words we type in at the keyboard, or "talk" to us in the sentences we see on the screen. The Central Processing Unit works with electronic impulses: Input and output can be converted to whatever form is best for the user—whether it's

visual, aural, or tactile. A computer can serve as an electronic translator that compensates for the user's disability.

## The Future is Here and Now

This kind of "miracle technology" is not years down the road—the dream product of obscure and unfunded research. Speech synthesizers, which are already used in everything from videogames to talking Coke machines, can make verbal communication possible for people with severe speech difficulties. The user just types in a sentence, and the speech synthesizer produces an understandable message. Speech capabilities are also used by blind writers and students, who can have the computer "read back" what has been typed at the keyboard, thus allowing instant error-checking.

In many cases, accessories that were developed for commercial appeal are perfect for disabled users. Touch tablets such as the Koala Pad are sold as graphics aids and as an alternative for children too young to handle a joystick. But these digitizing devices were a big breakthrough for people with cerebral palsy. Someone who doesn't have the motor control to write legibly, but who can scrawl signs with some kind of regularity, can use the Koala Pad along with a program that recognizes those signs and translates them into print.

Light pens, also marketed as an artistic novelty or a child's toy, can be held in the mouth or strapped to any motile part of a paralyzed person's body. They can be used to select menu options, draw on the screen, or even "type" commands on a simulated keyboard display.

Much of the new "enabling" technology was pioneered by disabled programmers who wanted to continue or begin a career in computer science. Programmers who lacked the manual dexterity to type in their programs were the innovators behind the development of special keyboard overlays, breath-controlled switches, and levers. The Optacon, a device that translates output from a monitor into braille, is used by blind programmers in specialized vocational training programs. Programs such as *PC Speak*, which lets a blind user scroll through the program while a speech synthesizer reads each screen aloud, were originally developed to make spreadsheet programs like *VisiCalc* more accessible. Developments of this type can open doors for disabled people in all walks of life.

## Better For Everyone

What's merely convenient for the average home computer user can be truly liberating to the handicapped. For example, the Apple "mouse," now used with the Lisa and Macintosh models to make word processing and spreadsheet programs faster and more fun, can also be used as a screen pointer to make standard software accessible to people who can't type on the keyboard. Likewise, the IBM PCjr's programmable keyboard can also make multiple keypresses manageable for a one-handed typist, or for a paralyzed person who uses a mouth stick to punch in commands. And a program that dials the telephone may be just a novelty for most people, but can mean more independence for a mentally retarded person who chooses to live alone.

Other trends, such as electronic mail, at-home shopping, and computerized information sources will provide a new way of life for people unable to go out

or communicate by telephone. Communications networks and electronic bulletin boards are a boon to deaf people, who can work or socialize via the keyboard, instead of depending on teletype systems that can be cumbersome, and are usually owned only by other deaf people. The computerized systems will give them a standardized means to interface with a much broader segment of society.

## Meeting the Challenge

Many new markets and industries have been opened up by this computer-hungry sector of the population. Some handicapped people have gone on to form small companies specializing in the development and marketing of hardware and software to meet the needs of disabled people. Others have initiated training programs to help disabled workers enter the job market. IBM and other corporations have turned to consulting firms for help in making their workplaces accessible to disabled employees, and computer skills are becoming increasingly important for rehabilitation counselors and trainers.

But many handicapped-rights advocates worry that progress is too slow and the equipment too expensive to benefit the people who need it. They are concerned that disabled people's needs will be bypassed in the rush to bring out profitable mass-market products. Dedicated companies that place need before profit and sell goods at cost do exist—but are not the norm. Disabled activists have organized to advise computer companies of their priorities, and to lobby for action. They have developed information networks and specialized publications to help people learn about and locate what they need.

So keep an eye on the desk next to yours. You may soon be working alongside a quadriplegic who uses a voice recognition module and microcomputer to thumb through files and write up a report, the same way you use yours to help keep your checkbook in balance.

—Joan Killough-Miller

# New Tech News

## A NEW MICRO-FLOPPY FROM JAPAN

The Apple Macintosh is making the Sony 3 1/2" floppy disk drive a standard in America, as the new micro-floppy gains in popularity. This same drive—although a fixed-speed version—has helped make the Hewlett-Packard 150 a very popular business computer. Some third-party developers have also come forward with 3 1/2" drives for other machines (e. g., the Apple II series and the IBM PC) Meanwhile, rumor has it that Mitsumi Electric in Japan has been perfecting a 2.8" drive which should prove to be very stiff competition for any of these products. The drive utilizes a single spiral track (as opposed to the standard concentric circle tracks) that allows it to access program and sequential files at incredibly fast speeds. It is said to load a 64K-byte program in about 8 seconds, but will be priced in the same range as an inexpensive cassette recorder. The new disk drive's medium is being developed by Hitachi, Ltd. (a subsidiary of Hitachi Maxell), and its reported \$2 price tag makes it a prime candidate for home computer applications.

## NEW APPLE IIe

Apple is rumored to be testing an Apple II series compatible "transportable" computer. It is said to be based on a 65C02 microprocessor and to have 128K of RAM, one 5 1/4" single-sided, single-density disk drive, and a built-in keyboard in a 13" x 17" x 4" unit. (Note that a monitor is not included.) All existing Apple software would run on the machine, but while the new microprocessor is a step up from the old 6502—featuring two new addressing modes and 27 more op-codes—it can't boast the power of newer 16- and 32-bit processors. No release date has been set, and while the price tag is expected to be below \$1000, Apple so far will say only that it "does not comment on unannounced products."

## WHAT WILL jr RUN?

Spinnaker, a leading third-party publisher of educational software, has once again distinguished itself by being the first publisher outside IBM to ship software for the PCjr. All three of the cartridges—*Facemaker* (\$34.95), *Fraction Fever* (\$34.95), and *Kindercomp*

(\$29.95)—come from their educational software "will-sell" list and are the result of months of careful translations. Along with Sierra On-Line's *HomeWord*, these Spinnaker offerings should keep PCjr users RUNNING until the second wave of PCjr software washes up on the retail beaches.

## SINCLAIR PREPARES FOR QUANTUM LEAP

The company that brought us the first micro-micro for the home (the ZX-81) will soon be releasing the QL (for Quantum Leap) personal computer. Sinclair's 68008-based 128K RAM machine will include a dual continuous-tape-loop microdrive for up to 100K-bytes of data and sell for a mere \$499. A .5-megabyte RAM add-on will follow. The operating system will be called Q-DOS, and the native language will be SuperBASIC (an enhanced version of Sinclair's Spectrum BASIC). In addition, a London-based software house, Psion Ltd., is working on applications for the new machine that include the four most commonly used business packages: word-processing, spreadsheet, database management, and graphics. The exact release date hasn't been announced, but third-quarter mail order availability in the U.S. is expected.

## AND NOW... jr COMPATIBILITY

While many continue to ask, "Is it PC-compatible?" Mindset of California has introduced a new home computer that may start people asking, "But, is it compatible with the PCjr?" A fully configured PCjr lists for \$1269. Mindset should be a faster and more powerful machine because it uses the 80186 (an upward-compatible relative of the the 8088 and 8086); it is PC-compatible at less than \$1700. The System Unit, featuring a detachable 84-key low-profile keyboard, 2 cartridge slots, a custom video processor, Microsoft's GW Basic—but without a disk drive—carries a suggested retail price of \$1099. Rumor has it that Mindset developers have plans for an adapter for the cartridge slots that will give Mindset access to PCjr's cartridge-based software. Looks like this new start-up firm has its mind set on giving Big Blue a run for the up-scale home computer market.

"Mathematical functions act like recipes for your computer. Your input is the raw ingredients, the computer cooks them according to the recipes, and the output is the finished meal."

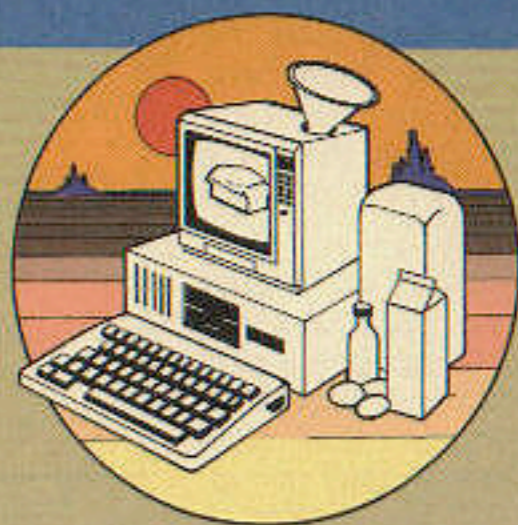
## On the Road to Computer Literacy



## COMPUTERS: MAGICAL MATH MACHINES

MAPPING & FUNCTIONS

### Part 2



**H**ave you ever wondered how computers can monitor a nation's missile defense system, generate a company's payroll, and provide medical diagnoses?

Or how they can print out your Christmas card list, control your microwave oven, and play games with your four-year-old?

It's all done with numbers—simple mathematics. The key to how these complex machines work is as basic as on or off, positive or negative, one plus one.

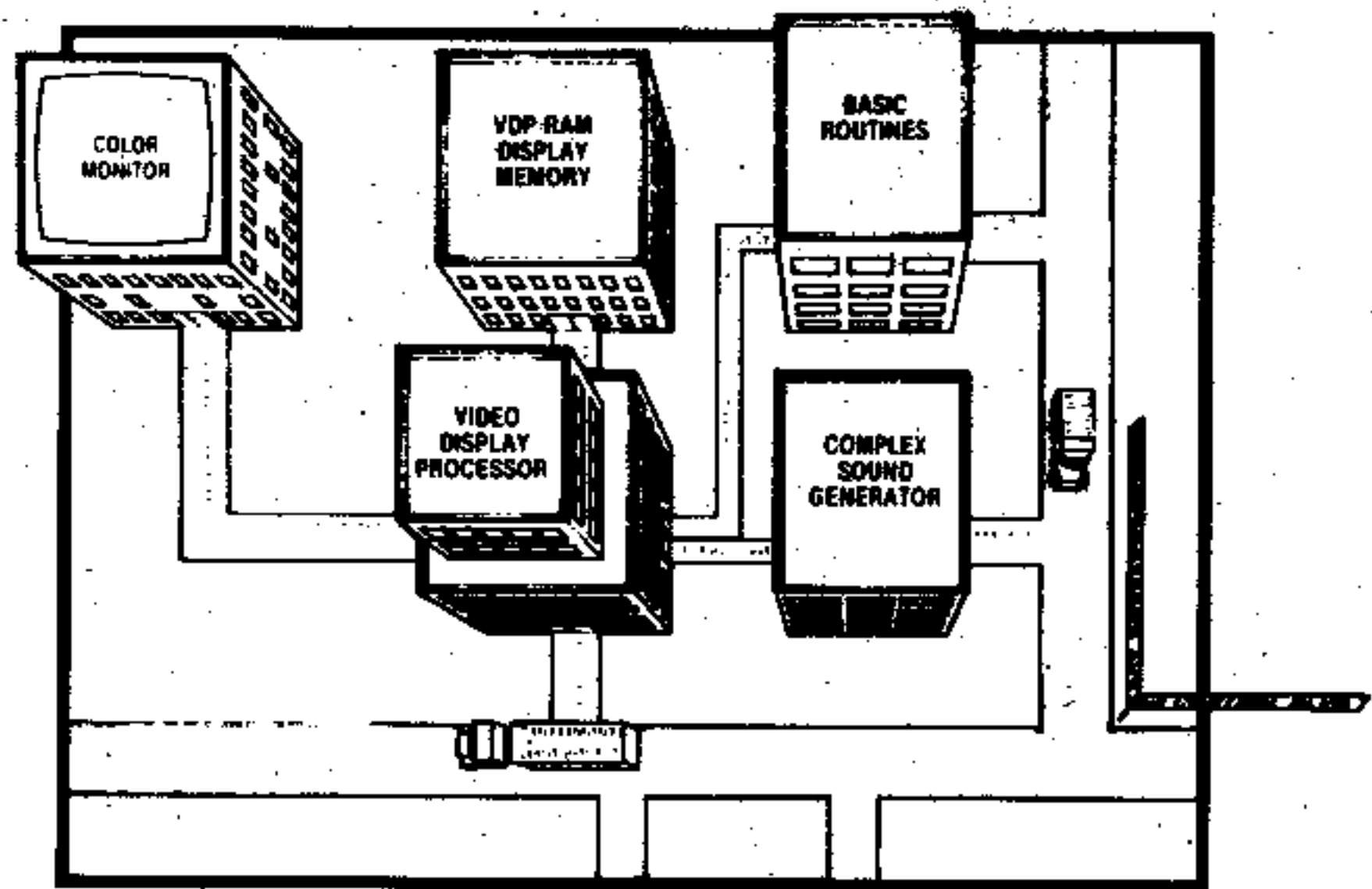
Understanding how a computing machine "thinks" involves understanding elementary mathematics. All computers use simple mathematics to transform a set of instructions into action. These sets of instructions—programs—organize and transmit data, solve problems, play games, and—through interfacing with other types of machines—even perform physical labor.

One of the most important mathematical ideas that all computers use is **mapping**. Computers use maps in much the same way we do. A city map isn't identical to the city itself—it's just a piece of paper after all—but once you understand what its symbols represent, it becomes a tool to help you find your way around. The map is useful because there is a one-to-one correspondence between the symbols on it and the actual places they represent. If you see the symbol for a mountain on a map and the symbols for the roads leading to the mountain, you can follow the actual roads and find the real mountain.

Mapping in mathematics is very similar—one set of symbols is said to "map" a group of numbers or other symbols onto another group. It's a lot like writing a report. You have a group of thoughts to convey that you map onto a piece of paper in the form of notes or an outline. Because you do the mapping yourself, you know what thoughts the notes stand for. Later, you can map those notes into readable sentences and paragraphs so that your original thoughts are conveyed to your reader. We have rules of grammar and syntax that allow you to map the sentences and paragraphs back into your thoughts, so that in a sense you have "mapped" your thoughts onto those of your reader.

### Mapping With Mathematics

Mathematics has a variety of rules for mapping. One major type of mathematical mapping is called a **function**. A function maps one set of things onto another in a unique way. You can think of these function maps as working like a recipe for baking a loaf of bread. The recipe calls for specific quantities of ingredients—say, 4 cups of flour, 2 table-



*Computers use maps in much the same way we do. The map of a city isn't identical to the city itself—but once you understand what its symbols represent, it becomes a tool to help you find your way around. The map is useful because there is a one-to-one correspondence between the symbols on it and the actual places they represent.*

spoons of honey, 1 package of yeast, 2 teaspoons of salt, 2 cups of milk, etc. The recipe also includes instructions for combining the ingredients to make the bread. If you combine them according to these instructions, you will get the same amount of bread every time. In fact, if you follow the instructions precisely, then you will get an identical loaf of bread every time (given identical ovens, relative humidities, temperatures, etc.).

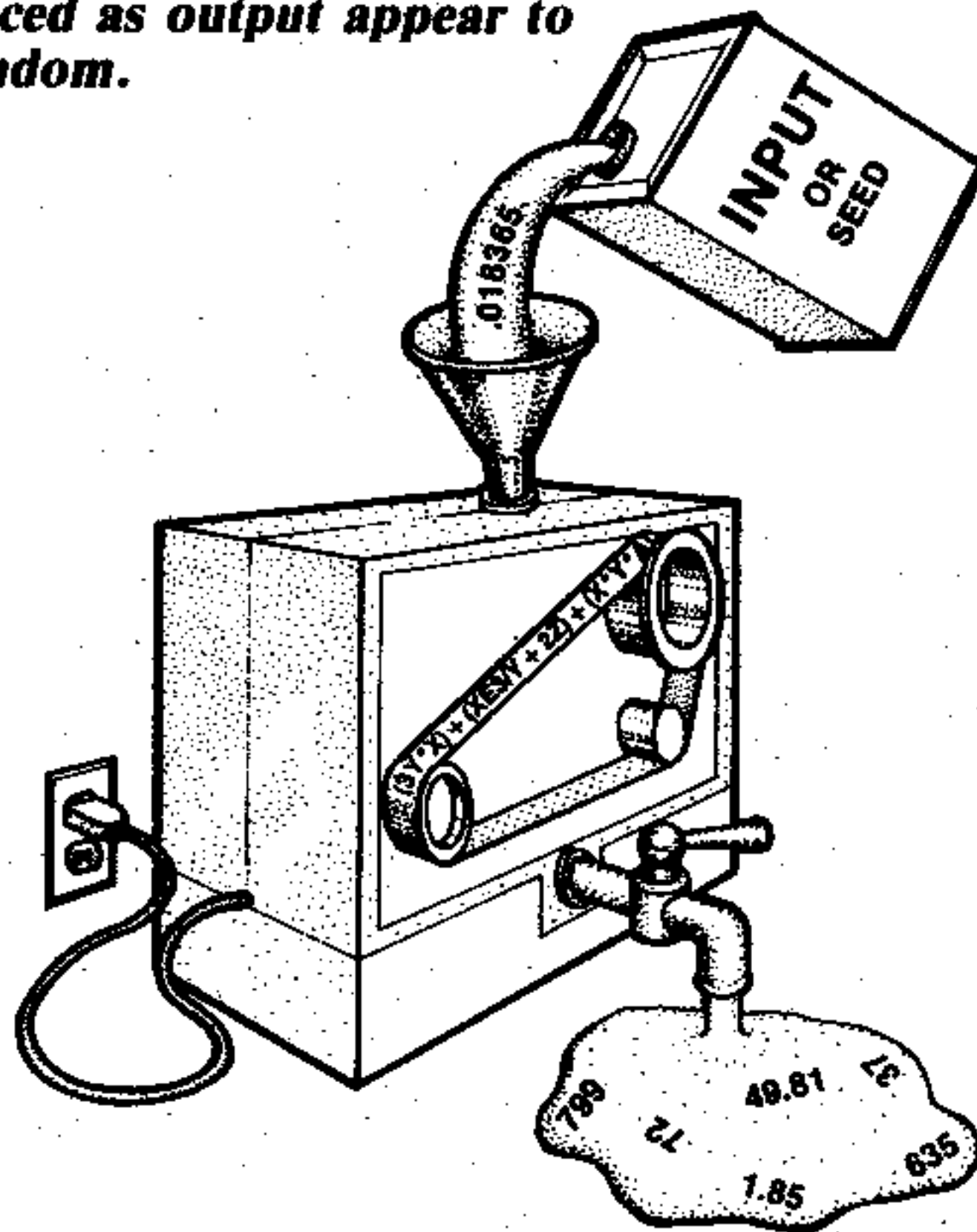
Mathematical functions act like recipes for your computer. Your input is the raw ingredients, the computer cooks them according to the recipes, and the output is the finished meal. For a given set of numbers a mathematical function returns a **unique** answer. Because mathematical functions work like this, we know that when you use a specific function it will return its own unique answer every time and that any other answer is wrong.

The idea of a unique output (the bread or the answer, depending on what you put in) does not mean that the only way to get a different output is to use different inputs. Some functions give the same answer for several different sets of input. For example, the function  $y = 0 * x$  always has the same answer because any real number  $x$  multiplied by zero equals zero. There is, however, one critical test of a function: For any

given input, a unique output results.

To understand functions better, let's look at how they are used in our lives. Income tax (a subject near and dear to our hearts) is a good example of how functions affect us all. The amount of tax you pay, the number of people you support, and your tax-deductible expenses are all functions of your income. If, for

*A typical program takes advantage of a specialized function called a "random number generator." The function in your program accesses this and tells the computer to respond with a unique output. It does this by entering a number into a complex mathematical function. The series of numbers produced as output appear to be random.*



a given income and set of conditions two people paid drastically different taxes, it would cause a lot of problems. Needless to say, the functions are so complex that it might seem they do pay drastically different amounts, but generally the mathematical functions used see to it that for a given income and deduction schedule a unique amount of tax is paid.

### A Function Machine

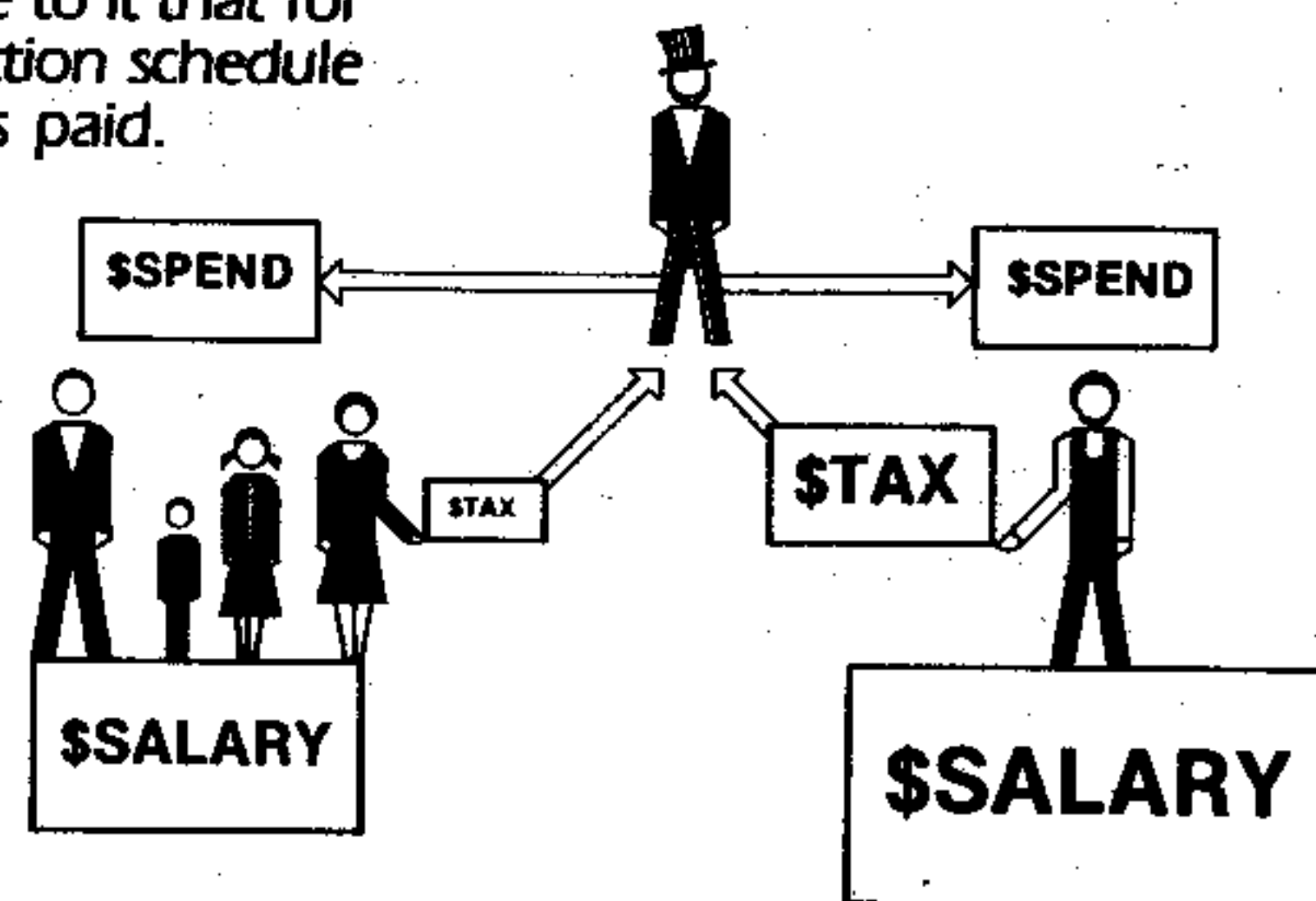
The reason we've spent so much time explaining mapping and functions is that computers are primarily function machines, and their programs are the functions that they implement. When you tell a computer in BASIC to PRINT "HELLO" you know

that it will put the word HELLO on the screen. That's because it understands that the BASIC function PRINT means to put on the screen the word or words that are contained within the quotes. Every time you tell it to PRINT it will do so, because the function PRINT has certain rules that make it always give a unique output for a given input.

When you write a program on a computer, it's like writing a whole series of connected mathematical functions that will give a unique output for a given input. When your program RUNs it will always give the identical output for identical input. The output will always be uniquely connected to the input by the functions that the computer implements in the program.

What about game programs? They change every time played (if they're any good), even if the same options are selected. Though this seems contradictory, there is a mathematical answer. Games employ a specialized function called a **random number generator**.

A function in your program accesses this specialized random number generator and tells the computer to respond with



*The amount of tax you pay is a function of the number of people you support and salary. Mathematical functions used by the government see to it that for a given income and deduction schedule a unique amount of tax is paid. Some functions yield the same output (spendable income) for different sets of input (salary and deductions).*

a unique output. A number called the **seed** of the random number generator is entered into a complex mathematical function, and a series of numbers is produced that seems quite random. The program then instructs the computer to make decisions based upon these seemingly random numbers, which, in turn, make the game operate differently every time.

In most game programs, if you could seed the computer's random number generator in the same way every time, you would always get the same game. Luckily, computer programmers see to it that a random seed is entered into the random number generator each time the program runs. This makes

the game respond with a unique output each time. So you see, functions can even be made to appear to be non-functions if you know how to use them.

Now that you know computers are based on functions, you see how they can be so useful. If you want your computer to solve math problems for you, it's obvious that its mathematical functions will figure them out correctly every time—if you program the functions correctly. If you program them so the functions don't adhere to the rules of the problems, you will get a lot of wrong answers—though you can rest assured you will get the same wrong answer for the same problem every time because the computer will be consistent in giving you unique output for your input.

These function machines (computers) can also be interfaced to data storage devices that will keep track of vast quantities of data for you. They can be programmed to use functions to check for system errors. A computer's functions can even be made complex enough to control entire manufacturing processes—all because every given input will always produce a unique output.

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**“... functions can even be made to appear to be non-functions if you know how to use them.”**

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# Industry Watch

## COURSE CHANGE AT COMMODORE

Recent turnovers in the management at Commodore have kindled much speculation about the company's future. When Commodore's founder and president, Jack Tramiel resigned in January, four other top executives soon followed suit. Shortly afterward, the company announced that it would delay production of its new 264 and 364 computers. This decision may stem partly from management upheaval and partly from the critics' reaction to the new machines at the Winter Consumer Electronics Show. Many observers felt that the machine was not a significant improvement over the C-64. And the fact that it also wasn't directly software-compatible with the C-64 didn't help matters any. Clearly, Commodore is going through some growing pains, making many C-64 owners uneasy about continued support of their favorite machine. But it is unlikely that Commodore will soon scuttle its most popular product. The Commodore 64 is selling extremely well right now, and provides a healthy cash flow for a company in transition.

## VIDEOTEX COMES CLOSER TO REALITY

Home computer-based shopping, entertainment, banking, and other kinds of information retrieval—videotex—has been in the formative stages for years, but only now does it seem ready to take off. Three huge backers—CBS, IBM, and Sears—have undertaken a joint venture intended to tap computer households. Other companies have attempted similar ventures, but none has had the combined clout that is possible with a conglomerate such as this. The companies predict that they will need several years to put their videotex plan into full operation, but that it could become a 30 billion-dollar industry within a decade. The road to riches won't be easy, however, because sales of that magnitude require at least half the homes in America to have a home computer. The "Big 3" expect that the availability of videotex services will be a strong enough incentive for consumers to buy a computer—thus making their sales forecast a self-fulfilling prophecy.

## DATA DEWAR'S DELIGHT IN DOING

The Dewar's Profile of Computer Professionals is based on interviews with over 300 men and women in this field. According to the survey, job satisfaction is extremely high: over 90% would not leave the field. Over 80% would not even change to another area in data processing. It may come as a surprise that this "technical" industry has a high regard for language skills. Creative liberal arts graduates can do well in many areas of this business. The chief complaint heard among computer professionals is that there is still too much paper work. Although some observers predicted that computers would help eliminate this burden, it is still the bane of many people employed in the computer field.

## TECHNO-WAR WITH JAPAN

Food for threat: First we nearly reached Sputnik-level hysteria over Japan's progress towards developing a super-powerful computer. Then we shuddered at reports of super-cheap, powerful micros soon to cross the Pacific to devastate the machines we know and love. The latest scare is seen as a Japanese infringement on software produced and copyrighted by U.S. firms. Japan's Ministry of International Trade and Industry proposes to enhance software development in that country by forcing foreign companies to license software to Japanese firms if such is in the national interest. American software companies see Japan's proposal as nothing more than piracy, and they are protesting it via the U.S. embassy in Tokyo. On another front, Japanese developers of machine tools for manufacturing integrated circuits are making great strides to capture the world market. In a market whose sales could approach six-billion dollars this year, the Japanese could easily slice off a third of the pie—more than doubling their share from last year. U.S. producers of such equipment are countering the Japanese attack with unprecedented expenditures for research and development.

# Celebrity Software and Software Celebrities



Celebrities have long been involved in the promotion of computers and software. One has only to think of Bill Cosby, Alan Alda, and Charlie Chaplin on TV, of Leonard Nimoy and even Minnesota Fats at recent computer shows. But the luster of celebrity will shine from within soon, as software companies marry expertise and famous names and scenarios with computer programming. There's even a movement afoot to create software's own heroes and celebrities.

While Japan diligently perfects the technology for expert, knowledge-based systems, software companies in the U.S. have blithely embarked on "expert-based" software production. The new software comes from the collaboration of famous and near-famous experts in their fields with software programmers. James Fixx, author of *The Complete Book of Running*, has contributed fitness lore and his name to MECA's *The Running Program*. Investment advisor and best-selling author Andrew Tobias has developed *Managing Your Money* with MECA's programmers.

We're not sure how extensive his actual contribution will be, but Mr. Rogers will at any rate lend his prestige to CBS Software's preschooler software, and Sesame Street's Big Bird, Cookie

Monster, and Ernie will star in Atari's educational games aimed at the 3 to 7 years set and promoted by the ubiquitous Alan Alda. Other famous names and characters are coming on-line: the late Bruce Lee's name has launched Datasoft's new martial arts adventure game; Marvel Comics' Super Heroes(tm) will appear in software from both First Star and Adventure International; and Walt Disney characters will star in software from Atari.

Famous fiction writers will lend their illustrious names and scenarios to computer games too. Simon & Schuster has prevailed upon the likes of *Galaxy* editor and seven-times Hugo Award nominee James Baen to prevail upon the likes of John Chenault (*Snake!*) and Stephen Walton (*Starclash II*) for scenarios. And next season the Baen series will release Robert Heinlein's *Glory Road*, Stephen R. Donaldson's *Animal Love*, Poul Anderson's *The Game of Empire*, and Larry Niven's and Jerry Pournelle's *Inferno*. Simon & Schuster will also turn Douglas Adams' *The Hitch-hiker's Guide to the Galaxy* into an adventure game series. Epyx will release *Robots of Dawn*, based on the book by Isaac Asimov. Miyamoto Mushashi's 300-years-old *A Book of Rings*, recently a best-seller among businessmen who find

parallels between their concerns and those of a samurai warrior, will go on from that unlikely success to become an adventure game. Authors' contracts will have to include software rights as well as paperback and movie rights from now on.

Lest it run out of celebrities from other media, software has also begun to turn out its own notables. Scott Adams has been something of a cult hero among fans of his adventure games. Now his software company, Adventure International, will release the first of its series of adventure games featuring Marvel Comics Super Heroes as a Limited Edition Scott Adams Signature Series. Along with Adams, First Star Software's Head of Design and Engineering, Fernando Herrera, is among the first true software celebrities. His games have won awards, and he has been honored by both the Toronto Film Festival and

UCLA's Video Game Conference. Herrera was the first software author to conduct an autograph signing, but he's not likely to be the last. This spring Simon & Schuster will launch their software writers on "author's tours." Their first candidate for the star system treatment is Sat Tara Singh Khalsa, a programming Sikh whose *Typing Tutor I* and *Typing Tutor II* for Kriya Systems are already best-sellers. Simon & Schuster will send Khalsa on a media blitz this spring to publicize *Typing Tutor III*(tm). In time-honored author's fashion he'll appear under Simon & Schuster's auspices on radio and TV talk shows, at press interviews, and at autograph signings in eleven major cities. And to think that only a year or so ago programmers were fixed in the public mind as those pasty-faced white-socked fellows happily programming in obscurity!

—Erin O'Connor

## Why . . . cont. from pg. 5

added convenience and indestructible packaging, the disks sell for approximately the same price as premium-grade 5 1/4" diskettes.

In comparing the amount of data storage available on these smaller disks, Sony says its disks have 437.5K-bytes maximum capacity, which is more than a double-sided, double-density 5 1/4" disk on the IBM PC. Technological advances have made denser storage possible (i.e., more tracks per inch), due in part to the more rigid packaging and the increased stability of the way the disk is held in the drive.

The 3 1/2" disk drive on the Hewlett-Packard 150 uses a format such that the disks hold 270K-bytes. Meanwhile, the Macintosh puts 400K on each disk by utilizing a variable-speed motor in the drive.

You may be wondering why these advances have not been applied to 5 1/4" disks. Well, now they have. Kodak has just released a 5 1/4" disk drive that will allow a special disk to hold nearly 10 times the normal amount of data (3.3 megabytes). However, interfaces are not yet available for major computers (See *Home Computer Digest* 1.1 for details on this drive).

Even with all the advantages that the smaller disks have, a great furor has arisen over which of the small disks (3", 3 1/4", or 3 1/2") will be the "standard" micro-floppy in the industry. Many people say the Sony 3 1/2" has already become the de facto standard, but considering the lack of any standard format (Sony, H-P, and Apple all use different ones), one of the other disks may yet gain supremacy in the fight to become the standard disk. In April, the American National Standards Institute (ANSI) will vote on a resolution declaring one of these different micro-floppies as the industry standard, but it's our guess that the marketplace will determine the true standard.

—Roger Wood

# Computers in Education

## PLATO GETS NEA SEAL OF APPROVAL

Control Data Corporation's PLATO courseware—available on the Apple, IBM, and Texas Instruments home computers—has earned the coveted approval of The National Education Association. Evaluations conducted by teachers and programmers found PLATO's Math, Foreign Language, and Computer Literacy packages (16 specific titles in all) technically reliable, educationally sound, and easy to use for both teachers and students. The NEA's nearly two million members have yet to react to the news, but CDC is busy converting more titles to run on the Apple and IBM.

## UNIVERSITIES HAVING MAC ATTACK

Twenty-four American universities have joined the Apple University Consortium (AUC) to get the \$2500 Macintosh at a large discount. While retailers worry about how such discounts will affect their hardware profits, Apple is reportedly counting on \$60 million in commitments from consortium members over a 3-year period. In return for their discounts, the universities are each expected to purchase \$2 million in Apple products as well as develop curriculum, new applications, and educational software for the Mac. IBM will undoubtedly keep a close eye on what happens because some AUC members also have similar contracts with Big Blue. The winner in this battle for dominance in academia's hallowed halls may not be IBM, Apple, or commercial software producers. With educational software coming out of prestigious universities, the consumer will emerge the real victor.

## A VIDEO GAME A DAY...

The new Basic Books publication *Mind At Play: The Psychology of Video Games* offers arcade fans new justification for the time spent in pursuit of the supreme score. Authors Geoffrey R. Loftus and Elizabeth F. Loftus applied the results of psychological experiments to video games—"electronic Skinner Boxes"—and found that they have a positive effect on memory retention. The same elements that keep you depositing coins also condition your mind to expect the unexpected, to remember details, and to respond quickly to each encounter. The book presents evidence that video games are fun, educational, have military training potential, and can even be substitute friends! Where else can you get all that for a quarter these days?

## SCHOOL DAYS ON 25 DISKS OR LESS?

Kaypro, looking for ways to court the home computer market, may be eyeing the schools. At Winter CES, David Kay, Kaypro's vice-president of marketing and sales, implied that their next move could be a combination of putting large quantities of educational courseware on diskette and creating a low-cost, disk-equipped computer to lure educators and then parents to the Kaypro product line.

## COMPUTERS: PRESCHOOL TOOL OR TRAUMA?

Are preschools with computers preschools with a plus, or is teaching technology to tots merely accelerated alienation? Experts feel that adult involvement makes all the difference. Certain child-development specialists have warned against long periods of passive, non-interactive computer use that utilizes the machine as no more than an electronic baby-sitter. On the other hand, if a responsible adult uses the computer with the child, the experience can increase his self-esteem, improve his social interaction, and sharpen his cognitive and motor skills.

## SECRETARY BELL RINGS EDUCATORS' CHIMES

Hot on the heels of a Presidential directive to bring computers into every student's studies comes a message from Education Secretary Terrell Bell offering federal funds to educators and school systems to develop educational software. Bell plans to give software development a "very high priority" in hopes that quality software, generated by those who need it, will encourage in-school use of computers, and will be available to the public at low prices. This news is causing concern in commercial software houses who may claim that this is government's attempt to control the software market as well as what children learn in the classroom. Secretary Bell asserts that this funding program will benefit students, which should be the main concern of all educational software developers.



# Novel Applications

## AND NOW THE GOOD NEWS

The Good Book is now available on diskette for Apple users, and versions are in the works for IBM and CP/M users. Bible Research Systems of Austin, Texas, offers THE WORD processor, which contains the entire King James Version of *The Bible*. The software has built-in programs to analyze, display, cross-reference, annotate, and print Biblical text. The program will be a great boon for theologians, but somehow we don't think an END OF FILE message will ever replace "Here endeth the reading."

## HIGH-TECH DECO

And now another reason to own a home computer: It can be your personal interior decorator. *Home Decorator*(tm), from SOFTRON, Inc., will take you in hand with expert advice on color, furniture, and room layout. With just a few keypresses you can install carpeting, paint walls, and rearrange the furniture to your heart's content. And there's no one to throw a fit if you want to try the baby grand in the far corner just one more time...

## ON DISK AND READY-TO-WEAR

Looking for a lawn mower, a cruise to Curacao, or the latest new wave album for your nephew's Bar Mitzvah gift? Your computer may be able to show you just the thing, without the hassle of crowded malls or tedious walks through the yellow pages. CompuServe is pioneering an "Adformation" service that lets you shop at home through on-line catalogs of merchandise and services. More advanced than earlier "electronic shopping" schemes that listed only simple product descriptions, Adformation will contain a detailed data base on products in ten categories: books, magazines, credit card subscriptions, club memberships, gardening and lawn care, national newspapers, records and tapes, financial services, computer products, and travel/vacation. On-screen instructions will guide the shopper in making the purchase directly from the manufacturer or through a retail outlet.

## THE COMPUTER THAT CLIMBED MT. EVEREST

Their tents are packed, the gorp is bagged, and the yaks are ready and waiting to go. This spring 16 American mountaineers and 15 Tibetan porters will attempt to retrace the "classic route" to the summit of Mt. Everest, following in the very footsteps of George Leigh-Malloy, the legendary British climber who wanted to climb Mt. Everest "because it's there." Stowed in the old kit bag, (among the seven tons of equipment the group will be hauling) will be an Okidata dot matrix printer hooked up to a Columbia VP portable computer. The system will facilitate biomedical research and financial accounting, functioning within a portable research tent, which will be heated to protect the hardware against the -30 degree chill.

The computer will coordinate the difficult logistics of the trip and insure that gear is unloaded in the proper order at each campsite. It will maintain a budget, monitor food consumption of both humans and yaks, and chart medical information such as pulse rates to warn against the danger of overexertion.

Dubbed *Ultima Thule* (a Greek and Latin phrase meaning "the outer limits of achievement"), the expedition is a far cry from the days when backpackers took the tags off their teabags to cut down on the weight of their packs.

## WANNA MAKE A BET?

Hi there, sports fans. Are you tired of taking a beating in the office football pool? *Pro Sports Stats* is a software package from Eastern Computer Consultants that lets you play Monday morning quarterback before the weekend rolls around. The program gives you complete statistical records on professional football teams from 1970 to the present. Its data base includes win/loss records, point spread information, coaching history, records of playing surfaces, and other critical statistics. Using the operating program, you can plug the relevant information into your Apple, IBM PC, or Commodore 64 (plus several other popular models), consult your team's history, and pick a winner.

# Gameware Updates

## VIDEO GAMES SPIN OFF THE BIG SCREEN

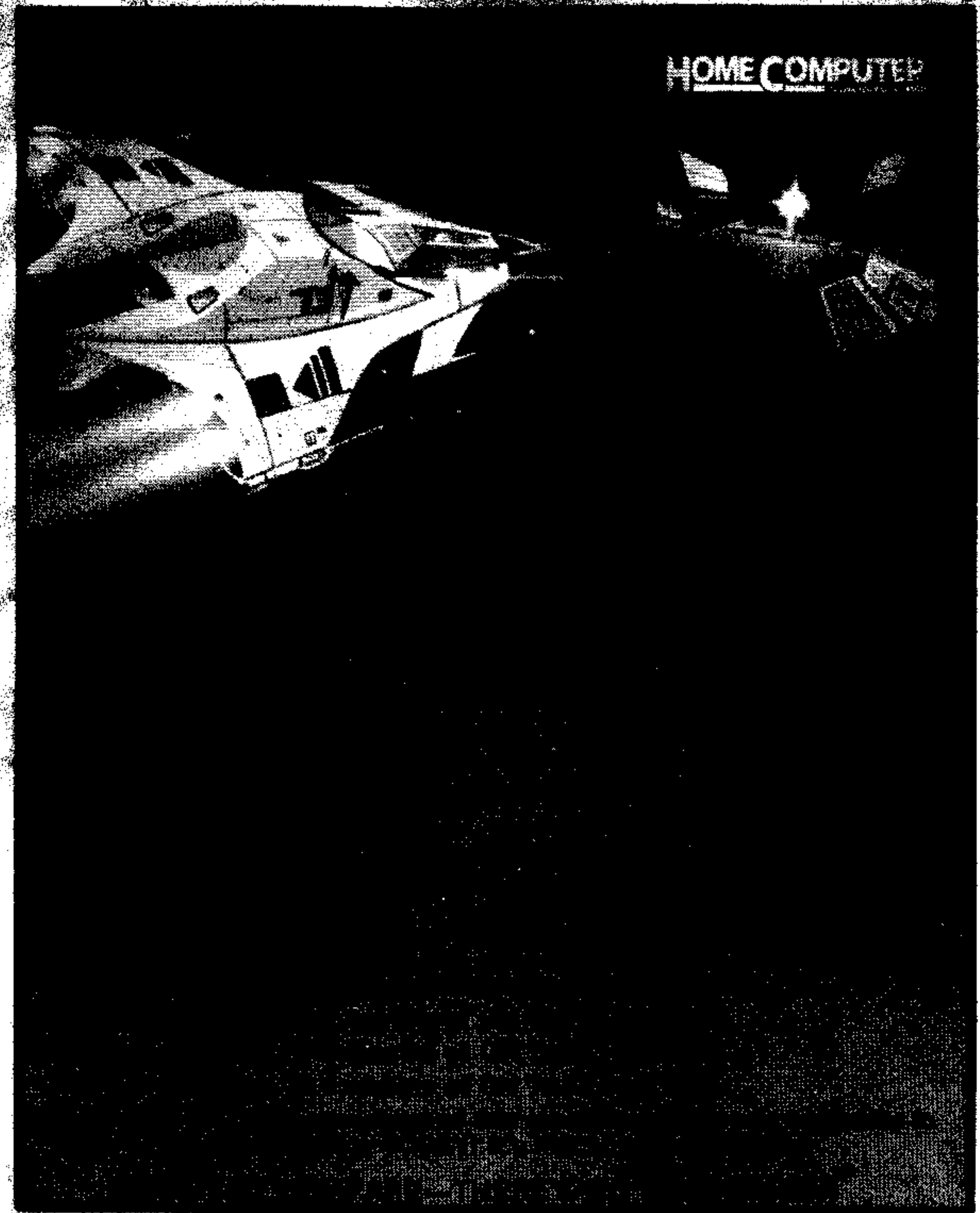
The movie release of *Dune*, Frank Herbert's science fiction classic, is expected to catch the fancy of many home computer users. This anticipation led a number of toy and video game manufacturers to vie for pre-release licensing agreements with Universal Pictures. Parker Brothers was the big winner in this contest and has been awarded the arcade and video game rights for the film, which is scheduled to be released sometime this year.

## SAILING SOFTWARE COMING ABOUT!

Landlubbers and sailors alike can enjoy the excitement of an afternoon on the water with *Regatta*, a new sailing game by Howard W. Sams & Co. *Regatta*, for the Apple II, simulates sailing races on four different lakes while a clock on the screen shows elapsed race time. Penalties are recorded each time a boat hits a buoy or runs aground. The game comes complete with an illustrated instruction manual that defines some basic sailing jargon such as running, reaching, tacking and "yarning."

## GO FOR THE GOLD—IN YOUR LIVINGROOM

Armchair athletes should be warming up the television sets and getting their sweatsuits out of mothballs in preparation for the summer Olympic Games. For those who want to start the action early, a variety of home computer and video arcade games is now available. *HES Games 84*, by Human Engineered Software, and *Summer Games*, by Epyx, have been added to the growing list that started with *Olympic Decathlon* from Microsoft. *HES Games 84* recreates a variety of summer games events including archery, springboard high diving, and weightlifting. *Summer Games* is actually a series of different games modeled after Olympic events. *Track and Field*, a surprisingly realistic arcade game that requires the player to use split second accuracy combined with a special touch on the keyboard, is expected to be adapted for the home computer in the near future.



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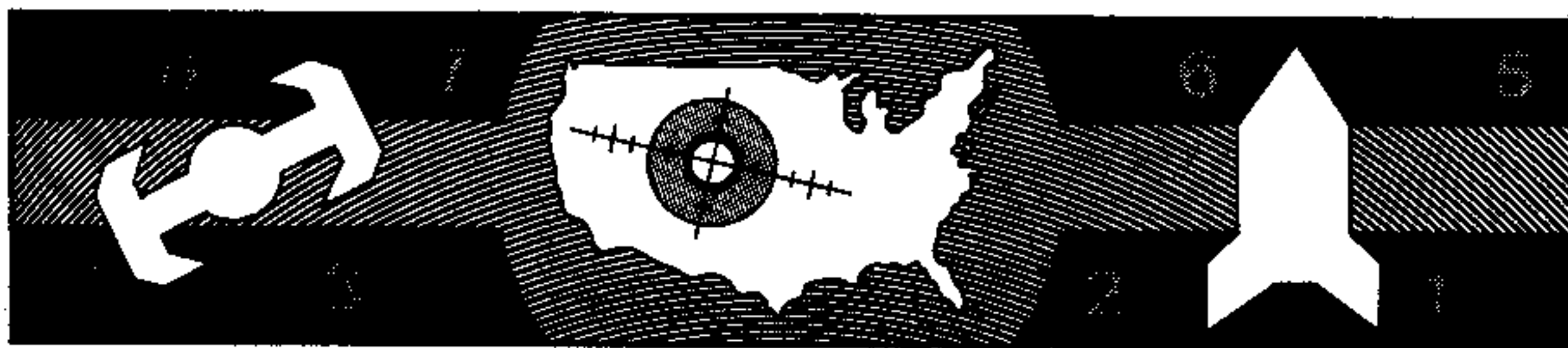
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# COMPUTER WAR

A Review by Greg Roberts  
HCM Staff

<b>Name:</b>	<b>ComputerWar</b>
<b>Program Type:</b>	<b>War Game</b>
<b>Machine:</b>	<b>VIC-20</b>
<b>Distributor:</b>	<b>Thorn-EMI</b> 1370 Avenue of the Americas New York, NY 10019
<b>Price:</b>	<b>\$39.95, cartridge</b>
	Poor Fair Good Excellent
<b>Performance:</b>	██████████
<b>Engrossment:</b>	██████████
<b>Documentation:</b>	██████████

The movie *WarGames* inspired this program that puts you in control of the computer at NORAD, the North American Air Defense System. You're dealing with a crisis: Someone has broken into the system and activated a war simulation program. Because the computer can't tell illusion from reality, it is about to fire retaliatory weapons, and that could mean the end of everything.

Your job is to make the computer believe you have eliminated the enemy missiles so that it won't launch the actual retaliation. You must wipe out the "attacking" missiles on the map. They are shown as white blips that move quickly towards their targets—missile silos in western North America. Move your cursor over the missile that seems closest to your missile base and press the fire button. Now the screen changes to a landscape that can scroll both horizontally and vertically, with arrows at the edges of the screen showing the direction in which the target is flying. Use your joystick to find the missile, set your sights on it, and fire. The targets are not hard to hit, but you must act quickly. While you are working on one missile, all the others are moving towards your bases. Once they knock out five bases, the computer responds with a real counter-attack and it's all over.

Should you succeed in destroying all the incoming missiles, there's more work to be done. You have to disable your own bases too, and you must break into the NORAD computer to do it. At the left of your screen are two grids, one much larger than the other, both filled with rows of small flashing squares. When the squares freeze, you have a few moments to set your cursor on the smaller grid and then try to place it over that exact configuration within the larger one. When you've matched the patterns, press the fire

button. Now you can move the map cursor over your own missile bases and shut them down.

## No Pushovers, These Missiles

The game is difficult, in my opinion. Everything happens so fast, it will take much dedicated play in order to get good at this one. But there's plenty of incentive to practice. The game's design is good, involving three distinctive elements of play: map, landscape, and matching grids.

All three screens are programmed in bright scarlet, and can be a bit much to stare at for long. The U.S. map stage of the game is a good piece of graphics work, although it doesn't feature much action—simply the tiny missile dots lurching across the landscape. The grid display blinks on and off so rapidly it is a real challenge to match the patterns. Finally, the rocket flying across a red, featureless landscape can be very difficult to track and destroy, but it explodes nicely when you do get a hit.



My negative reactions are not to the game's playability or level of engrossment, but to the story line itself. We are not engaged in the destruction of funny little aliens here—these are American towns. The map of your own country bristling with missiles is a grim reminder of reality—that we are all at the mercy of "leaders" who could destroy us in minutes. Perhaps the British designers of this game can detach themselves more easily from that aspect of the program—after all, the map is of the U.S.—but even they must realize that we are all in this together.

People need to escape from everyday pressures once in a while, and video games can be a useful medium for escape. But this game's handling of nuclear disaster puts it outside the normal guidelines for entertainment.

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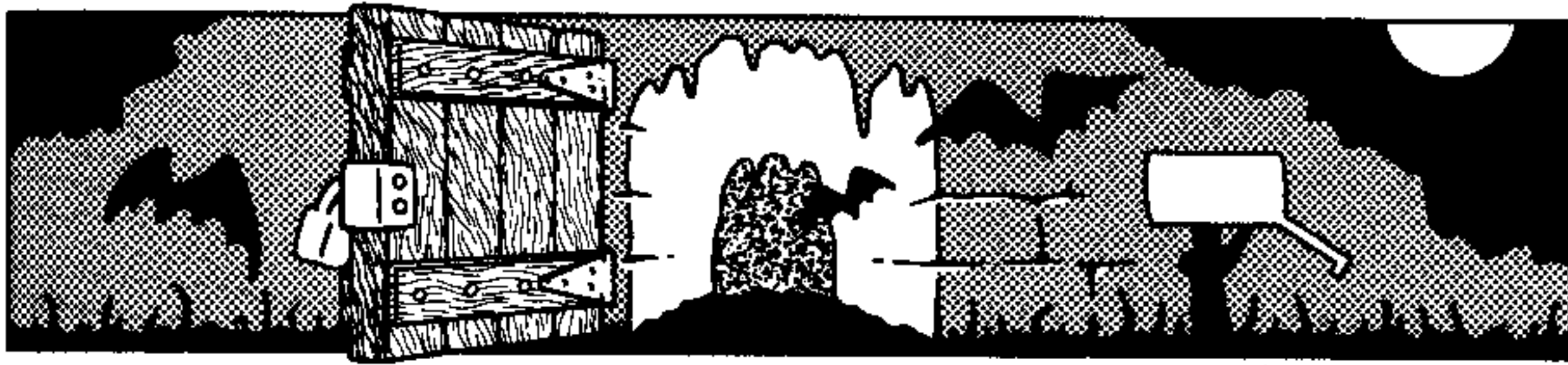
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# ZORK

A Review by HCM Staff  
with Randy Wilson

Name:	Zork I
Program Type:	Adventure Game
Machine:	Apple IIe, C-64, IBM PC, TI-99/4A
Distributor:	Infocom 55 Wheeler St. Cambridge, MA 01238
Price:	\$39.95, diskette
Performance	poor fair good excellent
Engrossment	_____
Documentation	_____

**Z**ork is a classic text adventure for Apple, Commodore, and IBM computers, among others, and may well be the most popular adventure game yet invented. It takes you through a forest, a mansion, a vast cavern complete with maze, the entrance to Hades, a dam, a river, and more. You have to fight a host of enemies in the Great Underground Empire.

The game is not only ancient in its setting and storyline, it dates from a relatively early period in computing. *Zork* originated on the DEC PDP-10, the combined effort of Tim Anderson, Marc Blank, Bruce Daniels, and David Lebling. For years it was passed back and forth among programmers, long before computers became common household objects.

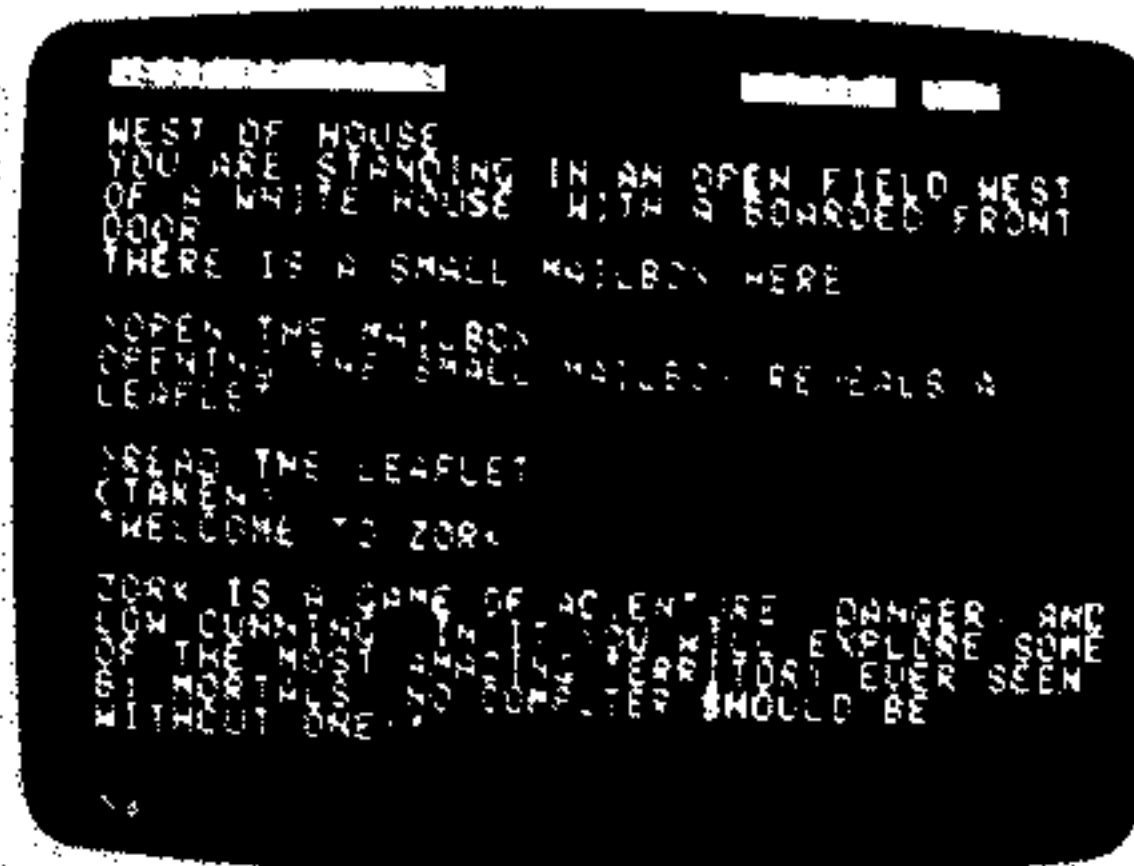
From the beginning, *Zork's* programmers were careful to provide flexibility of input. Players could immerse themselves in the scenario; they didn't have to "talk" to the computer in unnatural phrases that could detract from the fantasy. Even today most adventure games operate on two-word commands from the player, for example: "GET SWORD", "TAKE LAMP", "GRAB ROPE"; but *Zork* can handle all three objects at once, e.g., "TAKE THE SWORD, LAMP AND ROPE", or "TAKE ALL". You can even list several complete commands on a single line, as long as you separate them with periods: "GET ALL EXCEPT THE ROPE AND THE PLASTIC. LIGHT LAMP. W." (west) "KILL THE TROLL WITH THE SWORD." Note that the article "the" used with commands does not throw off the game's logic, and it can help the imagination fly more freely.

But there must be more to it than that; a program doesn't become a hit just because it's comfortable to "talk" to.

*Zork's* real drawing card is its story line—with its endless intrigues and surprises. The vast underground labyrinth is filled with treasure and populated with bizarre characters, most of them dangerous. More important, the elements of play are well-integrated. That is, as the game evolved, each new object or action was thoroughly analyzed to see that it was compatible with the rest of the plot. Thus, the game's action is logical, and there isn't a lot of clutter. Whatever the object or the event you must deal with, the program responds in a sophisticated, "knowledgeable" fashion.

Among some other little luxuries of this game are displays of your current score and number of moves, along with the room you are in. Most adventure players enjoy building a score as a reward for their fighting and treasure-finding skills, as opposed to a simple live-or-die contest.

In addition to its friendly input structure, *Zork* also accepts a long list of commands that keep you well-informed of your progress. The command BRIEF, for example, describes any newly-encountered rooms or objects, whereas VERBOSE shows you a long description of the objects in any room you enter. Naturally, there are commands for SAVING the game, RESTARTING it, taking INVENTORY of your possessions, plus a dozen other useful commands.



The game comes with an excellent little booklet that tells you how to use the commands, save your game, and fight your enemies—without giving away any secrets that could spoil the challenge. If you get completely bogged down, you may be interested in seeking help from certain maps and booklets sold by Infocom. An order form is included in the package.

The traditional text-only adventure does have its good points. Not obliged to paint pictures, it can devote all its bytes to telling the story, and it processes the plot quicker too, letting you cover ground faster. And there is that matter of letting your mind wander freely. Yes, a good case can be made for the text adventure, and nobody makes a stronger case than *Zork*.

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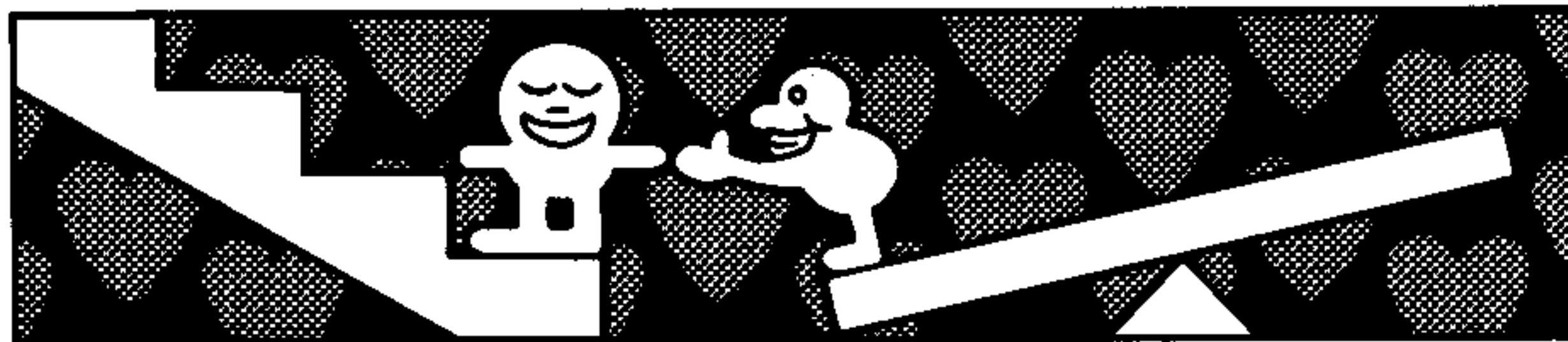
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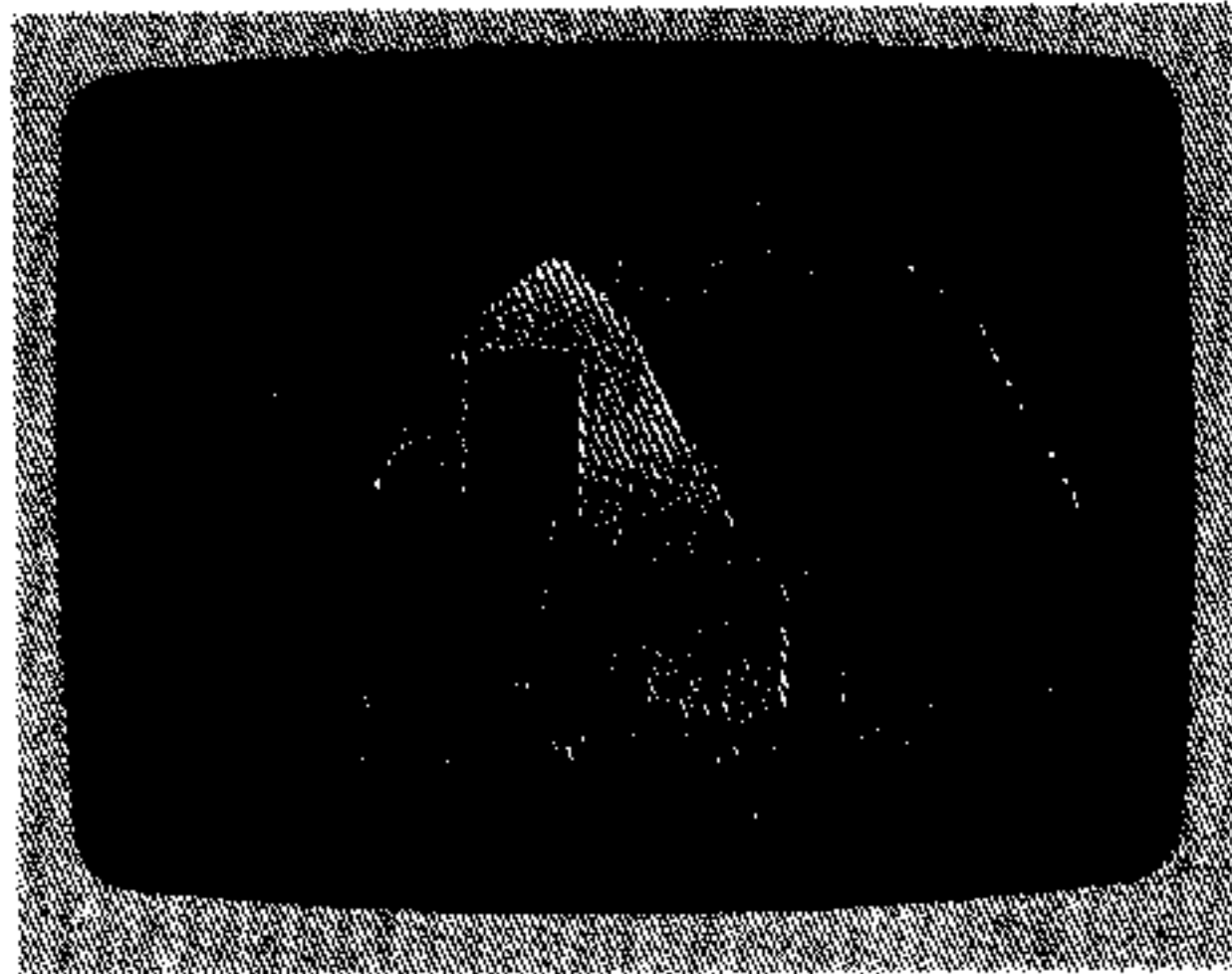
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A few decades ago, in a darker age of education, most children were not given ample resources for developing their minds until they reached first grade. Now we find that the two-year-olds are capable of much more than we gave credit for. It turns out that they love learning, and they have no time for anyone who would



deny and deaden their fine curiosity. Fortunately, the adult world is finally responding to the children with an outpouring of "read-early" books, television programs such as *Sesame Street*, and a widespread interest in Suzuki-style music education. And yet, the computer world has lagged in meeting the needs of pre-school children. Very little software has been designed for this group—and the truly good programs are as spotty as the selection of bordeaux in an all-night mini-market.

*Tag Tom* and *Fire* are packaged on a single diskette for pre-school children. Each game is designed to be entertaining, while teaching spatial relationships necessary for reading. For example, children must understand right and left before they can be expected to follow words printed on a page. This basic concept, plus shape recognition, sequencing, hand/eye coordination, and opposites are some of the considerations that went into the design of these programs.

# TAG TOM AND FIRE

A Review by Greg Roberts

HCM Staff

## Tag Tom

*Tag Tom's* basic scenario is to make one figure tag another on the playground and around the house. The game offers four variations in play. On the simplest level, a touch of the keyboard is the only input required. No matter what key you press, your man Timmy goes right over to tag Tom. The menu offers a second version that is faster than the first game, and it too is meant only for the very young.

The joystick mode is more challenging. You have a limited time to direct Timmy over to Tom. A speeded-up version of the joystick game is your fourth option. In all four levels of play, the screen flashes one-

Name:  
Program:  
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Price:  
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Performance:  
Engrossment:  
Documentation:

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Name: Donkey Kong  
Program Type: Arcade game  
Machine: TI-99/4A  
Distributor: Atarisoft  
Atari, Inc  
P.O. Box 61657  
Sunnyvale, CA 94088  
Price: \$34.94, cartridge  
\$44.95, diskette

System Requirements:  
Joysticks

	poor	fair	good	excellent
Performance	████████████████████			
Ease of Use	██████████████████			
Documentation	██████████			

This game is one of ten cartridges now manufactured by Atari for the TI-99/4A. The original *Donkey Kong* is a landmark, a fundamental institution of the arcade game cult; therefore, any new version will be scrutinized to determine how close it is to that revered icon known as the Arcade Original.

This one is very close. The programmers have meticulously constructed the framework girders and rolling barrels to look and act as they do in the original game. The barrels move in the same random fashion. They are deadly and unpredictable in the extreme.

No matter what your version of *Donkey Kong*, learning the basic barrel-jumping maneuver can be frustrating to a beginner. The player has to press the fire button and move the joystick handle in unison at the precise moment to carry out a successful leap. To get much out of this game you have to be willing to practice a bit. You also need a good responsive joystick. I found the play almost impossible with the TI joystick. My score went up only after I plugged in a third-party joystick which was clearly more responsive weapon.

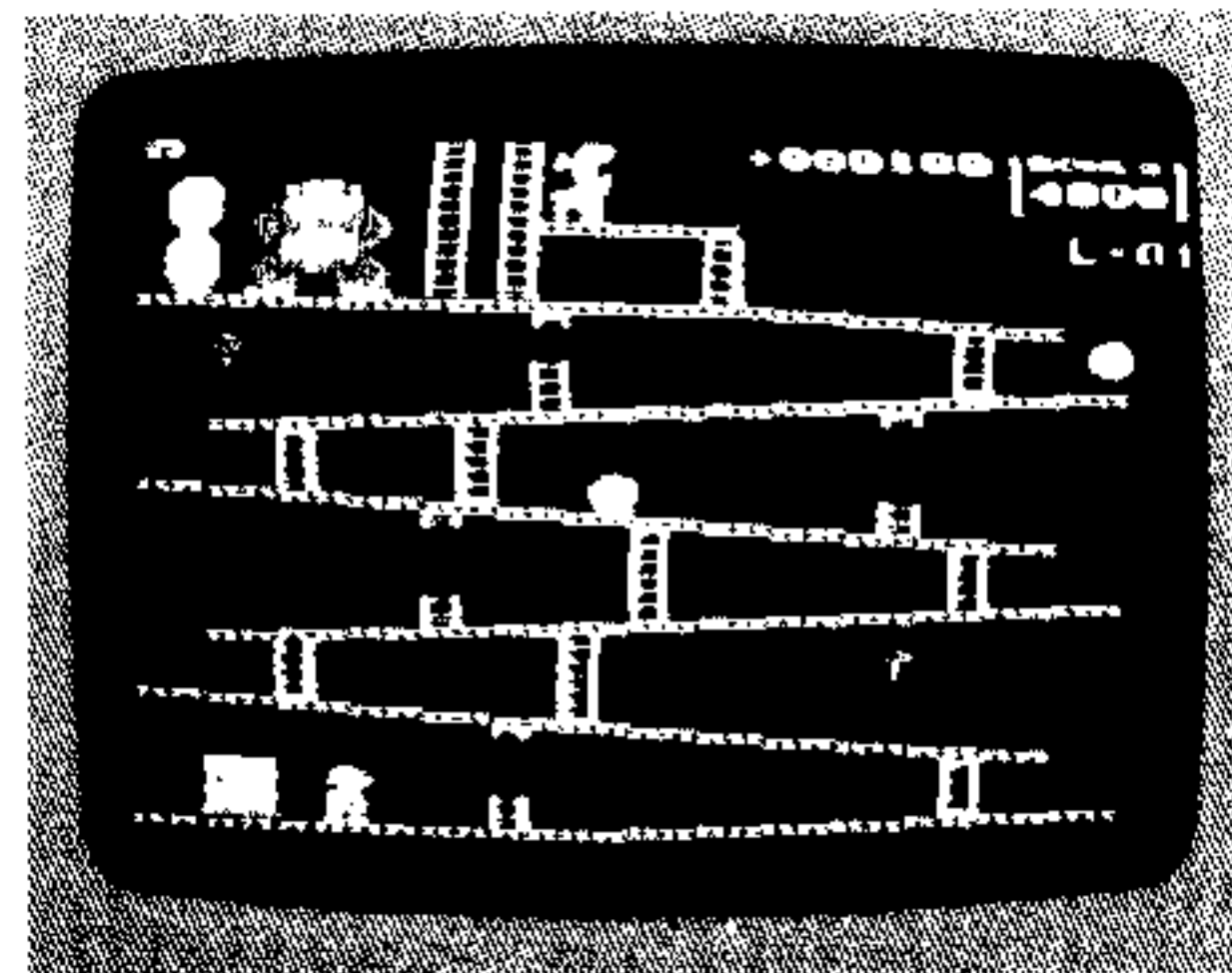


# DONKEY KONG

A Review by Greg Roberts

HCM Staff

Once you get used to the jump maneuver, you are in for a game that is not likely to get dull for many, many plays. The scenario is uncomplicated except that a barrel reaching the end of the track turns into a fireball that can move around and kill you. And there is the option of reaching up and grabbing a hammer that quickly smashes the approaching barrels. Moving your man through the barrel-strewn obstacle course to the top of the girders, you proceed to a second level with new challenges, including gaps in the framework and more fireballs. These last are so overwhelming, I found



them impossible to jump over. But this must be my lack of skill—other players faced this challenge with delight. The upper levels of this game, with their fast-moving elevators and conveyor belts, look impossible too.

My overall impression is that this is a major-league game for serious videacs, and one which could permanently frustrate some people. This is a matter of personal preference, of course. A good player could easily argue that anything less than *Donkey Kong* is boring baby stuff. However you perceive the game, its large variety of screens is the mark of a top-flight program.

*Donkey Kong* comes with a colorful, but vague brochure. It alludes to the dangers our hero must confront in order to rescue his girlfriend, and lets you know the point value of various achievements within the game, but there are few hints on strategy. This leaves much to be discovered through trial and error, a basic tenet of sophisticated games design, and one that is meant to keep you playing for a long, long time.

If you are looking for an arcade atmosphere in your own home, all you need is the dim lights, cigarette smoke, and a few loiterers. The TI-99/4A *Donkey Kong* version nicely provides the rest.

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**Name:** Tag Tom and Fire  
**Program Type:** Early Learning  
**Machine:** TI-99/4A  
**Distributor:** Software Advances  
 P.O. Box 11409  
 Eugene, OR 97440  
**Price:** \$15.95, diskette, cassette

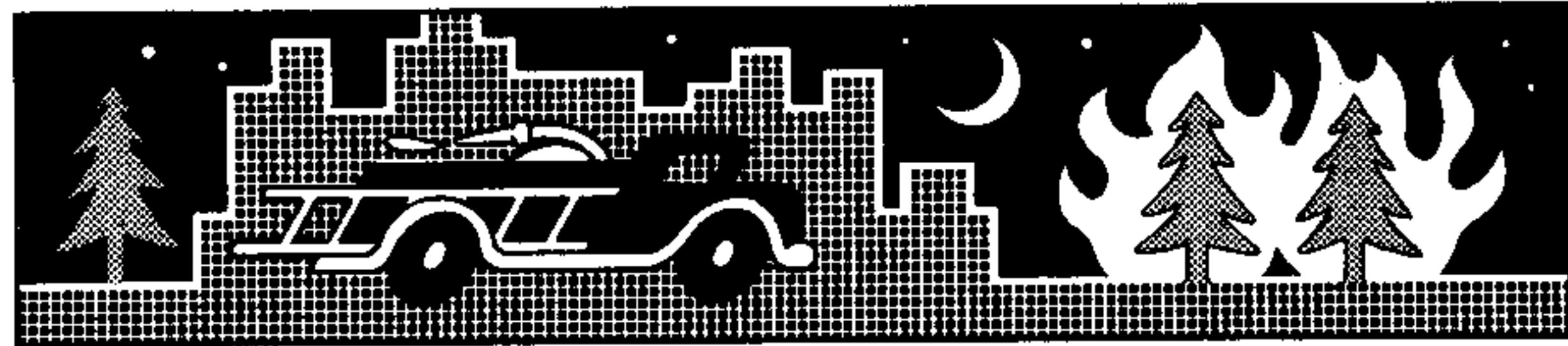
**System Requirements:**  
 Extended BASIC, Joystick recommended

	poor	fair	good	excellent
Performance	██████████	██████████	██████████	██████████
Engrossment	██████████	██████████	██████████	██████████
Documentation	██████████	██████████	██████████	██████████

word descriptions of Tom's location within the scene—up, down, upon, etc. These words may be heard through a speech synthesizer, but the silent version also does a thorough job of teaching and entertaining. The movements of the two figures are accompanied by cheerful sound effects that should appeal to any child.

### Fire

On the same diskette is *Fire*, a colorful little maze game that asks the player to direct a fire truck through the streets to a blaze at the top of the display. On its lowest level, you simply press a key on the right or left



to its destination. A more complex option uses up and down arrows. Finally, you can choose joystick mode to guide the fire truck, again using all four directions.

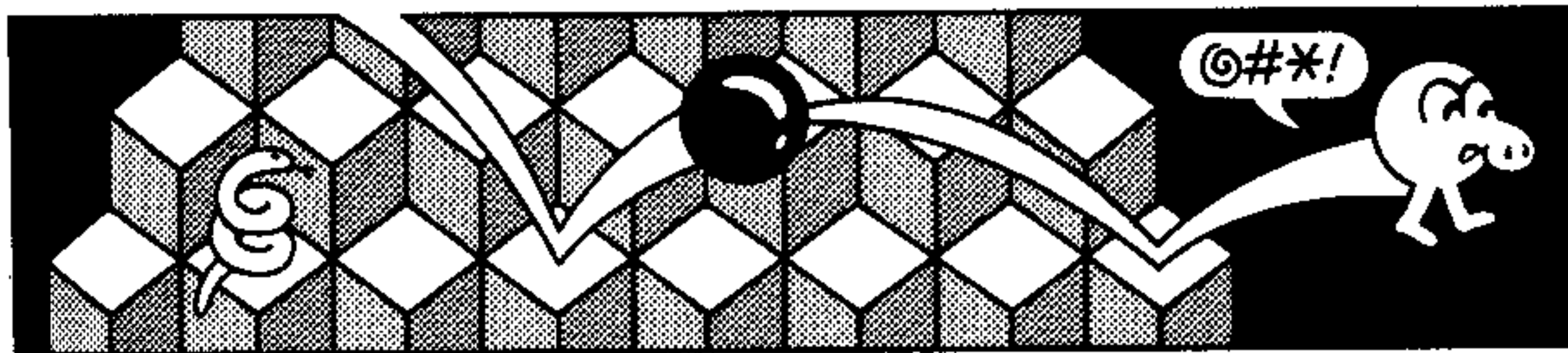
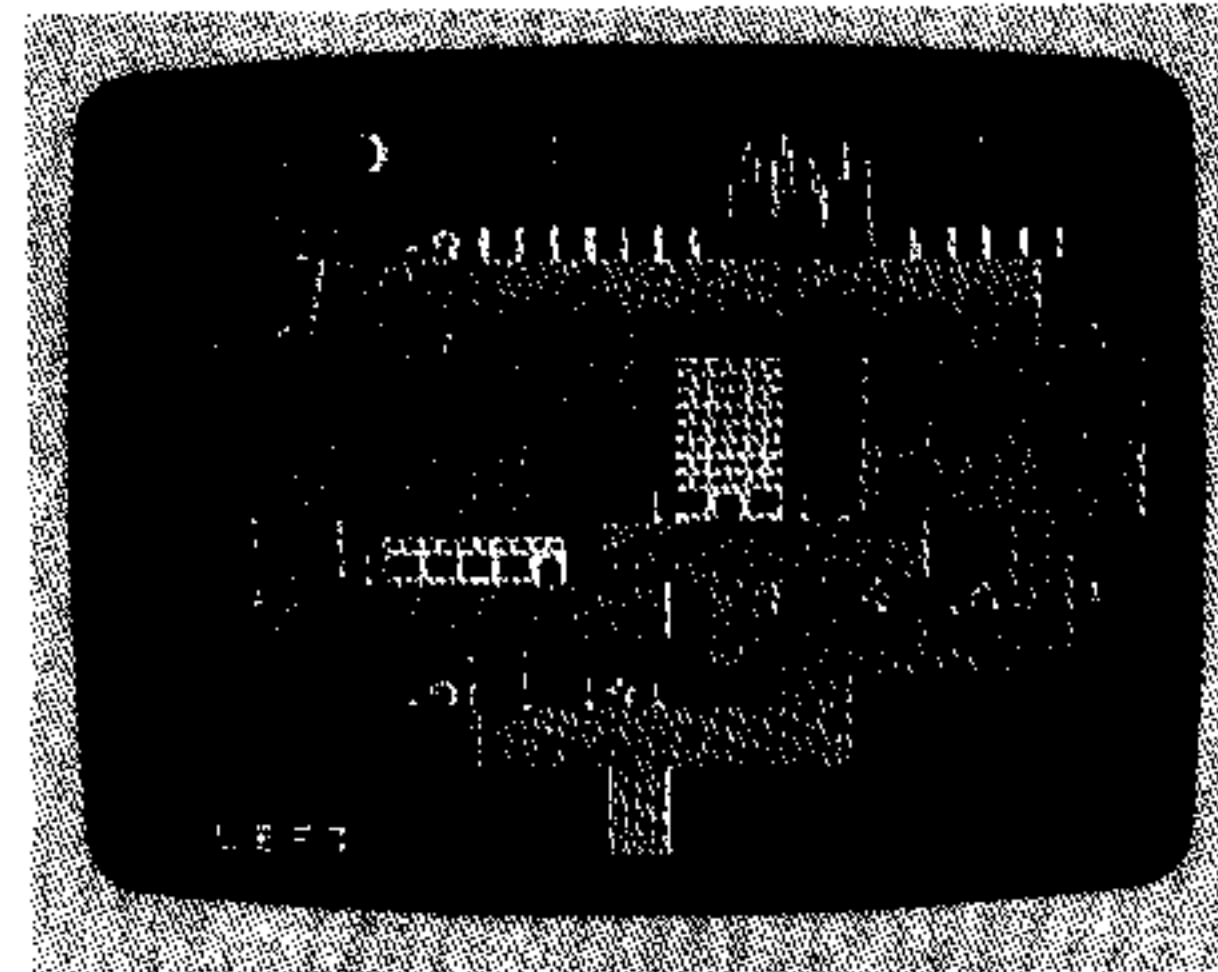
This program provides stick-on arrows for the keyboard. The arrows come in four colors, corresponding to the arrows that come up on the screen showing the proper direction to guide the truck. It is a good exercise for giving very young children some experience with basic directions.

Both games use simple graphics showing a colorful, albeit static background with only one moving object at a time. A little more action would probably not be lost on a child, but the existing graphics certainly do captivate the typical pre-schooler. Both games will be quickly outgrown, but that is a quality of most playthings for this fast-growing age group. And that is why a package like this has been priced reasonably at \$15.95.

These games come with thorough documentation, including an explanation of

the educational concepts behind their design. They are simple games, of course, and would not hold much interest for anyone but a child—but that is what makes them special. *Tag Tom and Fire* are worthy offerings for a previously neglected group of computer users.

HCM



# Q\*bert

A Review by Joan Killough-Miller

HCM Staff

For those of us who aren't ready to be hurtled through a universe of exploding asteroids or crammed into the cockpit of a destroyer weapon and charged with the fate of the universe, there is *Q\*bert*. Home computer owners who've come to know *Q\*bert* in the arcade finally have their own version to bring home for the family.

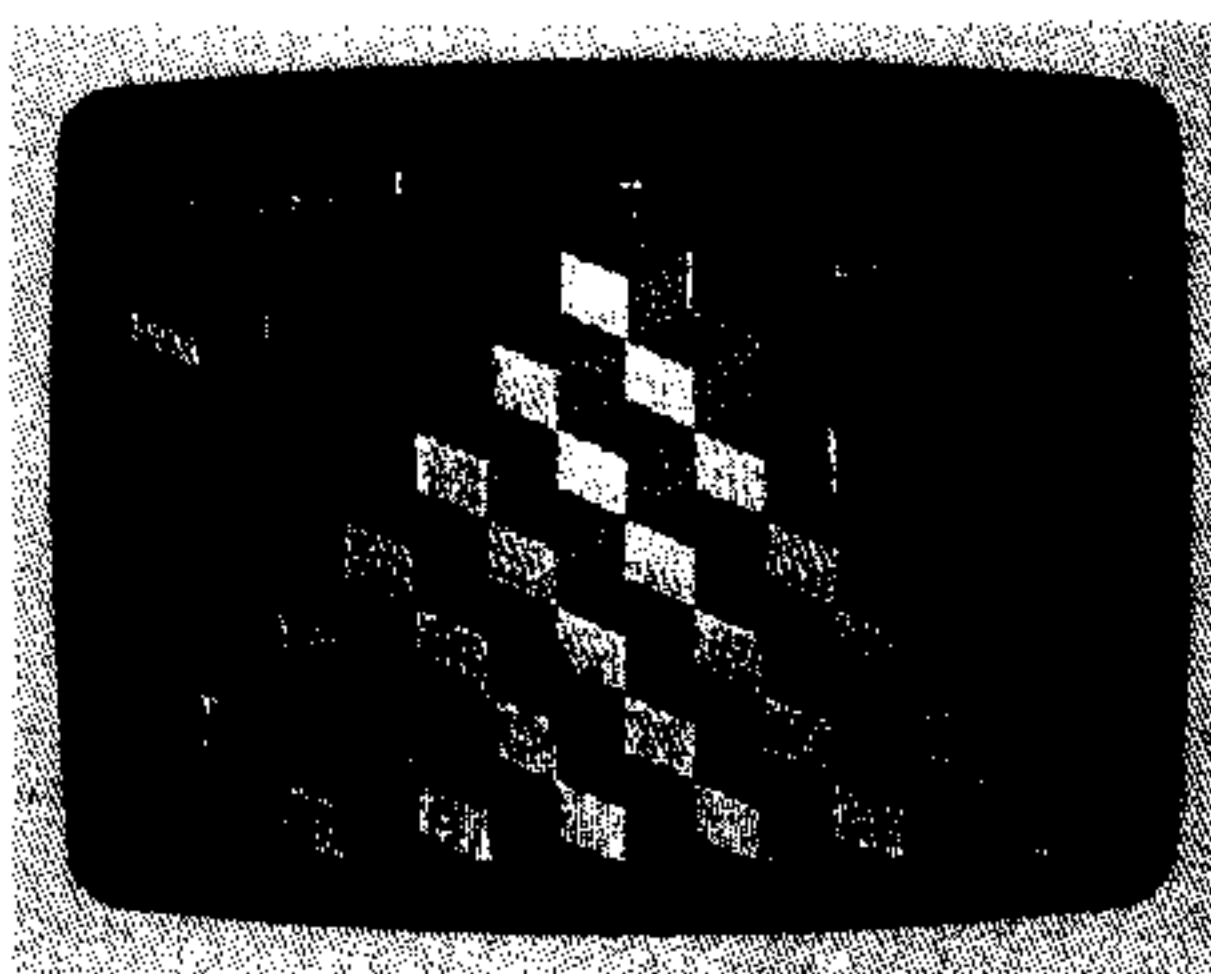
*Q\*bert* is a shy, lovable little character who moves in quick, nervous hops down the steps of a three-dimensional pyramid of stacked cubes that resembles a "baby's blocks" patchwork quilt. His mission is to change the color of every block by hopping on it. Life is out to get *Q\*bert*, it seems, and hazards come from all directions. You have to be quick on the joystick to avoid the red and purple balls that come rolling after him. If a purple ball reaches the bottom, it uncoils into Coily, a bouncing snake who pursues *Q\*bert* with zeal. In the later rounds, other demons maneuver to ambush him and undermine his work by changing the blocks back to their starting color.

### Oh, @!#\*!!

*Q\*bert* works with dogged patience: When squashed by a ball or jumped by the snake, he utters an innocent oath—@!#\*!!—and goes back to work. The round ends when you have completed the pyramid or used up all of your allotted "Q\*berts." But *Q\*bert* is not without resources. He can hop a pinwheel-patterned disc that twirls him back to the top of the pyramid. In a rather cunning ploy, he can jettison the snake by luring him to the edge of the pyramid and

jumping a disc at the last minute, a routine reminiscent of the old Roadrunner cartoons. If *Q\*bert* can catch a green ball, the screen freezes for a moment, and our timid hero can grab some quick action while the enemies are paralyzed.

For a simple, non-aggressive game, *Q\*bert* builds rapidly in speed and complexity as the enemies become faster and more plentiful. Although all of the screen displays are basically the same (only the cube colors change), new creatures and challenges lurk on every level.



**Name:** Q\*bert  
**Program:** Arcade Game  
**Machine:** TI-99/4A,  
 Apple II series, Atari,  
 C-64 and VIC-20  
**Distributor:** Parker Brothers  
 P.O. Box 1012  
 Beverly, MA 01915  
**Price:** \$39.95, cartridge

**System Requirements:**  
 Joystick

	poor	fair	good	excellent
Performance	██████████	██████████	██████████	██████████
Engrossment	██████████	██████████	██████████	██████████
Documentation	██████████	██████████	██████████	██████████

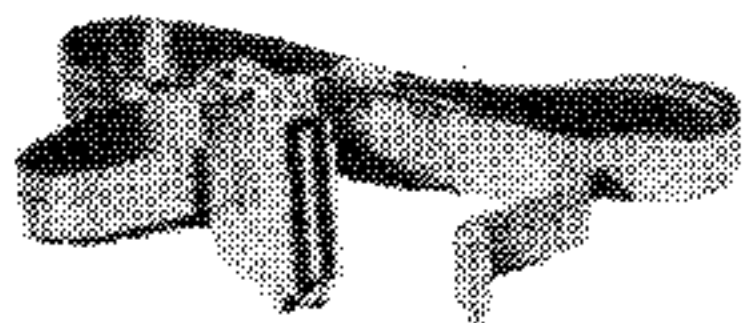
We play-tested *Q\*bert* extensively on the TI-99/4A. With the machine's fast 16-bit microprocessor, the action was very fast, and the joystick was very responsive—perhaps even a bit too sensitive, as an overly enthusiastic flick will send *Q\*bert* toppling off the edge of the pyramid. It may take a while to fine tune your touch on the joystick and learn how and when to jump the flying discs.

There is a bit too much predictability in the course of the balls and timing of the enemies—you will quickly learn a set of stock maneuvers to dupe the snake and ditch the demons. But having the preliminary rounds under control is an advantage here, because the TI version of *Q\*bert* sends you back to the very beginning every time you deplete your reserve of *Q\*bert* figures. After you've finally reached Level 2 and found a whole new dimension (you now have an intermediate color as well as a destination color, so that each square must be jumped on twice), you may resent having to plod through the lower levels all over again—or you may see it as useful practice that sharpens your reflexes for the faster,

Continued on next page



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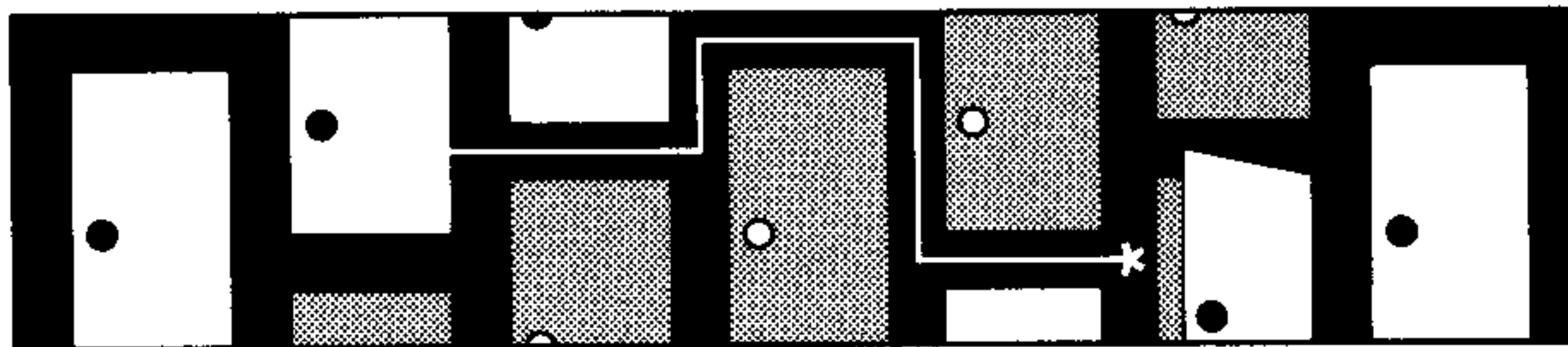


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**TI-MAZE**

A Review by G. R. Michaels  
 HCM Staff

Do some people possess an innate sense of direction? Experiments with a simple blind fold have shown that, so far, the answer is no. A certain few, however, have developed their powers of observation to find their way out of the most bewildering terrain. If you take pride in keeping your wits about you as you wander through seemingly endless passages, you will take to the challenge of *TI-MAZE*.

This program can generate ten trillion (10,000,000,000,000) mazes. You help determine the configuration of each new maze by entering a "lucky number" into the computer. Select the level of difficulty by specifying the maze's dimensions—its width and length as measured on a scale of 2-10. The maze is presented as a series of rather spare images made up of vertical and horizontal lines, but clearly simulating a corridor, including side passages and a distant wall. For this review we used a TI monitor, model PHA4100A, but the game can also be played on a standard television set, in spite of a slight degrading of the resolution.

My first effort was a medium-sized 6x8 rectangle. Picking my way through the corridor with single moves of the joystick, I was further guided by a screen display that gave me my direction (N, S, E, W), and by a map of the path I'd already traveled (revealed with a touch of the fire button). Nevertheless, after dozens of moves, I could not find the door. Abandoning that game, I tried a baby-level 2x3 rectangle and got out in six moves. Clearly, unless you have the homing resources of a Daniel Boone or an abandoned cat, you will save much frustration by choosing a postage stamp for your first attempt, just to get your confidence up.

**Q\*bert . . . from p. 75**

more intricate levels, where jumping on the intermediate or destination colors will undo what *Q\*bert* has already accomplished.

**Standard Documentation**

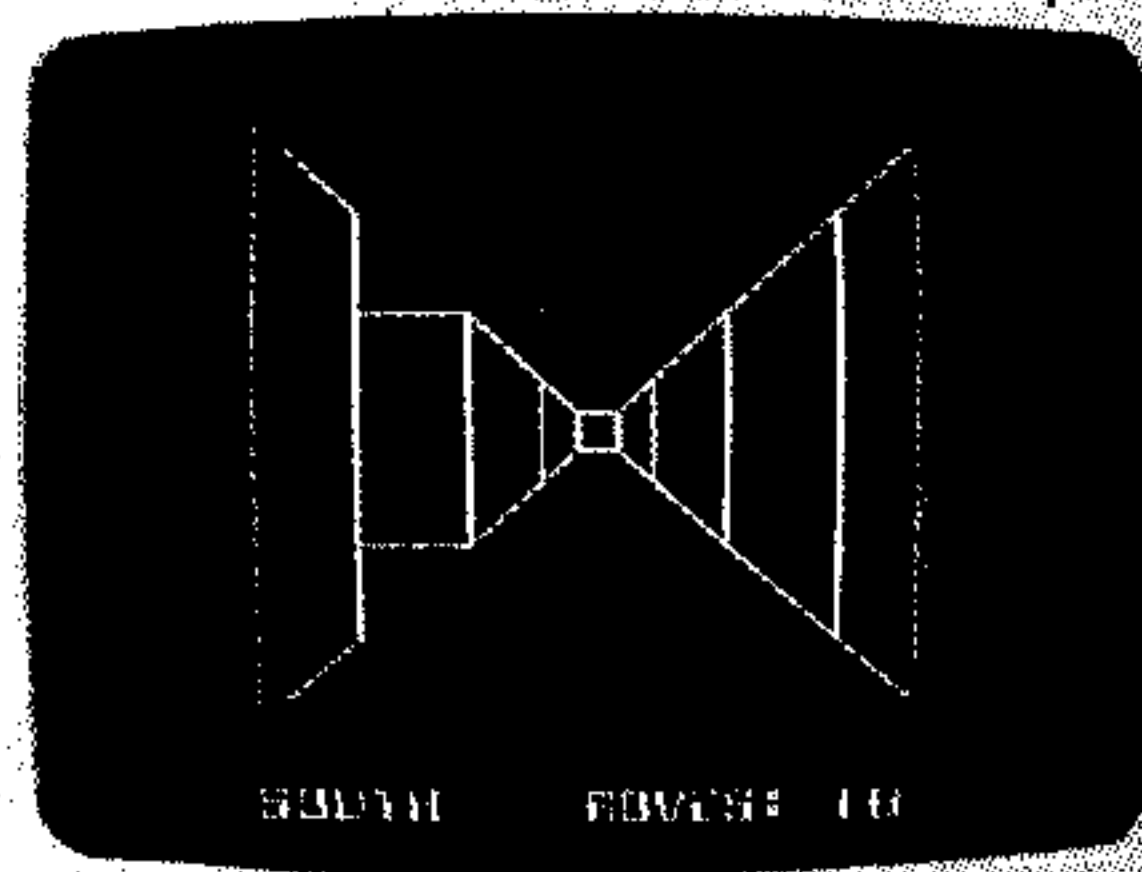
Parker Brothers' documentation covers the basics: a rundown of the various demons, the point value system, and the function of the flying discs. A clear and concise chart shows you the precise results of hopping on the starting, intermediate, and destination colors on each of the nine levels, although this information is difficult to retain in the heat of the game.

*Q\*bert* offers a lot of flexibility for such a simple game. You can play an opponent, or play alone. You can even engage a foursome

Name: TI-MAZE  
 Program Type: 3-dimensional maze game  
 Machine: TI-99/4A  
 Distributor: Gadget Software  
 Post Office Box 98  
 Port Moody, B.C.  
 V3H 3E1  
 Price: \$16.95 US, cassette  
 \$19.95 Canada, cassette

**System requirements:**  
 Cassette Recorder

	Poor	Fair	Good	Excellent
Performance:	██████████			
Engrossment:	██████████			
Documentation:	██████████			



**Spare Graphics**

The intrigue of the game, then, is in your mental involvement with the maze problems—not in fast-paced action or fancy graphics. The graphics have been kept very simple because, with each move, the computer must display a new picture to simulate your advancement through the corridors. As it is, each new scene appears rather slowly, even with the sparest of stage props. This is a characteristic of TI BASIC, and nothing can be done about it.

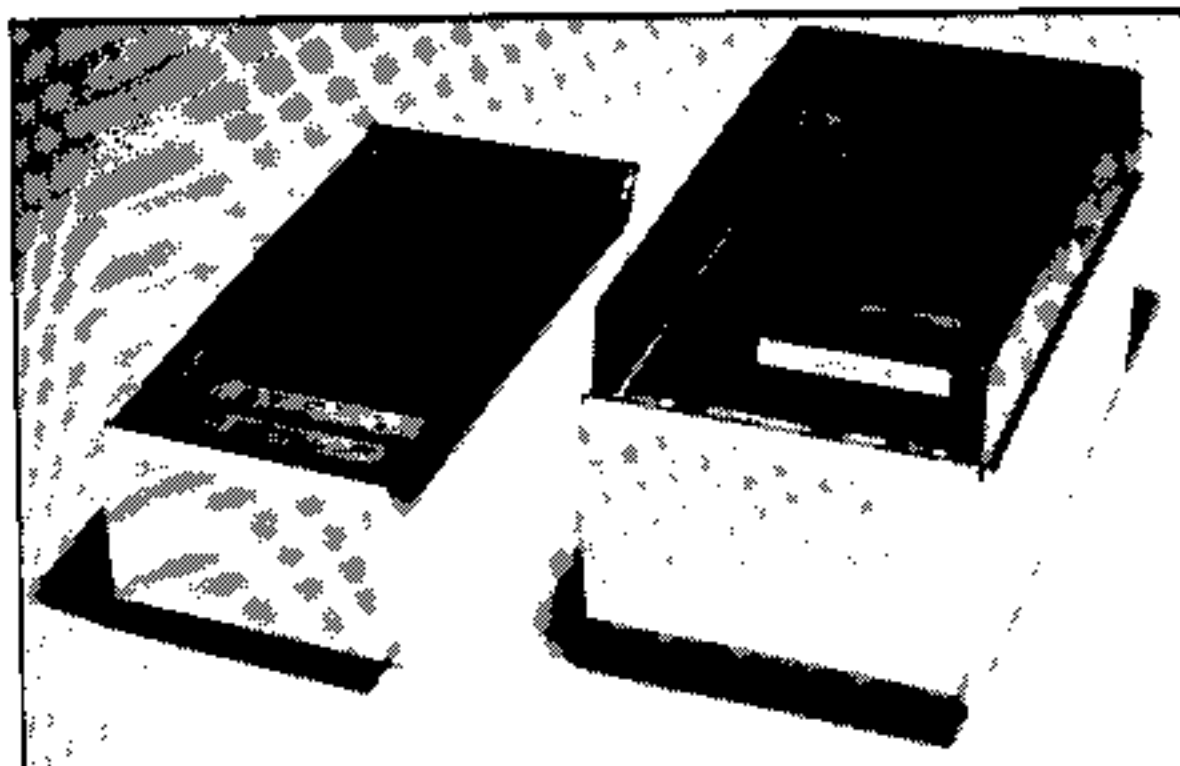
This is a large program. It will run only on a skeleton system made up of console, monitor, and cassette deck, unless other peripherals are turned off, any attempt to load *TI-MAZE* will result in a loading error.

The game must be loaded in two parts. On one side of the cassette tape is the *TI-MAZE* game itself; on the other side is the MASTER DATA. After you load the first side of the tape and type RUN, the program

and alternate turns with a partner. You can play for mere survival, or you can study the manual and play for points: Conserving the flying discs, catching the green ball, and throwing the snake all have their rewards in point values. The game accommodates a variety of personal styles and allows players to develop unique strategies.

*Q\*bert* has a lot to offer on all levels: Novices, children, and arcade wizards can get started without a lot of explanation and stay with it for a long time. There's plenty of room for skill development in *Q\*bert*, and you'll soon find yourself cursing along with the little orange guy, and doing whatever you can to ease his way in a world of continuous bombardment and slithering evil, where every harried step seems crucial. Don't we all have days like that? HCM

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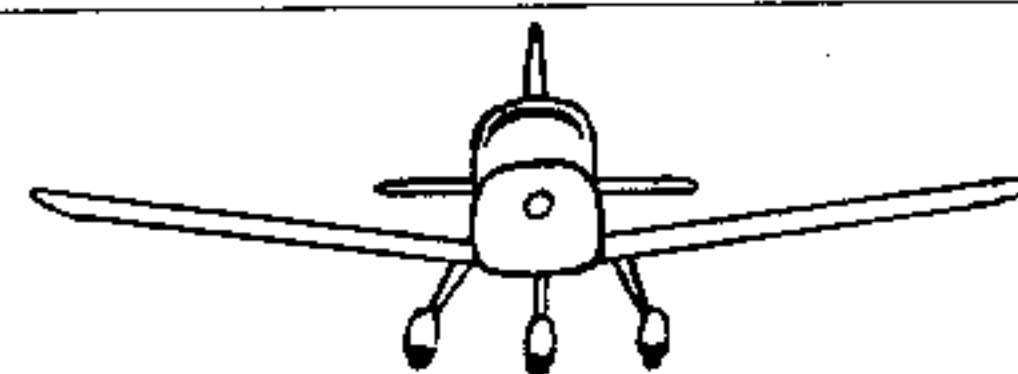
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automatically goes to its own version of the familiar OLD CS1 routine necessary to add on the MASTER DATA. This procedure may seem a bit cumbersome to those who are used to cartridges. But detailed loading instructions are provided in a little booklet that also explains how to play, whether with joystick or using the arrow keys.

In some places the game could have benefited from more intense graphics. For example, painting the exit door a dramatic glowing shade would have made it a richer reward (after all, reaching it can take forever). Nevertheless, the present simple outline does serve its purpose.

The understated nature of this game may not appeal to players looking for multicolored moonscapes and Pac tracks; but those who like to work out a complex, long-lasting puzzle will find plenty to absorb them here. With ten trillion possibilities offered in one game, *TI-MAZE* fans will get plenty of play for the money. **HCM**

**Mouser . . . from p. 65**

new (or incompetent) players who get tired of having to lose and restart the game every three minutes. And there are two slight bugs that should be corrected: If a wall hits a mouse as it is swinging shut, the wall is partially obscured on the screen. So even after the mouse moves away, the wall appears as a fragmented collection of dots, rather than a solid wall. It does, however, return to its solid shape after you swing it again. The second flaw occurs if a mouse catches the farmer at the spot where he normally enters the first screen (approximately the nine o'clock position at far left). On each game's new farmer, the mouse is right on the spot—ready to pounce—and finishes the poor guy off each time before you can move him.

**Punishing Staying Power**

The documentation discusses the rules, obstacles, and moves of the game; it also of-

fers a few helpful hints for improving your score. Although adequate, we feel that with some additional instruction on the "fine points of play"—i.e., staying alive a little longer—the game would be more appealing and less frustrating for more players.

We all know that a game's superior graphics and sound "don't mean a thing if it ain't got that swing." But *Mouser* does. It is truly a fun and challenging game. Its main action—manipulating characters to trap moving objects—is a refreshing change from the many shoot-'em-ups on the market. And because *Mouser* is so difficult, it has staying power. After several rounds without capturing even one mouse, I was frustrated but I couldn't put down the joystick. *Mouser* has that undefinable quality that keeps drawing you back for more punishment. With constant electrical failures and mice that multiply like rabbits, you could be down on Farmer Wheatbread's farm for a long, long time. **HCM**

**2049'er . . . from p. 57**

offers new backdrops and new challenges.

For example, after negotiating the first level with its complex arrangement of ladders and shafts, you find that the second level features transporters capable of firing your man to various floors within the strata of the screen. When Bounty Bob enters his Star-Trek type "beamer" and shoots to the top of the tube, you witness some unparalleled graphics.

Farther along, you run into tanks of radioactive waste, pulverizing devices, and a cannon you can load with TNT in order to shoot Bounty Bob to glory. With so much

to see, it is no wonder that Tigervision provides us, at the beginning of the game, with a sneak preview of all eight levels. They are a real draw to the prospective buyer. The complex moves of this well-designed cartridge game look good on an ordinary color television, as well as on a dedicated monitor.

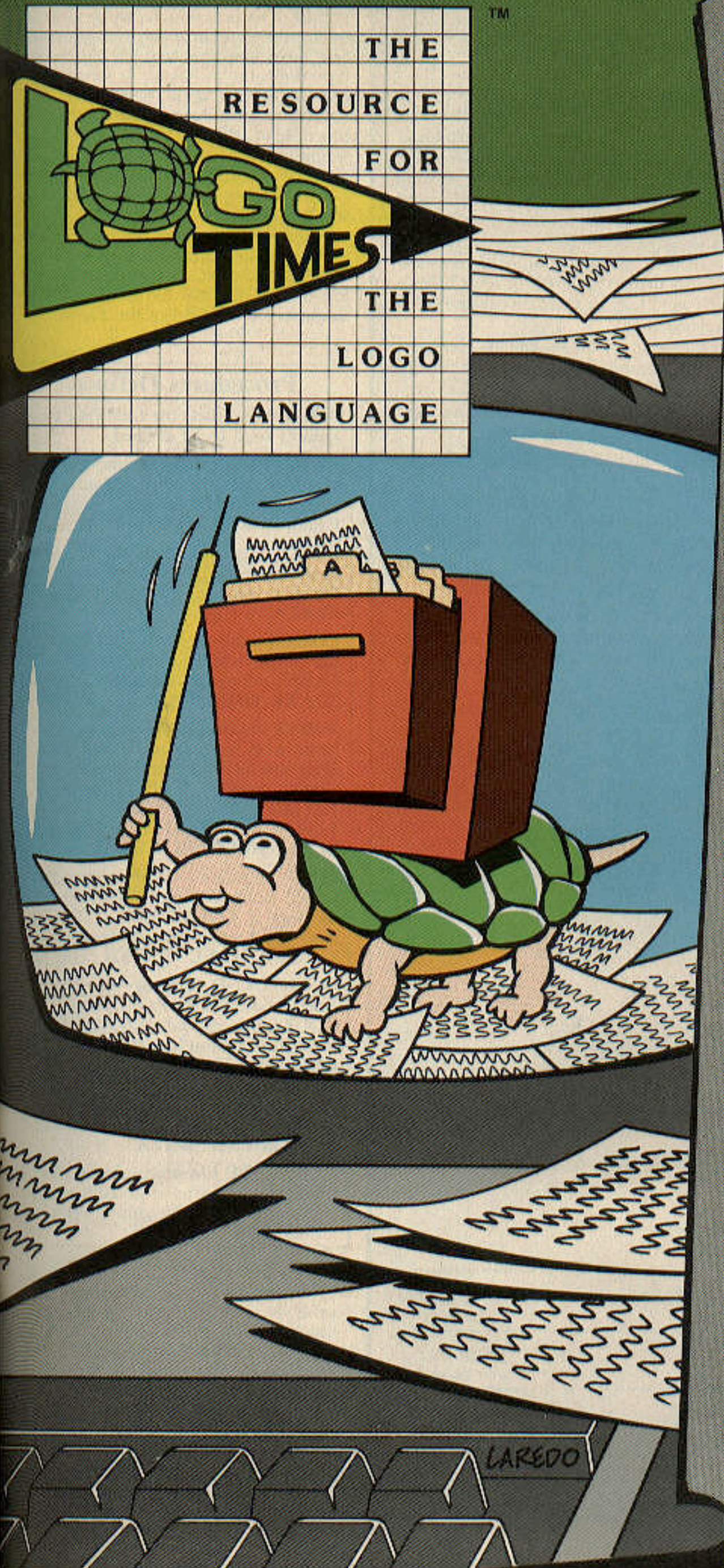
A few elements of this game, however, are a little frustrating: The mine shafts or slides don't line up well with their entrances, so it is difficult to tell when your man is at the edge of a shaft. He appears to walk in space, then fall. This lack of precision is a real distraction that adds nothing to the game. In fact, it arbitrarily ruins the player's strategy. Nevertheless, once you establish where the

shaft entrances begin and end, you can resume play and really enjoy this game.

*Miner 2049'er's* sound effects are typical computer Blippenese, but they are well integrated with the play. The only aural bugbear in this program is the primitive Clementine melody played during the sneak preview of the screens, and it can be mercifully squelched with the touch of a button.

The game comes with a detailed brochure that explains each screen, with a few hints on playing. The documentation is vital in a game as complex as this one.

It comes as no surprise that *Miner 2049'er* is available for every major home computer. It certainly deserves a wide audience. **HCM**



# FILES IN LOGO

## A Response to Muller's Challenge II

By Roger B. Kirchner

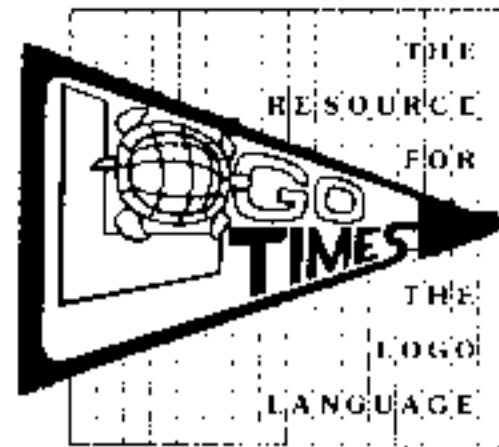
*As many readers will recall, Jim Muller, President of the Young People's LOGO Association, formulated three challenges to give LOGO fans an opportunity to answer criticisms of the LOGO language. In our July 1983 issue Roger Kirchner answered Muller's third challenge with a tessellation procedure for "multi-colored mosaics that graphically represent multiple depths of recursion." Then in August, Kirchner responded to Muller's first challenge, demonstrating that TI LOGO could perform word-processing functions on either a 40- or 80-column screen and print out in 40 or 80 columns. Now Kirchner completes his defense of TI LOGO by demonstrating that the unfairly maligned language can even be made to access data files as BASIC can.*

Jim Muller's second LOGO challenge calls for an interactive graphics program which includes data file access such as is offered by BASIC. TI LOGO has a limitation that makes data file access a challenge: Although you can access a disk while in the LOGO direct mode—with the SAVE and RECALL commands—no one has found a way to access the disk from procedures, i.e., while a program is running. Thus, our solution will be to write procedures that set up and maintain files in immediate memory. The files can then be saved as procedures.

It is possible to meet this challenge because LOGO is an extensible language. Commands and operations can be defined and used just like primitives. So new capabilities can constantly be created.

A file is a nameable collection of elements called records. Each record may be a simple data item or a structured collection of data. Information is written to and read from a file one record at a time.

The file commands we'll introduce here are similar to the file commands in Pascal. Readers familiar with Pascal will recognize this at once, and others will learn something about how files are used in Pascal. Standard Pascal is limited to the simplest kind of files, sequential files. They



## Introduction

*LOGO Times* is an information resource for users who want to create their own *personal* languages—languages that will easily allow them to communicate with the computer in a totally new audiovisual realm of applied imagination, exploration, and self-discovery. The articles on these pages concern the use of the 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 LOGO environment, they will need a computer, the requisite software and/or cartridges, and any additional hardware required for a particular implementation. A disk drive is required for some LOGO implementations, but in other cases, a user's work may be saved on cassette tape, or copied into a notebook (for later re-keyboarding).

The varieties of LOGO we'll consider include—but are not limited to—Terrapin LOGO for the Apple II, II+ or IIe and the Commodore 64, TI LOGO for the TI-99/4A, and LOGO Computer Systems LOGO for the IBM PC and PCjr.

- **Apple:** Terrapin LOGO requires an Apple II, II+ or IIe with 64K of RAM, one disk drive with controller, and a blank, initialized disk.
- **Commodore 64:** Terrapin LOGO requires a Commodore 64 with a VIC-1541 Disk Drive and a blank, initialized disk.
- **TI-99/4A:** TI LOGO requires the TI LOGO or TI LOGO II cartridge and a compatible 32K memory expansion unit. A cassette recorder may be used for storage, but a compatible disk system is recommended for convenience.
- **IBM PC or PCjr:** LOGO Computer Systems LOGO requires the PC or PCjr with 128 bytes of RAM, one disk drive, and a blank, initialized disk.

In each issue, one or more of the articles may refer to 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 *Home Computer Magazine* containing *LOGO Times* articles.

### LOGO Listings

As you enter LOGO statements, the last thing you do at the end of every statement is to press [ENTER] on the TI and IBM (the key with the  symbol), or [RETURN] on the Commodore 64 and Apple. This signals the system to begin a new line. In our typeset listings, single LOGO statements may carry over from one line to the next without ending. The end of a LOGO statement is marked with a curved arrow (↷) to indicate that you press [ENTER] or [RETURN] at that point.

### 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.

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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 *Home Computer Magazine's* Masthead page.

### Our Contributing Editors

Henry Gorman, Jr.    Roger B. Kirchner    William M. Goodman    Rich Haller

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## Contents

Volume 4, Number 2

- |     |  |  |
|-----|--|--|
| 81. | <b>Files in LOGO</b><br>Muller's Last Challenge is answered        | by Roger Kirchner<br>and the HCM Staff |
| 83. | <b>LOGO Spans the Generation Gap</b><br>A Review of Commodore LOGO | by Richard and Sarah Haller            |
| 84. | <b>FROGO: LOGO Invades the Arcade</b><br>Frogo Meets LOGO Turtle   | by Ted Barnicoat                       |

consist of records which can be accessed only in the order in which they are stored. The records in a Pascal file can be any type definable in Pascal, as long as they are all of the same type. In LOGO, records can also have this arbitrary structure, and in addition, the uniform file type requirement is lifted: The structures of individual records in a file may vary. So LOGO files are slightly more flexible than those of Pascal.

The salient feature of sequential files is that a marker indicates the record which can be read next. Records can be written to a sequential file only when the marker is at the end of the file.

### Procedures Defined

To process files, the following procedures need to be defined:

**REWRITE filename**—creates (or re-creates) a file with name *filename* and prepares it so data can be written to it. Example: **REWRITE "DATA"**.

**RESET filename**—prepares *filename* so that data can be read beginning with the first record. Example: **RESET "DATA"**.

**EOF filename**—outputs **TRUE** if the file marker is at the end of the file, and **FALSE** otherwise. Example: **IF EOF "DATA THEN STOP"**.

**WRITE filename data**—causes *data* to be stored as the next record in *filename*. *Data* can be a number, word, or list. Gives an error if **EOF filename** is **FALSE**. Examples: **WRITE "DATA 1234"**, and **WRITE "NAMES [[C.Q.UMBER]][SILICONGULCH]"**.

**FIND filename**—outputs the next record from *filename*. Gives an error message if **EOF filename** is **TRUE**. Each read advances the file marker. Example: **MAKE "X FIND "DATA"**.

**SCANTOEND filename**—causes successive reads until **EOF filename** is **TRUE**. This procedure is used when more information is to be added to an existing file. There is no corresponding Pascal procedure, but it is included for convenience and as an example of the use of file commands. Example: **SCANTOEND "DATA"**.

**CLOSEFILE filename**—causes information in the file to be stored as a procedure with name *filename*. Example: **CLOSEFILE "DATA"**.

### Using the Files

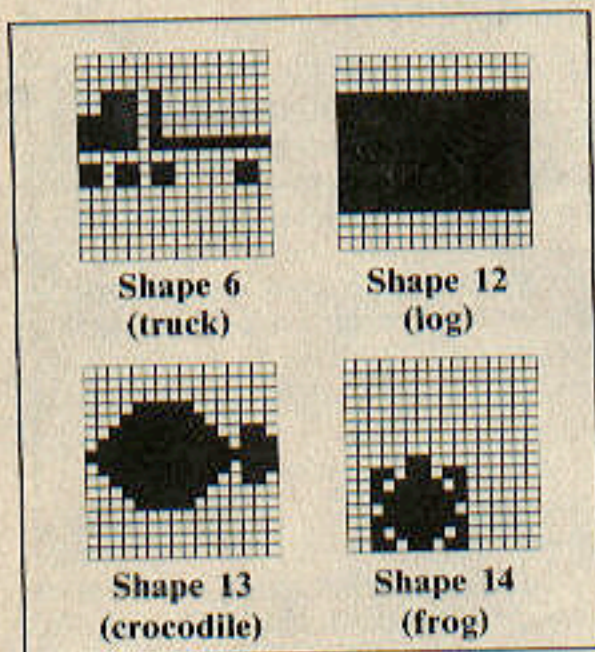
To illustrate the use of files, we'll suppose we have a list of names of people together with the cities in which they live. Let's call the file **NAMELIST** and consider a record to be a list of two lists: the first a list of a person's first and last names, the second a list of the words in the city's name. We can activate all procedures directly, as well as from within another procedure. Let's create the file using direct commands as follows:

Continued on p. 94



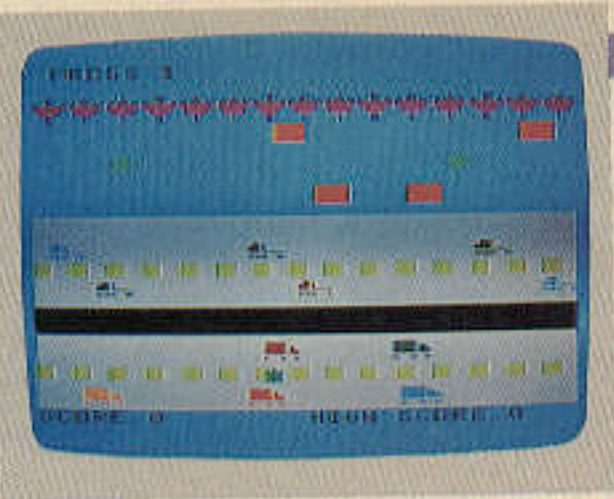
by Ted Barnicoat

I had been looking for quite some time for a vehicle to teach computer literacy to my children, aged 8 and 10. I eventually selected the TI-99/4A as an inexpensive but powerful computer with the promise of great graphics; and an article by Roger Kirchner called "LOGO Has Style" (99'er HCM, November 1982) convinced me that TI LOGO was the learning tool I needed. LOGO not only promotes logical problem-solving habits, but it also allows you to test each unit, subroutine, or procedure (whatever you like to call it) independently. This is a marvelous feature for kids, who want to see progress right away.

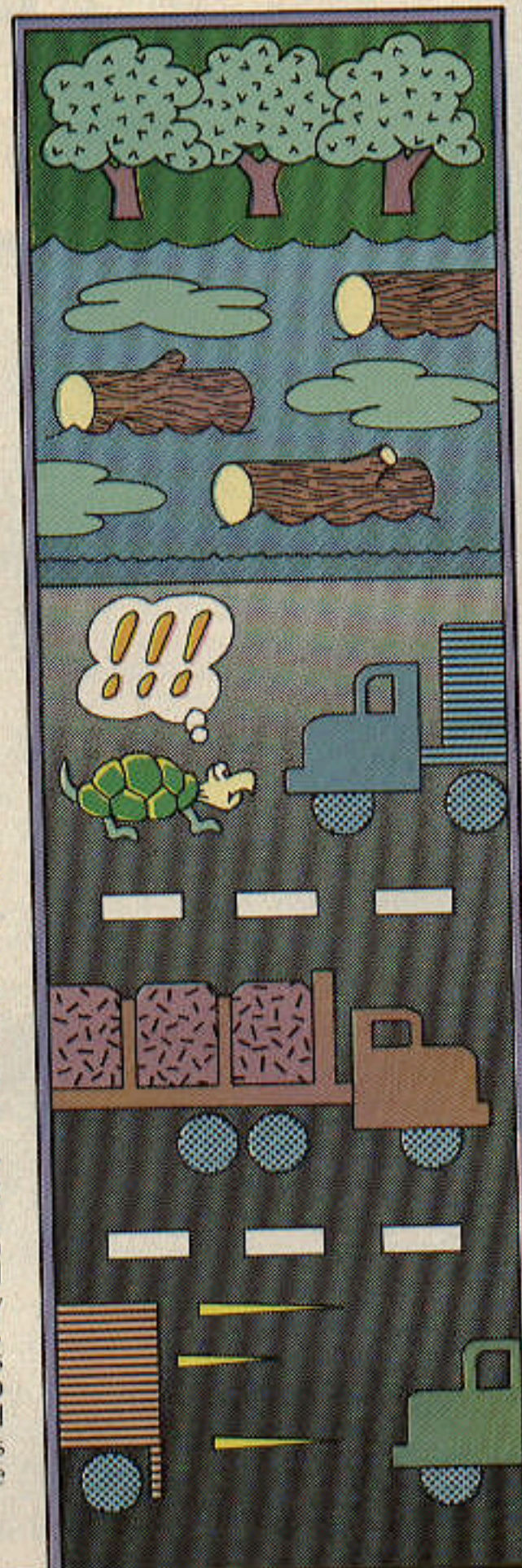


FROGO came out of a small neighborhood club I have formed for my kids and some of their friends. Called the "Logomaniacs," its aim is to give them a step forward in computer literacy while they have a bit of fun along the way. (We also play lots of table tennis and commercial video games.) FROGO was our first project, and we designed it to show ourselves that we could use LOGO and come up with a good approximation of an arcade game. At the same time, we wanted to learn about sprites, tiles, and recursive procedures.

FROGO was designed *top down*. In the first two-hour session we developed the mainline program, using dummy procedures for all except the hopping, skipping, and scoring routines. The kids also completed the TITLE and ROAD procedures, which taught us all a good deal about tiles and rows and columns on the screen. In the second session we



## FROGO: LOGO Invades the Arcade

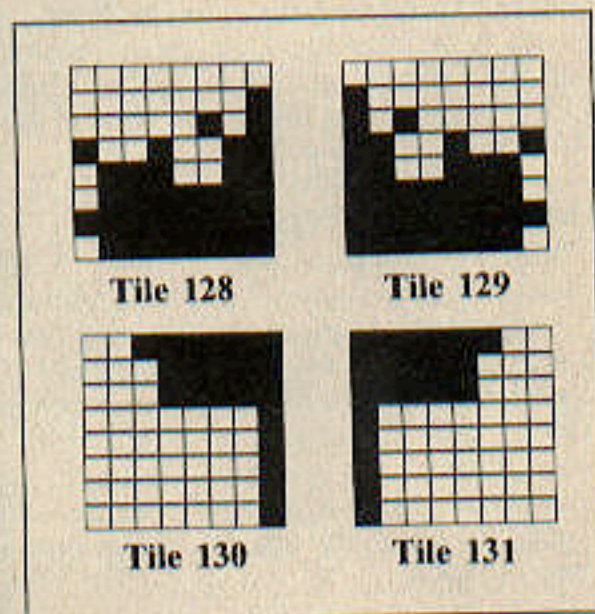


tackled TRAFFIC and learned some valuable lessons about x and y coordinates. After that, the kids took off and programmed the other sprites on their own. Our hardest task was the coincidence routines, COINC and ONIT, which only goes to prove that we should re-read our LOGO Times before starting our projects. Both Vol. 1, No. 5, and the December 1982 issue specifically explain the how-to's of these routines.

FROGO'S familiar scenario asks you to hop a frog across four lanes of traffic, with cars moving at different speeds in the four lanes. If your frog survives this ordeal, he must make his way home—to some lily pads on the opposite side of the river—by skipping onto two sets of logs floating down the river, and then onto some crocodiles swimming upstream. Each time he succeeds, you score, the frog is returned to the start, and the sprites are speeded up.

After you type in the procedure definitions, you will have to define the tiles using MAKECHAR and the shapes using MAKESHape. Then to start the game, type FROGO. Use the E, S, and D keys to move the frogs. Remember that the keys don't auto-repeat in LOGO and that LOGO stores keypresses in the keyboard buffer. This is why the frogs may hop or skip even though you think you haven't pressed a key—it's a stored keypress in the keyboard buffer that's responsible.

This game proved to be a valuable learning experience for all of us in understanding rows and columns, x and y coordinates, and direction and speed. We had fun devising and playing it, and I hope that you will too.



**FROGO**

**Explanation of the Program**

**Procedure Title**

FROGO..... Start game.

TITLE ROAD..... Use tiles to lay out title and game screens.  
LILYPADS

SETUP..... A collection of commonly used procedures to re-initialize all moving sprites and the score.

START..... Re-initialize the game.

TRAFFIC LOGS SNAPPER..... Set up moving sprites with specific X and Y coordinate positions with different directions and speeds.  
FROGS

GAME..... Recursive procedure that allows the game to be played.

HOP..... Move frog 1 row forward or sideways as a result of key input.

SKIP..... Move frog 2 rows forward or sideways as a result of key input.

COINC ONIT..... Check for coincidence of frog with traffic or logs/crocodiles. If "yes" for trucks or "no" for logs/crocodiles, the frog comes to a sticky end.

**TI LOGO - TI 99/4A**

```

TO TIT FROGO >
TIT FLE >
ROAD >
LILYPADS >
SETUP >
PRINT [ SCORE ] >
GAME >
END >

TO TIT FROGO >
CB 15 >
TELL : ALL SC 0 >
TELL TIT 96 SC [ 9 9 ] >
REPEAT 30 [ PC 96 ] >
REPEAT 5 [ PRINT 32 ] >
REPEAT 10 [ PC 32 ] >
PRINT [ F ] >
REPEAT 13 [ PC 32 ] >
PRINT [ BY ] >
REPEAT 7 [ PC 32 ] >
PRINT [ THE LOGOMANIACS ] >
REPEAT 8 [ PRINT ] >
REPEAT 30 [ PC 96 ] >
MAKE R 20 [ PUT TITLE 96 ] >
REPEAT PUT TITLE 96 30 : R 1 >
1 MAKE PRESS + 1 : R >
O PLAY ] >
CALL RC ] >
END >

TO MAKE SCORE >
PUT TITLE : T + 1 >
TELL [ 1 2 3 ] SS SPEED >
+ 5 >
TELL [ 4 5 6 ] SS SPEED >
+ 5 >
TELL [ 7 8 9 ] SS SPEED >
+ 5 >
TELL [ 10 11 12 ] SS SPE >
ED + 5 >
TELL [ 16 17 19 20 ] SS >
SPEED + 3 >
TELL [ 22 23 ] SS SPEED >
+ 1 >
END >
    
```

Continued on p. 86

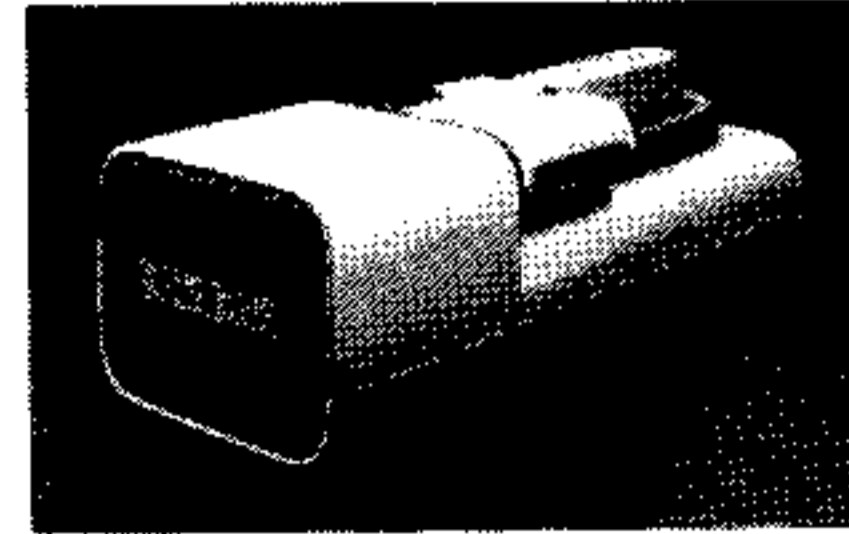
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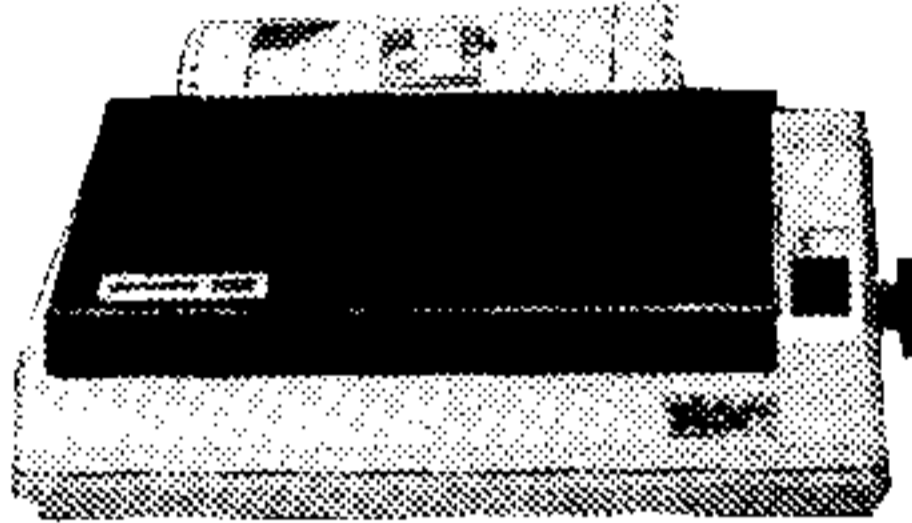
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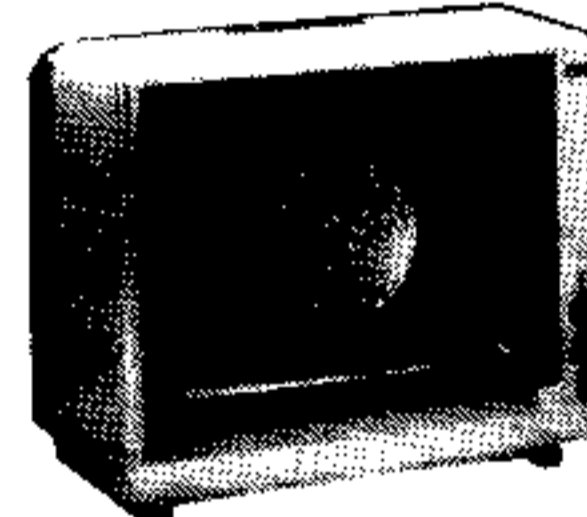
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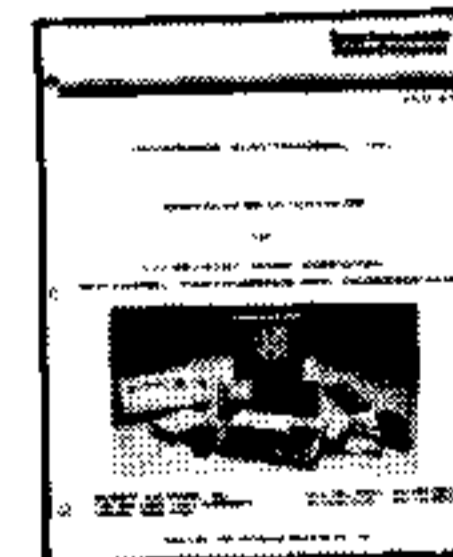


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### Files In LOGO . . . from p. 82

```
REWRITE "NAMELIST
WRITE "NAMELIST [[ERNST KIRCH
NER] [ST. PAUL]]
WRITE "NAMELIST [[MARGARET
MCCOURTNEY][NORTHFIELD]]
WRITE "NAMELIST [[C.Q. UMBER]
[SILICON GULCH]]
CLOSEFILE "NAMELIST
```

After executing these commands, we can access this file with a procedure such as the following:

```
TO TESTNAMES "NAMELIST
RESET "NAMELIST
I:
IF EOF "NAMELIST THEN CLOSEFILE
"NAMELIST STOP
MAKE "REC READ "NAMELIST
MAKE "NAME FIRST :REC
MAKE "CITY LAST :REC
PRINT (SE :NAME [LIVES IN] :CITY)
GO "I
END
```

Notice that when we create or re-create a file, we use REWRITE. When an existing file is to be accessed, we use RESET. These commands are like the BASIC commands to OPEN for output and OPEN for update. Suppose other names are to be added to the file. We'll then use the commands:

```
RESET "NAMELIST
SCANTOEND "NAMELIST
WRITE "NAMELIST [[JANE
ELIZABETH][NASHVILLE]]
etc.
CLOSEFILE "NAMELIST
```

### Definitions as Data

The LOGO primitives that make the introduction of files possible are TEXT and DEFINE. These procedures allow procedure definitions to be regarded and manipulated as data. This is an unusual capability for a programming language, a feature LOGO inherited from its precursor, LISP.

Files are implemented as procedure definitions, with each line of a definition containing one record of the file. (After closing a file, inspect its contents by entering TO filename.) When a file is rewritten or reset, the procedure definition is transformed into a pair of lists. The first list is empty, and the second contains the records in the file. As data is read from the file, records are transferred from the second list to the first. When the second list is empty, more data can be written into the file. New data is then entered at the end of the first list. The CLOSEFILE procedure combines the records in the two lists and redefines them into a procedure definition with the given file name.

It isn't necessary to know any of these details in order to use the files. The file procedures can be stored as a separate procedure file and given the name FILES. Then when we want file capability, FILES can be merged into the workspace. To save the data file you've created, erase all the procedures in the workspace except your data file. Then save it with an appropriate name. Later, you can merge into the workspace when necessary.

Besides allowing file capability, these file procedures are examples of the advanced programming that is possible with LOGO. After all, LOGO is a language for learning, even learning about files.



Muller's challenge and Kirchner's response are addressed to the problem of disk access in TI LOGO. Terrapin LOGO, however, offers a variety of ways to access the disk. The solution presented here—building a pseudo-file in the form of a procedure and then saving that procedure—is only one of the solutions possible in Terrapin LOGO. Another solution might use the DPRINT utility (Technical Manual, Section 7.3,

pages 80-82), and there may be others as well.

Although Terrapin LOGO does allow procedures to access the disk, it is like TI LOGO in that it doesn't have any facilities for building files as such. For this reason we've adapted the method used in "Files in LOGO" for Terrapin LOGO.

The procedures for the two programs are very similar, and the operations of the programs are nearly identical. (One user-defined procedure in the TI LOGO program—LIST—is a primitive in Terrapin LOGO.) In the Terrapin LOGO version, you can save the procedures used to manipulate your file (along with the file) by saving the entire workspace, just as in the TI LOGO version. In Terrapin LOGO, however, you can save any single procedure (or selection of procedures) from the workspace. In order to save selected procedures, you need to load two files from the Utility Disk: PSAVE and ADDRESSES. (You have to load ADDRESSES because it defines the addresses used in PSAVE's procedures as variable names.) The file PSAVE (described in Section 4.1, page 47 of the manual) contains a procedure named PSAVE; to save a procedure (or a selection of procedures), give PSAVE a file name and a list of procedures as input:

```
PSAVE "DATAFILE [NAMELIST]
```

You can then erase NAMELIST from the workspace and save all the rest of the file manipulation procedures, including PSAVE and ADDRESSES, together. Another option is to save the utilities and the data file together, so that the utilities will always be with the file.

Just as in TI LOGO, the inputs for the data file are lists. A typical session from the command mode might run as follows:

```
REWRITE "NAMELIST
WRITE "NAMELIST [[ERNST
KIRCHNER][ST. PAUL]]
```



## Doing Without Extended BASIC

At first glance, the TI-99/4A home computer by itself seems much less powerful than it is when augmented by the Extended BASIC cartridge. However, many of the tasks you thought possible only with Extended BASIC can be accomplished in BASIC with just a little more work. The following five commands found only in Extended BASIC can easily be converted into BASIC subroutines.

### PI

The PI function in Extended BASIC is the easiest of the five to convert. All you need to do is add this statement near the beginning of the BASIC program and then use PI just as you would in Extended BASIC:

```
PI = 3.14159265359
```

### DISPLAY AT

DISPLAY AT is an Extended BASIC command that allows you to print information anywhere on the screen without scrolling the screen. It can be simulated (although it will be a bit slower) with the following routine:

```
100 FOR Z = 0 TO LEN(A$)-1
110 CALL HCHAR(Y,X+Z,ASC(SEG$(A$,Z+1,1)))
120 NEXT Z
130 RETURN
```

Before branching to the routine with a GOSUB, you need to set up three variables. Set A\$ to the string you want printed. The variable Y is the row number, and X is the column number. The length of the string A\$ plus the value of X should never be more than 32. This routine cannot handle line wrapping.

### RPT\$

In Extended BASIC you can repeat a string and place the results in another string using the RPT\$ function. You can also do this in BASIC with a simple routine:

```
100 A$ = ""
110 FOR Z = 1 TO R
120 A$ = A$&B$
130 NEXT Z
140 RETURN
```

Before using the subroutine you will need to set B\$ equal to the string to be repeated and R equal to the number of times to repeat the string. The result will be returned in A\$.

### MAX and MIN

The last two functions we will cover here allow you to retrieve the lower or higher value from two variables. The MAX and MIN functions do this in Extended BASIC. Two short routines can simulate this in BASIC.

#### MAX

```
100 IF A < B THEN 130
110 C = A
120 GOTO 140
130 C = B
140 REM CONTINUE PROGRAM
```

#### MIN

```
100 IF A < B THEN 130
110 C = B
120 GOTO 140
130 C = A
140 REM CONTINUE PROGRAM
```

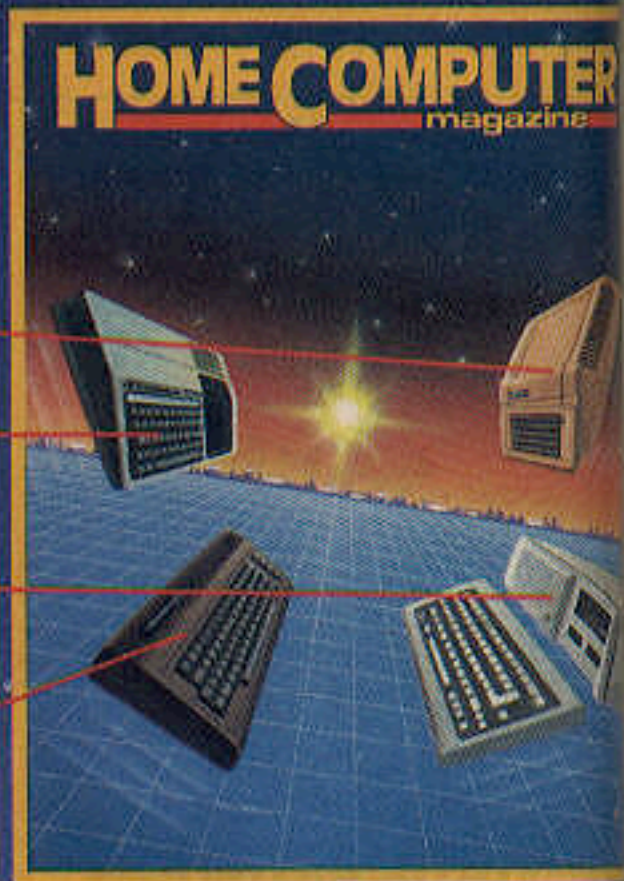
In these two programs the values in variables A and B are compared. In MAX the higher of the two is assigned to C. In MIN the lower of the two is assigned to C.

—William K. Balthrop

# LASER-TARGETED TO THE RIGHT HOME COMPUTER MARKET...



Focused ONLY ON  
Apple, Commodore,  
IBM and TEXAS INSTRUMENTS



## 5 MARKETING STRATEGIES FOR MAXIMUM REACH, IMPACT, AND RESPONSE

1

### Pinpoint The High-Growth Segment Of The Home Market.

The home computer expansion of the 80's will be dominated by 3 brands: Apple, Commodore, and IBM. Advertisers who focus on this group will realize the largest gains.

2

### Avoid Too Broad Or Too Narrow An Advertising Medium.

Indiscriminate advertising in both "general interest" and "machine-specific" publications is an inefficient strategy that quickly depletes your advertising budget.

3

### Place Your Ad In The Strongest Editorial Environment.

Commercial messages stand out best when surrounded by facts—not fluff! Ads that keep company with the right balance of useful, stimulating articles will be noticed repeatedly.

4

### Capture An Overlooked Universe Of Proven Computer Enthusiasts.

The over two million TI Home Computer owners represent an explosive buying potential. These proven enthusiasts will continue to shop for new products and many will migrate to larger, expanded home computer systems.

5

### Simplify Your Media Buy With Home Computer Magazine.

No other magazine gives you more for your advertising dollar than Home Computer Magazine. It gives you instant access to the Apple, Commodore, IBM, and TI home markets without having to pay for readers you don't need or ad duplication you don't want. Our popular programs, colorful graphics, valuable reference articles, and in-depth product reviews provide readers with a magazine that is eagerly read, carefully saved, and constantly referred to. We invite you to examine a copy of Home Computer Magazine and measure it against other print buys.

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# HOME COMPUTER<sup>TM</sup>

## product news

Each month we publish items of interest and news of recently or soon-to-be released computer products. Our publication of information from manufacturers of computers, peripherals, software, and accessories is not to be construed as product endorsement. Prices quoted are the manufacturers' suggested retail prices and are subject to change.

Send press releases to:

Product News Editor  
Home Computer Magazine  
1500 Valley River Dr., Suite 250  
Eugene, OR 97401

### TECH-SKETCH Light Pens

Tech Sketch, Inc., announces TECH-SKETCH Light Pens for Commodore, Apple, and Atari computers. These devices allow the user to select from a menu or control the cursor without typing commands on the keyboard. The user touches the screen with the light pen, which works directly on the CRT to access programs and manipulate data. The pen plugs into the standard RS232 joystick port.

Two light pen models are available: LPI0-S controls the cursor via screen contact, and LPI5-S is a high resolution model that controls the cursor up to six inches from the screen. Both pens have a built-in switch and are equally usable by left- and right-handed people. All TECH-SKETCH Light Pens are priced from \$39.95 and include a free *Paint-N-Sketch I* program, available in cassette, disk, and cartridge form.

Tech-Sketch, Inc.  
26 Just Rd.  
Fairfield, NJ 07006  
(800) 526-2154



### CARTRIDGE PROGRAMMING AT HOME

Navarone Industries has introduced its Cartridge Programming System for the TI-99/4A and IBM PCjr. An add-on device, the system will transfer programs to ROMOX(tm) ECPC(tm) reprogrammable cartridges. Users who want to change a program simply erase it and program it again. The Cartridge Programming System, including hardware, diskette, and manual, retails for \$299.95 for the TI-99/4A and for \$499.95 for the IBM PCjr. Navarone has also announced a licensing agreement with ROMOX Software Publishing to publish and distribute their entire line of cartridge software for the TI-99/4A and Commodore 64, including *Anteater*, *Topper*, and several more unreleased titles. Six titles already released for the TI-99/4A retail for \$29.95 each, and retail prices for the C-64 titles released so far range from \$29.95 to \$39.95.

Navarone has also announced an updated version of its Widget, the New Cartridge Expander that inserts directly into the game slot on the TI-99/4A and allows three Command Cartridges to be plugged in at one time. With three sockets and a selector switch, the user can choose among cartridges without plugging and unplugging to save wear on the console's cartridge slot. A built-in reset button allows the computer to be reset without turning the power off and on. The New Cartridge Expander retails for \$39.95.

Navarone Industries, Inc.  
510 Lawrence Expressway, #800  
Sunnyvale, CA 94086  
(408) 866-8579

### S.A.T. CONTEST

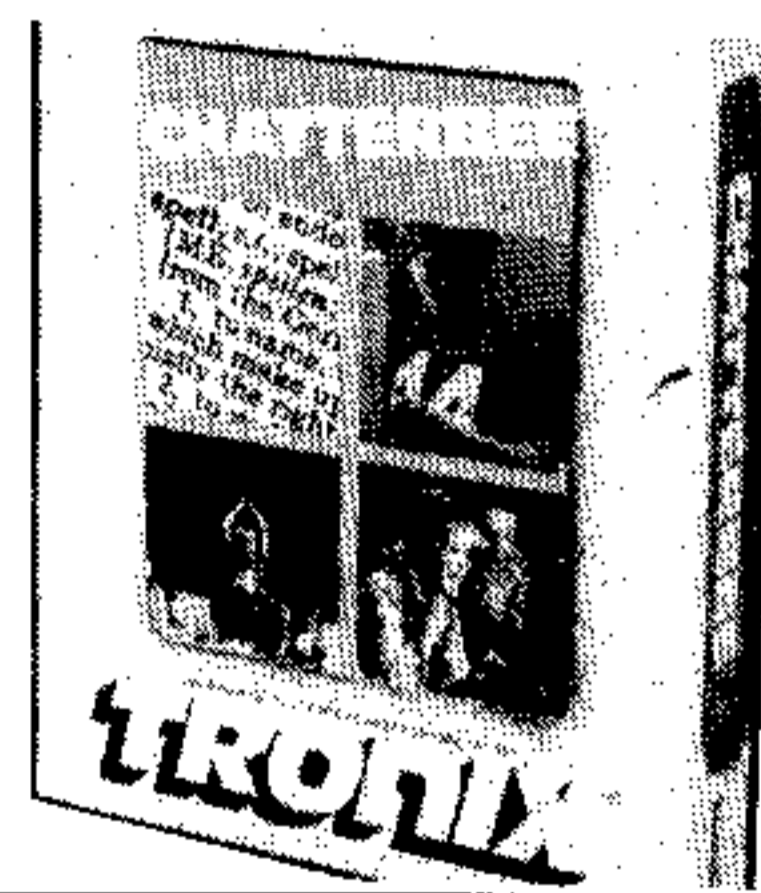
Krell Software Corp. has announced The Great American S.A.T. (Scholastic Aptitude Test) Contest in two categories: Highest S.A.T. Score and Most Improved S.A.T. Score. First prize in each category will be \$1,500 worth of personal computer equipment; second prize will be \$750 worth of personal computer equipment. Fifteen runner-up prizes in each category will be \$500 worth of Krell software. Each of the 34 winners will be given \$1,000 worth of Krell Educational Software to donate to a school of his or her choice. All completed entries must be received by August 31, 1984, and must include copies of official ETS

### SPEECH SYNTHESIZER AND SPELLING SOFTWARE

Tronix Publishing, Inc., has introduced a C-64 version of its S.A.M., Software Automatic Mouth. The speech synthesizing product is already available for the Atari and Apple computers. Four BASIC demo programs are included with S.A.M.: *SAYIT*, *DEMO*, *SPEECHES*, and *GUESSNUM*. Users can input words using either RECITER, the English text-to-speech converter on S.A.M. that uses 400 rules for combining letters, or phonetic spelling. A dictionary of 1,500 words with phonetic spellings is included. The Atari and C-64 versions of S.A.M. retail for \$59.95, and the Apple version retails for \$99.95.

Also available for use with S.A.M. is *Chatterbee*, an interactive spelling program for synthesized speech. Available for the C-64 and Atari, *Chatterbee* features a dictionary of 2,500 words and automatic placing of the user at either grades 1-12 or college levels of study. Requiring a disk drive and 40K RAM, *Chatterbee* retails for \$39.95.

Tronix Publishing, Inc.  
8295 S. La Cienega Blvd.  
Inglewood, CA 90301  
(213) 215-0529



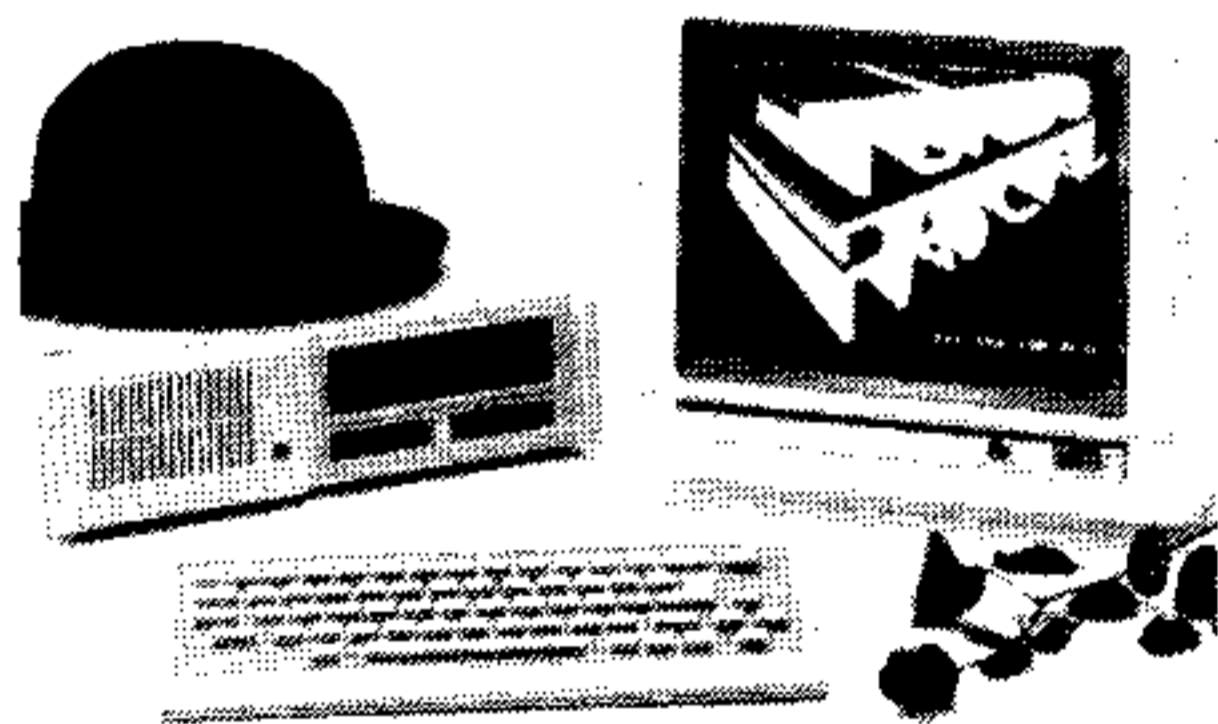
(Educational Testing Service) transcripts and proof of purchase of Krell's College Board S.A.T. Preparation Series. If Krell's S.A.T. Preparation Series is used in a school setting, then proof of purchase by the school is required. Winners will be asked to certify their use of Krell's College Board S.A.T. Preparation Series, and Krell reserves the right to use names and pictures of winners for promotional purposes. The College Board S.A.T. Exam Preparation Series retails for \$299.95 and is available for Acorn, Apple, Atari, Commodore 64, PET, IBM, and Radio Shack computers.

Krell Software Corp.  
1320 Stony Brook Rd.  
Stony Brook, NY 11790  
(800) 24-KRELL

## TURBO PASCAL COMPILER FOR THE IBM PCjr

Borland International has introduced the only Pascal language compiler to date that will run on the IBM PCjr. The combination compiler/editor occupies 33 Kbytes of memory, compared to 129-300 Kbytes for other Pascal compilers. A single-pass native-code compiler, *Turbo Pascal* produces Pascal for microcomputers based on the Z-80 and 8088/8086 microprocessors. In addition the compiler offers extensions of standard Pascal that include bit-byte manipulation, direct access to CPU memory, dynamic strings, and include files. It will compile more than 2,000 lines of code per minute. Borland will pre-install *Turbo Pascal* on customers' PCjr systems at no charge, eliminating the need for a terminal installation program. *Turbo Pascal* on diskette retails for \$49.95.

Borland International  
4113 Scotts Valley Dr.  
Scotts Valley, CA 95066  
(408) 438-8400



## TUTORIALS FOR IBM COMPUTERS

Individual Software has announced three interactive tutorial programs for the IBM PCjr, PC, and PC-XT computers. *Typing INSTRUCTOR* features traditional drill and practice, a chase game, and a link to word processing concepts. *Typing INSTRUCTOR* retails for \$49.95. *Professor Pixel* includes interactive training in generating sound, graphics, and animation in BASIC, and retails for \$59.95. *Professor DOS* is a PC-DOS and MS-DOS training package retailing for \$59.95. Each training program includes one or two interactive diskettes and a user guide. System requirements vary slightly, but most programs require a minimum 64K memory, any version of DOS, a monochrome or color display, and at least one double-sided disk drive.

Individual Software  
1163-I Chess Drive  
Foster City, CA 94404  
(415) 341-6116

## SNEAKY SNAKE

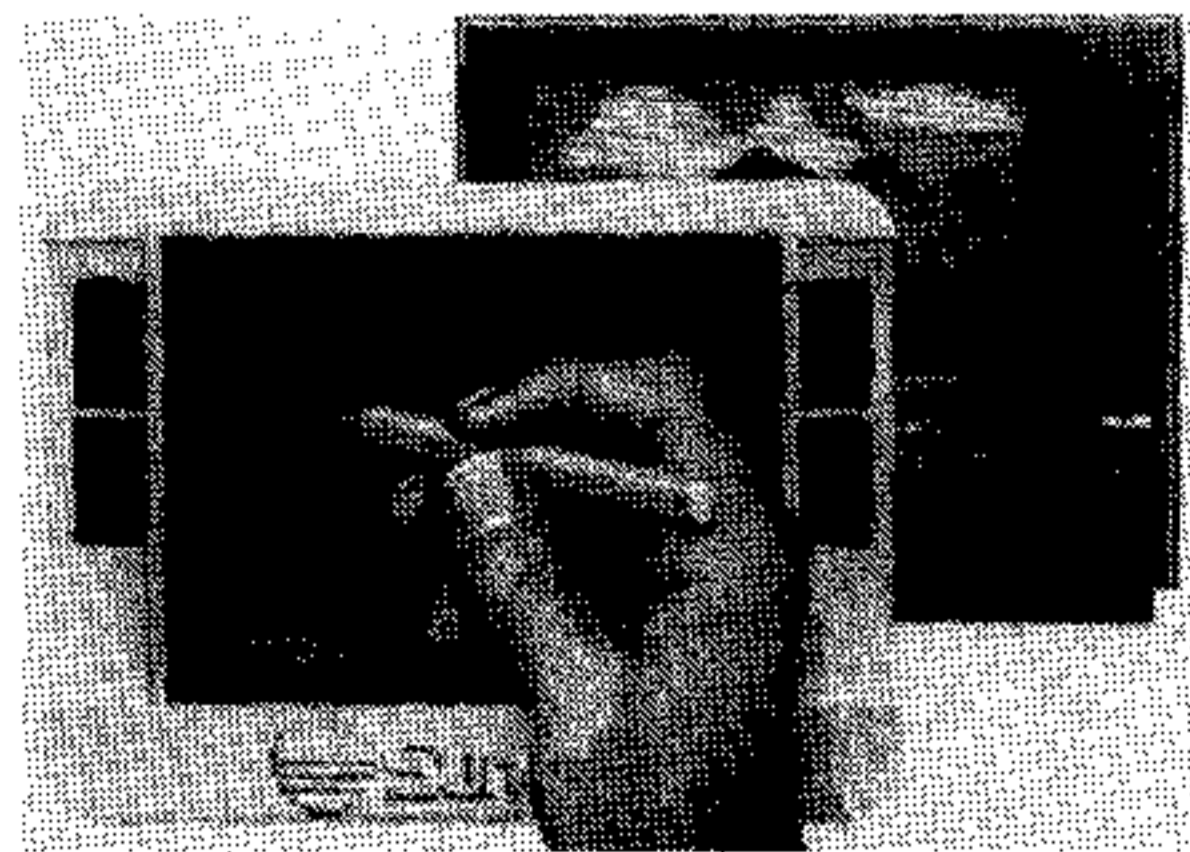
Kean Computing Inc., introduces an action game written in BASIC for the TI-99/4A. *Sneaky Snake* features colorful graphics, quick keyboard response, and multiple screens for a continuous challenge. *Sneaky Snake* sells for \$14.95. In addition, Kean Computing offers three TI-99/4A programs in Extended BASIC: *Heist*, an arcade/action game; *Void*, a graphics adventure game; and *Sprite Maker*, a programming and learning tool.

Kean Computing Inc.  
Box 571  
Kingston, NJ 08528  
(201) 329-2438

## GRAPHICS TABLET CURSOR CONTROLLER

Suncom, Inc., has introduced *Animation Station*(tm), a touch-sensitive graphics tablet computer cursor controller. *Animation Station* features side mounted dual left or right hand function buttons. Its touch sensor surface is built to the rectangular proportions of a home television set to make the on-screen graphics fit the borders of the TV screen. *Animation Station* will be packed with its own graphics utility program and a line of educational, word processing, and graphics applications is planned. Versions of *Animation Station* for the Commodore 64 and Atari retail for \$79.95; the Apple version retails for \$114.95; a version for the IBM PCjr is planned.

Suncom, Inc.  
650E Anthony Trail  
Northbrook, IL 60062  
(312) 291-9780



## PERIPHERALS FOR THE TI-99/4A

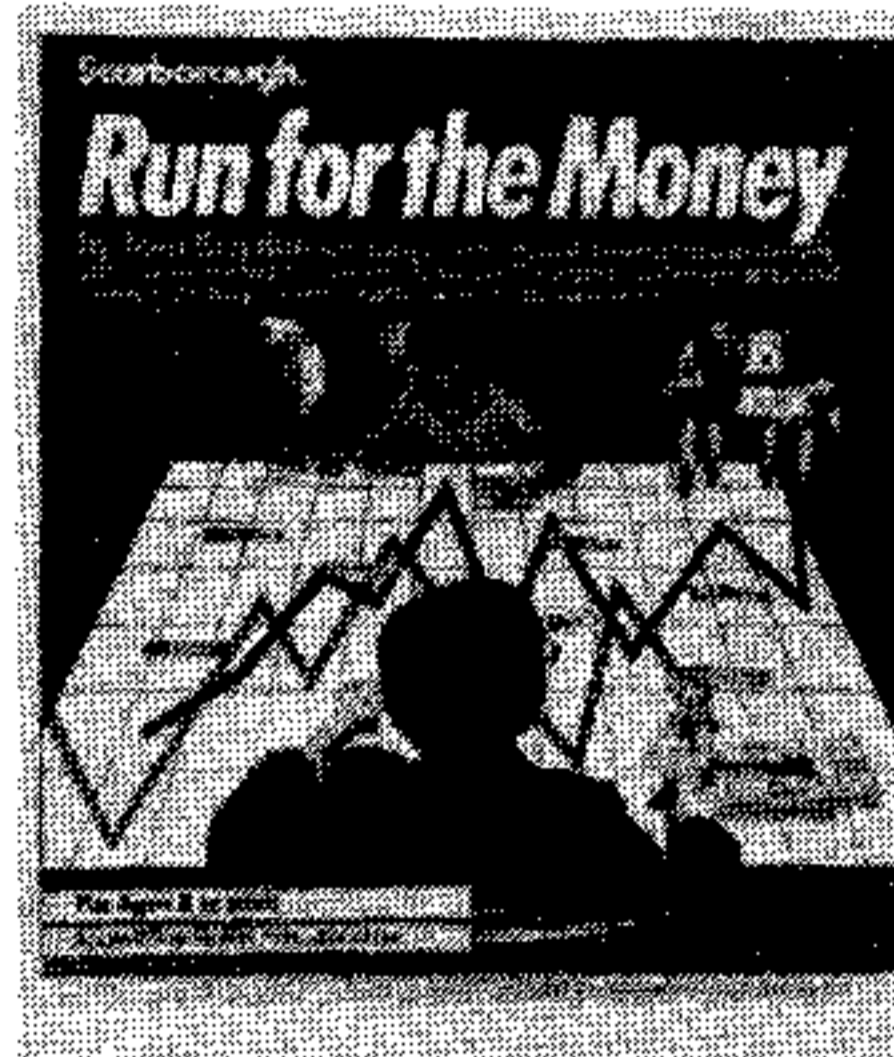
Mikel Laboratories, Inc., has announced a new RS232 Interface system compatible with the TI-99/4A. The system is a free standing unit allowing the use of a printer and modem without the peripheral expansion box. The system retails for \$149.95. Mikel also offers cassette interface systems for \$49.95, TI cassette cables for \$11.95, and printers and monitors.

Mikel Laboratories, Inc.  
3341 W. El Segundo Blvd.  
Hawthorne, Ca 90250  
(213) 679-2542

## A RUN FOR YOUR MONEY

Scarborough Systems, Inc., announces a unique arcade-action business game designed to encourage the development of sound entrepreneurial skills while providing family fun. *Run For The Money* takes place on the hypothetical planet Simian, where the user's spaceship has suffered a forced landing. The players must develop a business and raise money for the needed repairs. Scarborough claims that the action is based on accurate economic models and requires the players to quickly make important decisions about raw materials, marketing, prices, and profits. Increasingly challenging "what if's" occur at regular intervals. *Run For The Money* is available for the IBM PC for \$49.95, and versions for the Atari, Apple II+ and Apple IIe are in the works.

Scarborough Systems, Inc.  
25 North Broadway  
Tarrytown, NY 10591  
(914) 332-4545



## MULTIPLAN FOR THE COMMODORE

Through a licensing agreement with Microsoft Corp., Human Engineered Software will distribute Microsoft's *Multiplan* (tm) spreadsheet program under the HesWare (tm) label for the Commodore 64. The program, which Microsoft has recreated for the C-64, contains built-in arithmetic, financial, and trigonometric functions, screen windows, variable column widths, alphabetic and numeric sorting, the ability to link worksheets, and flexible formatting for screen displays and reports. Human Engineered Software's *Multiplan* package comes with a disk, manual, and keyboard overlay, and retails for \$99.95. Files in *Multiplan* for the C-64 can be transferred to *Omniwriter*, Human Engineered Software's word processor for the C-64 that includes *Omnispeller*, a 30,000 word spelling checker. *Omniwriter* retails for \$69.95.

Human Engineered Software  
Brisbane, CA 94005  
(415) 468-4111

## NEW INTERFACE CABLE ALLOWS OKIDATA/TI HOOK-UP

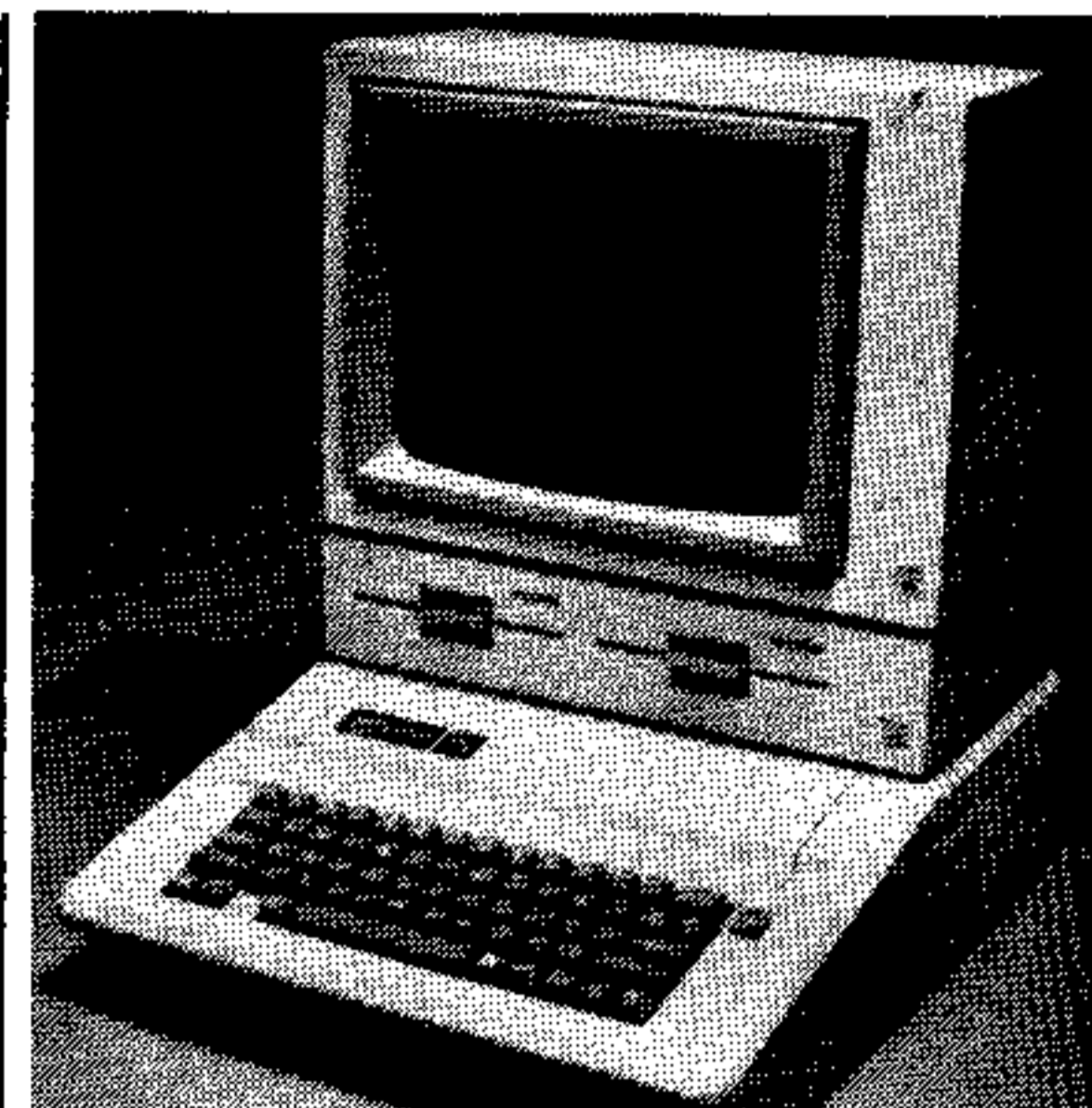
Innovative Electronics and Computing has announced an interface that permits an Okidata printer to be connected to the PIO (parallel) interface port on the TI RS232 card. The interface circuitry fits into one end of a standard parallel cable. The interface changes the signal from the PIO port to make it acceptable to the Okidata parallel interface port. The interface is priced at \$29.95.

Innovative Electronics and Computing  
4150 Fox St., A-5  
Denver, CO 80216  
(303) 458-5600.

## CAGEY CATERPILLARS FOR HOME GAMESMEN

Castle Software, Inc., has announced the release of *Killerpillar*, available on cassette and diskette for the Commodore 64 computer. The game features the player as a pest eradicator against caterpillars that threaten an orchard. The caterpillars grow as they eat trees, multiply as they split when hit, and are protected by attacking moths. *Killerpillar* has seven screen levels and two skill settings. Joystick is required. The game is available at \$9.99 for cassette and \$12.75 for diskette.

Castle Software, Inc.  
P.O. Box 350  
New Castle, DE 19720  
(302) 429-8565.

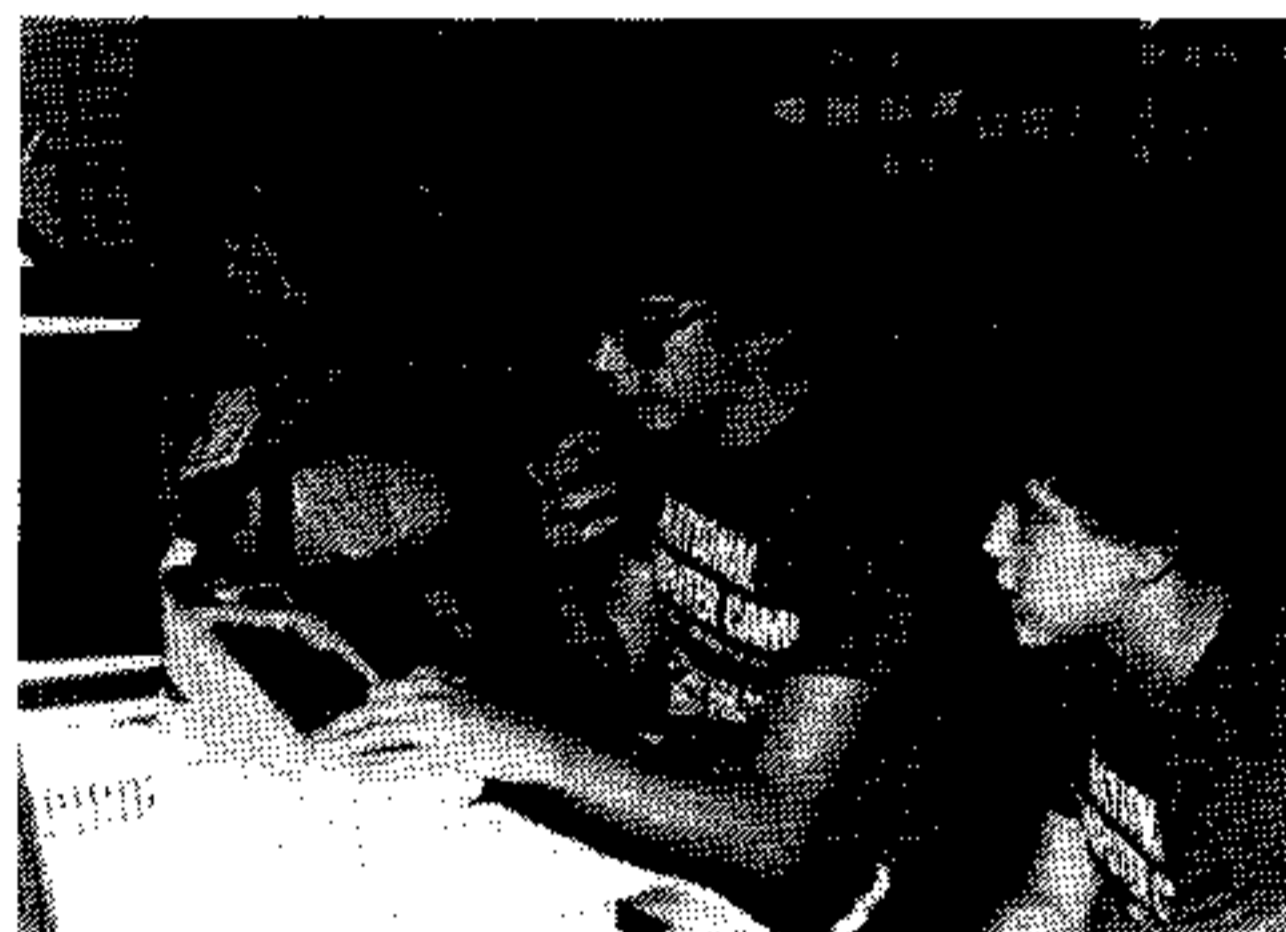


## DUAL DISK DRIVE FOR APPLE

Apple Computer announces a new floppy disk drive unit which contains two half-high, 140 kilobyte drives side-by-side in a single case. Duodisk offers full compatibility with Apple II software and is operationally identical to the Disk II floppy disk drive. Technical improvements include a new disk eject mechanism and an advanced head positioning mechanism, which gives a more precise reading of half-tracks.

The Duodisk comes with a controller card that connects it to any Apple II, Apple II+ or Apple IIe. It fits between the computer and monitor in a case designed to create an integrated system look. The suggested retail price is \$795.

Apple Computer, Inc.  
10260 Bandleway Dr.  
Cupertino, CA 95014  
(408) 996-1010



## COMPUTER CAMPS

National Computer Camps has announced 5 locations for 1984, its 7th season. Campers ages 9 to 18 may sign up for one or more weeks during June, July, and August. The coeducational camps with a ratio of one teacher and assistant per twelve campers will feature 5 hours "hands-on" instruction per day on TRS-80

and Apple computers, two campers per computer, with up to 5 additional hours of optional computer time each day. Campers will be grouped by background and age into 11 different levels of study. The program of study will include BASIC, machine language for Apple and Radio Shack computers, graphics and animation, word processing, Pascal for beginners, computer game design, the social implications of computers, and computer careers and literacy. Outdoor recreation—tennis, swimming, aerobic dancing, weight-lifting, soccer, basketball, softball, and volleyball—will be featured as well. Camps will be located at prep schools, colleges, and universities in Simsbury, CT; Atlanta, GA; St. Louis, MO; Cleveland, OH; and McMinnville, OR.

National Computer Camps  
Box 585  
Orange, CT 06477  
(203) 795-9667

## PORTABLE PRACTICE KEYBOARD

Computer Practice Keyboard Co. has introduced a portable keyboard for practice away from the computer. Each plastic-laminated keyboard, printed on 8 1/2" x 11" stock to fit standard size binders, explains special key functions for the Apple, Atari, TRS-80, TI-99/4A, IBM, Commodore, Wang, Xerox, Osborne, Timex, and Advantage computers. A brief dictionary of computer words is printed on the back of the keyboard, which retails for \$3.95.

Computer Practice Keyboard Co.  
616 9th St.  
Union City, NJ 07087  
(201) 863-0999

## NEW ARCADE POWER STRUGGLE

Gadget Software has announced *Power Failure*, a multi-screened arcade game for the TI-99/4A. The game features ten different playing screens, keyboard or joystick control, and one- or two-player capability. *Power Failure* is available in both BASIC and Extended BASIC for \$16.99 U.S./\$19.99 Can.

NU-WEST Marketing  
10013 Densmore Ave.  
North Seattle, WA 98133



## ENHANCED LOGO FOR THE APPLE

Terrapin, Inc., has announced Terrapin LOGO, an enhanced MIT LOGO for the Apple II or II+ (with 64K memory) and the Apple IIe. With assembly language interface capability and the ability to save pictures on disk, Terrapin LOGO features more than 120 primitives, including program-tracing capability, music procedures, and *Instant*, a program to draw turtle graphics with single-letter commands. The LOGO package, including a LOGO language disk, a utilities disk, 229-page LOGO Tutorial, and 86-page technical manual, retails for \$149.95.

Terrapin, Inc.  
380 Green St.  
Cambridge, MA 02139  
(617) 492-8816.



### THREE FOR TI FROM TOMPUTER

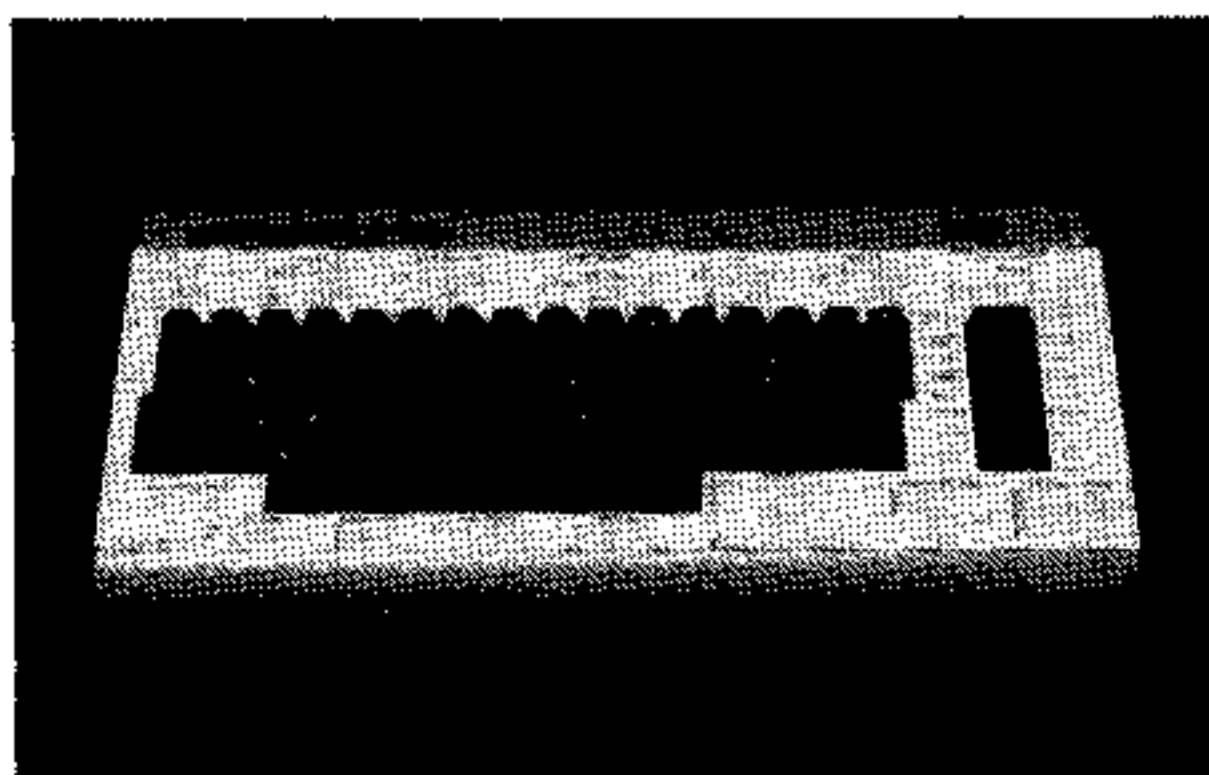
Tomputer Software announces three new programs for the TI-99/4A. *Extended Addition and Subtraction* is designed to improve the math skills of grade school children. It is priced at \$14.99 and requires Extended BASIC and a cassette recorder. *The Castle of Death* is a graphics adventure game featuring a 100-room castle complete with bats, spiders, mice, bombs, skulls, mazes, and more. In *The Quest for Hitler's Diary* players are confronted with a subterranean secret room, flying swastikas, and Hitler's ghost. Both of the games require Extended BASIC, a joystick, and a cassette recorder, and are priced at \$17.99 each.

**Tomputer Software**  
1550 Montgomery Dr.  
Deerfield, IL 60015  
(312) 945-9677

### CHEATSHEET OVERLAYS

Cheatsheet Products(tm) announces help for Commodore 64 and VIC-20 users in the form of Leroy's Cheatsheets. These durable plastic-coated templates lie on the keyboard to identify specialized commands and functions. Overlays are available for many popular Commodore and third-party programs, including *Basic*, *Quick Brown Fox*, *Easy Script*, and *Graphic Printer*. Each Cheatsheet comes with starting instructions, marked function keys, and additional tables, charts, or drawings particular to the program for which it was designed. All Cheatsheets are \$3.95 apiece.

**Cheatsheet Products**  
P.O. Box 8299  
Pittsburgh, PA 15218  
(412) 456-7420

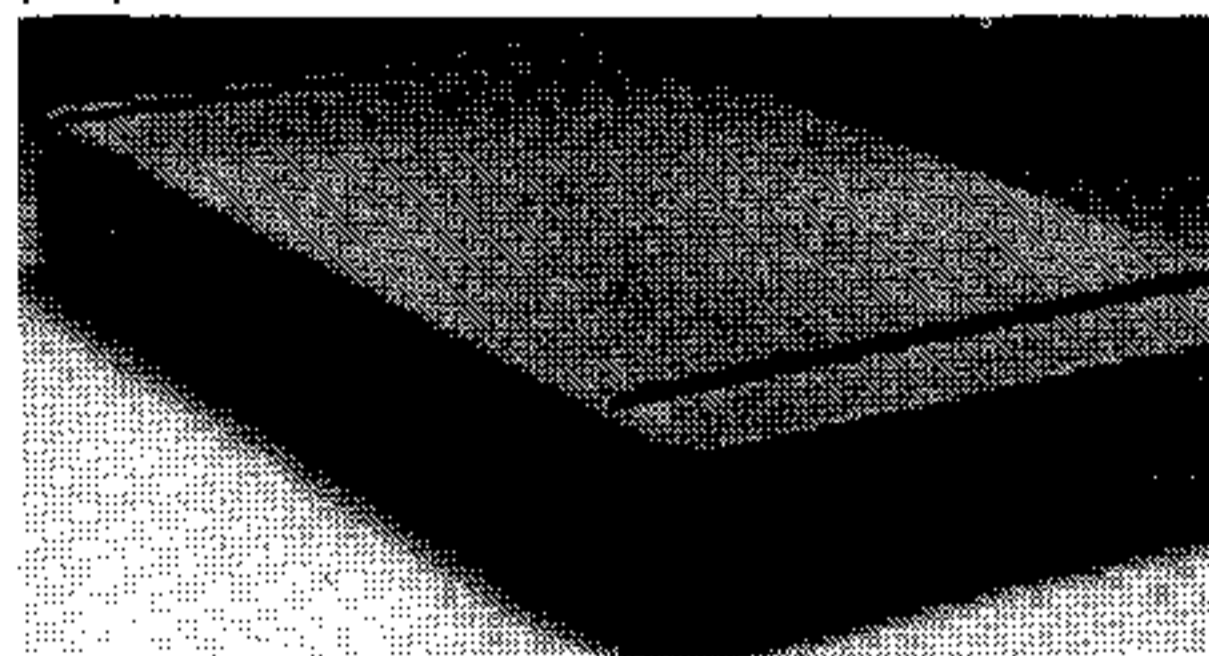


### TWO NEW APPLE MODEMS

Apple Computer has announced two modems, a 300-baud model and a 1200-baud model, each fully compatible with all Apple II, Apple III, Macintosh, and Lisa personal computers. The modems permit the transmission and reception of data files, electronic mail, and computer programs to and from other personal computers, minicomputers, and mainframes. Home users can perform home banking transactions and tie into information services such as CompuServe, Dow Jones News/Retrieval, and The Source. The Modem 1200 can operate at both 300-baud and 1200-baud rates. The Modem 300 works at both 300-baud and 110-baud rates.

The modems use an RS-232C serial interface with a 9-pin connector. The Apple II requires a serial interface card to connect with either modem. The modems come with an accessory kit containing installation manual, user's manual, and computer-specific connector cable. An optional accessory kit for Apple II users includes a serial interface card. Modem accessory kits for Apple II and Apple III computers include a terminal program that allows users to dial into information services such as CompuServe and The Source. The Apple Modem 300 retails for \$225.00; with accessory kit including the serial interface card, for \$299.00. The Modem 1200 retails for \$495.00; with the optional accessory kit containing the card, for \$570.00.

**Apple Computer, Inc.**  
20525 Mariani Ave.  
Cupertino, CA 95014  
(408) 996-1010



### DISK DRIVE DIAGNOSIS

Data Encore has announced the Datalife Disk Drive Analyzer(tm) on 5 1/4" minidisk for IBM PC and some compatible systems. Also available for Apple II, II+, IIe, and III computer systems, the analyzer will run four tests (for head alignment, disk clamping, write/read accuracy, and disk speed) and display an evaluation on-screen to indicate whether tested areas will require adjustment and/or repair. The IBM version and a new Apple version of the Disk Drive Analyzer retail for \$39.95 each.

**Data Encore**  
585 N. Mary Ave  
Sunnyvale, CA 94086  
(408) 720-7400

### IBM-APPLE LINK

Quadram Corporation has introduced Quadlink, an expansion board that allows IBM PC users to run Apple software. When installed in slot #4, the board makes the IBM PC or XT functionally equivalent to an Apple 64K computer. There is no need to convert or reformat any disks, nor to plug or unplug monitor cables. The user can switch back and forth between Apple mode and IBM mode with just a couple of keypresses. The Quadlink board works with most installed I/O devices such as parallel and serial ports for connecting printers and other accessories. It allows the use of all IBM enhancements such as printer buffers, etc., while running Apple software. The Quadlink system comes standard with 64K of memory, a game port that is both IBM and Apple compatible, and a display adapter that offers five display modes, including high-resolution color graphics. The price is \$680.

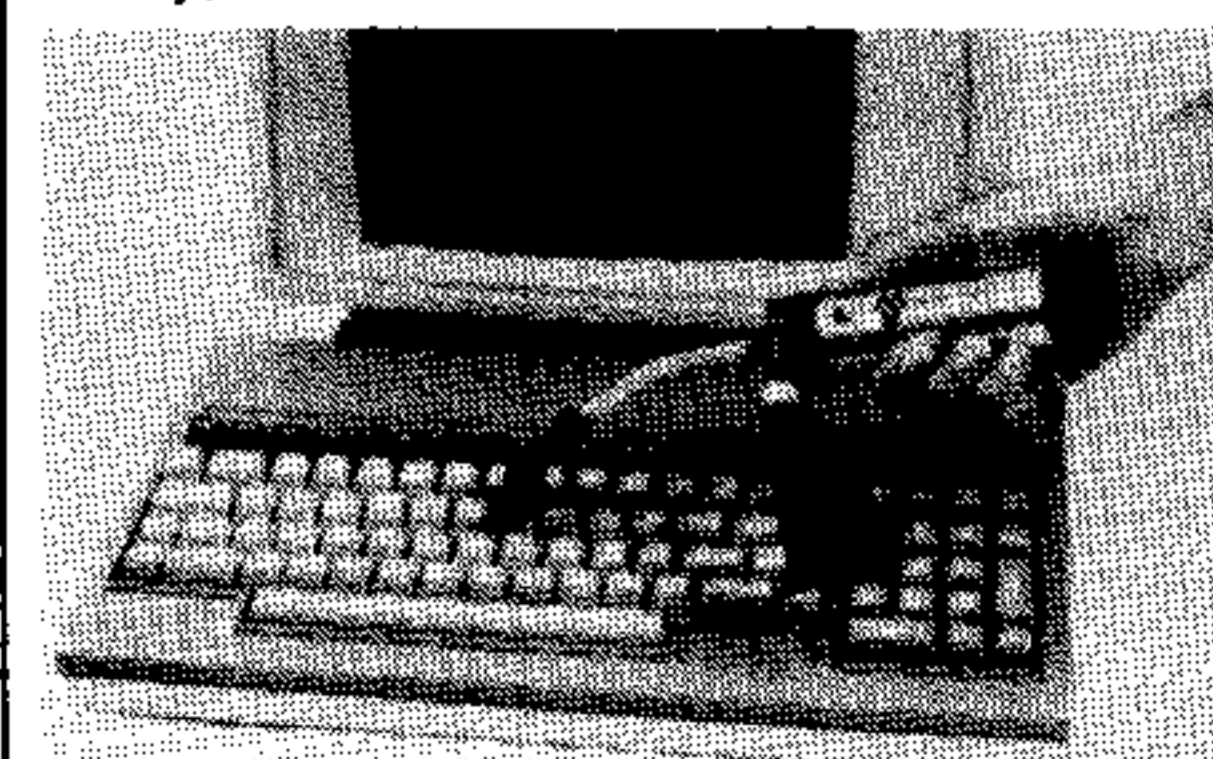
**Quadram Corporation**  
4355 International Blvd.  
Norcross, GA 30093  
(404) 923-6666



### COMPUTER VACUUM CLEANER

The Pine Cone has announced the MINI-VAC, a 6-ounce, 5" x 1 1/4" x 1 1/4" vacuum cleaner or blower designed to remove minute particles of dust and debris from computers, cameras, and other dust-sensitive gear. MINI-VAC comes with lens and all-purpose brushes, two interchangeable directional wands, two fine-bristle brushes, and a cloth vacuum bag. The motor is AC or DC powered with optional adapter (9-volt battery not included). The MINI-VAC retails for \$29.95.

**The Pine Cone**  
Blake Building, Dept. ER-284  
P.O. Box 1378  
Gilroy, CA 95021





# cms BETTER QUALITY SOFTWARE

\* Software for TI-99/4A Home Computer \*



## MS-ADVENTURES

Created by MIKE STEWART. These adventures consist of MS Data Bases which are run by a MS Adventure Module Program. The module program is included with "Quest for the Key, Part 1". The adventures accept 2 word commands and have the ability to save and restore games.

Requires extended basic. Disk version in assembly language and also require the 32K memory expansion.

—MS Data Bases include:—

**QUEST FOR THE KEY, Part I**  
Search for Mergen's Keep. Search a magical land for entrance into the keep.  
\$24.95 Cass. \$26.95 Disk

**QUEST FOR THE KEY, Part II**  
The Enchanted Keep. The quest continues in Mergen's enchanted castle. Find the key to free the princess.  
\$14.95 Cass. \$16.95 Disk

**THE NEW KING**  
Return to the enchanted lands to recover the fallen kingdom.  
\$14.95 Cass. \$16.95 Disk

Look for Future Data Bases



## SPRITE BUILDER

This utility program makes it easy to design and modify sprites. 21 active functions. Automatic cursor movement. Control of all screen colors. Sprite code output to cassette, disk or printer. Sprite code input from cassette, disk or keyboard. Animation of up to 4 sprites. Rotation in any of 6 directions. Comes with a book containing 150 pre-defined sprites, ready for you to use. Requires extended basic. Disk version requires 32K expansion to use all of the features. Speech synthesizer optional. By JET.  
\$19.95 Cass. \$21.95 Disk



## MERRY MATH

An educational extended basic program by JUDY THOMAS. Help your pre-schooler and early grade learners with beginning math skills. 3 difficulty levels and sprite graphics will encourage them to go from one reward to the next.  
\$14.95 Cass. \$16.95 Disk



## ALPHANUM DELIGHT

ALPHIE works at the ALPHANUM DELIGHT factory, catching and sending letters and numbers to earth. ALPHIE's eyesight is failing. Will you help him with his work? This educational game will captivate your preschooler with its graphics, sprites and sounds. Choose letters or number, random or ordered, speeds ranging from slow (1) to fast (8), and speech is optional with an attached synthesizer. Requires extended basic. By JET.  
\$14.95 Cass. \$16.95 Disk

## COMBO SPECIAL 1



**CAPTURE THE INTRUDER**  
An intruder has penetrated a top secret naval base. Your mission: surround and capture him for interrogation. With TEII speech option. By JET.  
\$14.95 Cass. \$16.95 Disk



## COMBO SPECIAL 2

**MOON BASE RYNIN**  
Command a research facility. Will you be able to save the base from an approaching meteor? Use neutron laser and deflector beam. By JIM BOZEMAN.  
Both basic programs:  
\$14.95 Cass. \$16.95 Disk

## COMBO SPECIAL 3



## COMBO SPECIAL 4

**NIGHT PATROL**  
An extended basic game in which each of two players commands an army which seeks to find and destroy the other's forces. Joysticks required.  
Both by John Rutland-Wallis  
\$14.95 Cass. \$16.95 Disk



## OUT ON A LIMB

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An extended basic game in which each of two players commands an army which seeks to find and destroy the other's forces. Joysticks required.  
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A two rabbit game. Find the prized egg in the graphical maze before the other rabbit does. Follow the clues and beware of delicious carrots which will slow you down. Requires joysticks. By JET.  
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A graphic game for 2-4 players. Roll the dice to collect the parts. Be the first to build your bug. By JOHN MOODY.  
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Tablut . . . from p. 60

## TABLUT (Apple) Explanation of the Program

Line Nos.	Explanation of the Program
100-160	Program header.
170-250	Display title screen; initialize game.
260-390	Display playing screen.
400-460	Main control loop.
470-510	Keep track of players' turns.
520-570	White player inputs move.
580-620	Red player inputs move.
630-740	Check for legal moves.
750-810	Move the player.
820-850	Adjust player's location array.
860-900	Check for king at border.
910-1040	Check for captures.
1050-1120	Check for capture of king.
1130-1210	End of the game; option to play again.
1220-1500	Draw row and column labels at edge of board.
1510-1550	Subroutine to input one character between A and I.
1560-1570	Subroutine to input one character between 1 and 9.
1580-1610	Illegal move message.
1620-1650	DATA statement containing coordinates for the screen position of each board location.
1660-1690	DATA statement containing information for the TB( ) array to maintain location of pieces.
1700-1830	DATA statements contain shape table for the players' pieces and king's crown.
1840	End of the program.

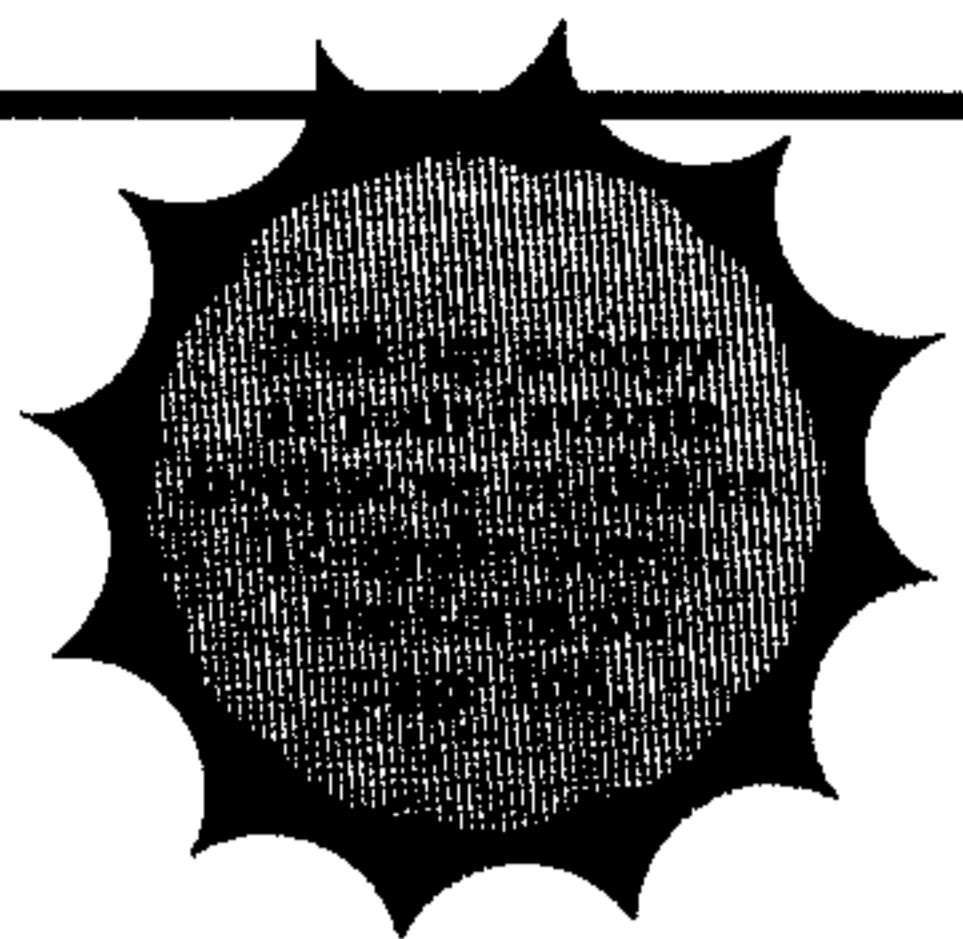
## APPLE II Series

```

100 REM ***
110 REM * TABLUT *
120 REM ***
130 REM BY JAMES J. MULLIGAN
140 REM AND THE HCM STAFF
150 REM HOME COMPUTER MAGAZINE
160 REM VERSION 4.2.1
170 REM APPLE II SERIES APPLESOFT
180 REM
190 REM TITLE, AND INITIALIZATION
200 REM
210 HOME : VTAB 12 : HTAB 17 : PRINT "TAB
LUT" : FOR X = 1 TO 1000 : NEXT X : HO
ME : GAME = 0
220 DIM TB(9,9), S(2,9)
230 KING = 0 : KC = 5 : KR = 5 : PN = 1 : FG =
0
240 FOR X = 1 TO 2 : FOR Y = 1 TO 9 : REA
D S(X,Y) : NEXT Y : NEXT X
250 FOR X = 1 TO 9 : FOR Y = 1 TO 9 : REA
D TB(X,Y) : NEXT Y : NEXT X
260 FOR X = 24576 TO 24668 : READ A : POK
E X,A : NEXT X : POKE 232,0 : POKE 233
,96
270 REM
280 REM DISPLAY PLAYING SCREEN
290 REM
300 HGR : SCALE = 1 : ROT = 0
310 HCOLOR = 3
320 HPLOT 41,8 TO 239,8 TO 239,152 TO 4
1,152 TO 41,8
330 FOR X = 63 TO 217 STEP 22 : HPLOT X,
8 TO X,152 : NEXT X : FOR X = 24 TO 1
36 STEP 16 : HPLOT 41,X TO 239,X : NE
XT X
340 GOSUB 1250
350 FOR X = 1 TO 9 : FOR Y = 1 TO 9
360 IF TB(X,Y) = 0 THEN 400
370 IF TB(X,Y) = 1 THEN HCOLOR = 3 : DRA
W 2 AT S(1,X),S(2,Y) : GOTO 400
380 IF TB(X,Y) = 2 THEN HCOLOR = 3 : DRA
W 1 AT S(1,X),S(2,Y) : GOTO 400
390 IF TB(X,Y) = 3 THEN HCOLOR = 5 : DRA
W 1 AT S(1,X),S(2,Y)
400 NEXT Y : NEXT X
410 REM
420 REM *** CONTROL LOOP ***
430 REM PLAY IS CONTROLLED FROM THIS LO
OP
440 REM
450 GOSUB 510 : GOSUB 790 : GOSUB 900 : GO
SUB 1090 : IF KING = 1 THEN GOTO 11
70
460 IF KING = 2 THEN GOTO 1190
470 GOTO 450
480 REM
490 REM ADJUST PLAYERS TURN NUMBER
500 REM
510 PN = ABS (PN - 1)
520 IF PN = 1 THEN 620
530 REM
540 REM WHITE PLAYER INPUTS MOVE
550 REM
560 HOME

```

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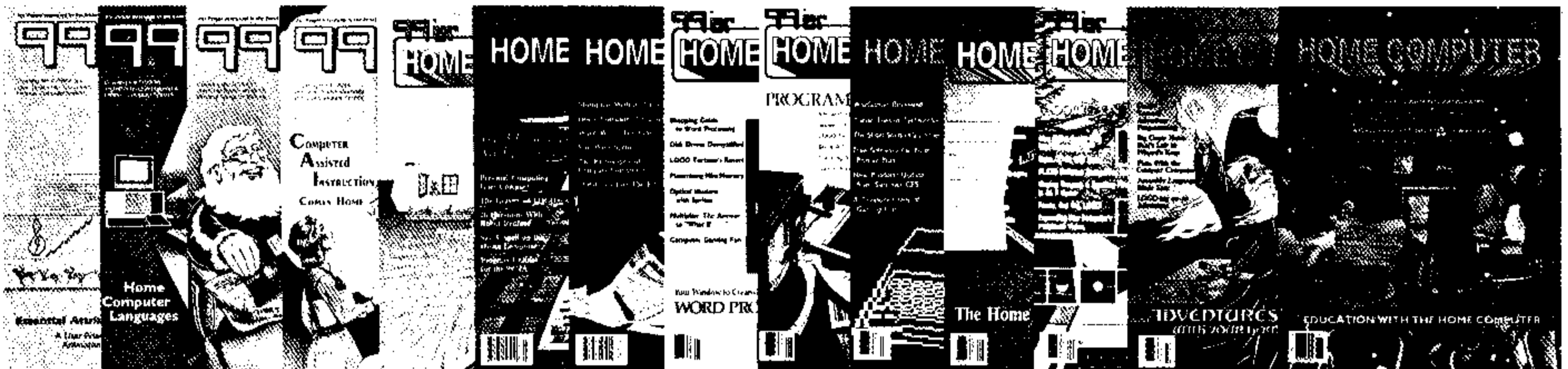
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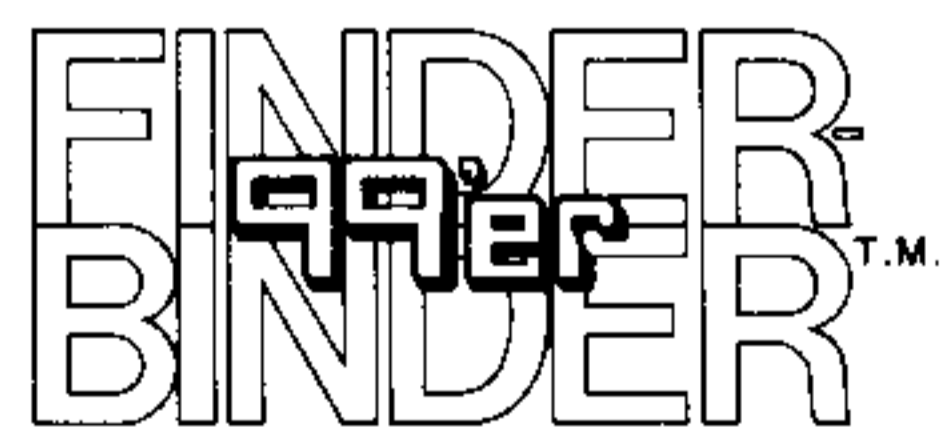
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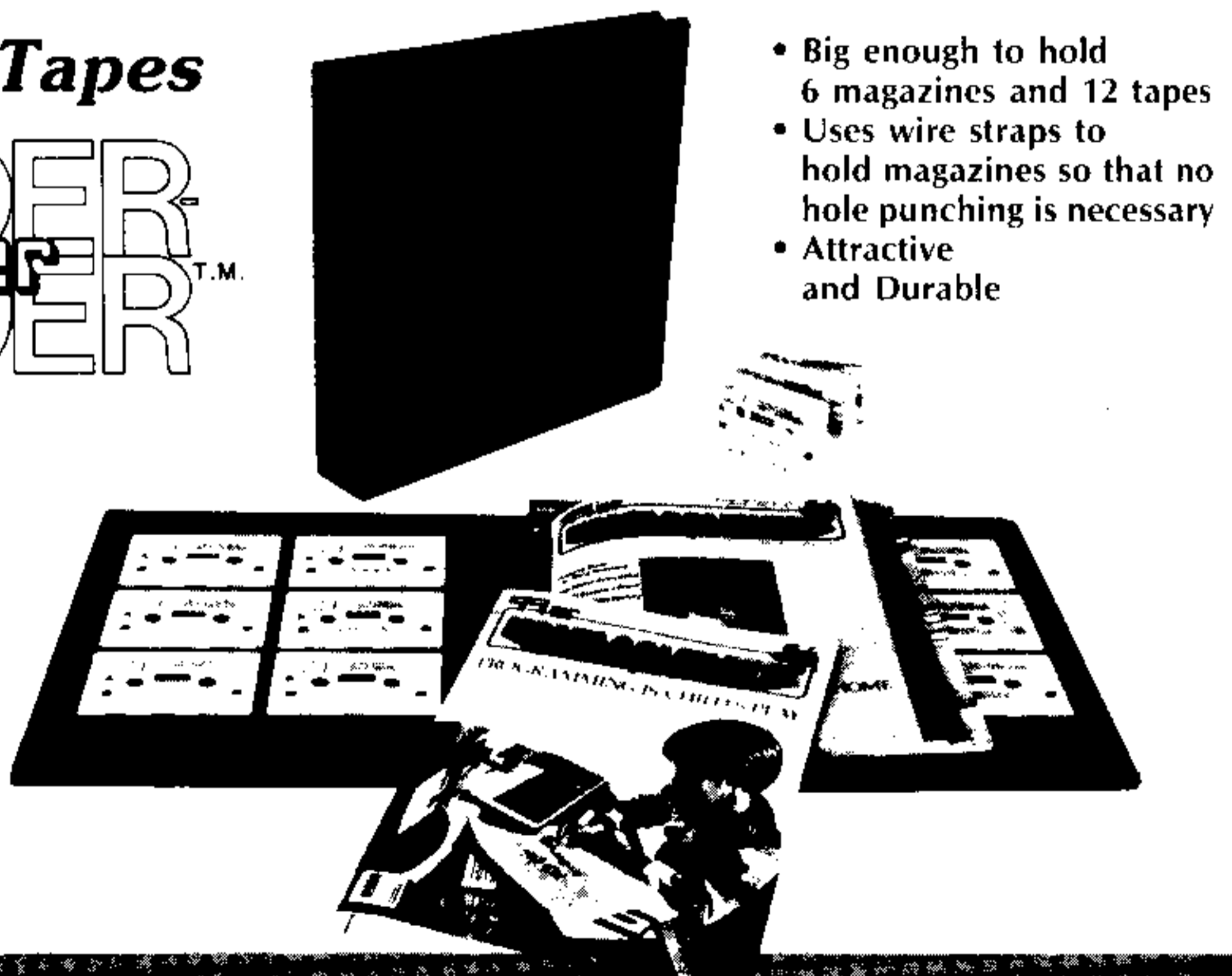


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code for each row of the Design Grid. Below these codes, you'll see a sample of your character scaled down to its correct size. Beneath the sample is a Plot Grid. Here you can plot your characters to see how several of them look together. You can also change the foreground and background colors of your characters on the Plot Grid. And if you're working with sprites, you can take advantage of the Magnify option by pressing [CTRL][S].

Any previously defined character can be recalled for editing via the Insert command. This command moves the selected character back onto the Design Grid. You edit with Y, N, [FCTN] and the arrow keys. Since you are changing the

---

**"These programs not only compute the hexadecimal codes for custom characters, but also allow almost instant editing of these characters."**

---

character definition when you edit, all the characters (even magnified sprites) with that character code on the Plot Grid will also change.

Two of the most useful features of this program are the Flip and Rotate commands. With the Rotate command you can rotate a character 90 degrees clockwise. As the command is completed, you are given the new hexadecimal codes for the rotated figure. At the same time, the program will rotate the figure—in the sample area as well as on the Plot Grid—to conform to your editing changes. If you rotate twice, your figure will of course be pointed in the opposite direction, and unless it is a horizontally symmetrical figure, it will now be upside-down. To avoid this inversion, you can invoke the Flip command to flip a figure so that it is pointing in the opposite direction but is not upside-down. This is very useful to those of us who like to make sprites change their shapes as they change directions.

### Documentation

The uncluttered format of the instruction manual for *Graphics Designer* makes it easy to use. Instructions are illustrated. At the end of the manual a "Quick Reference Guide" reviews each instruction. After spending just a short time with the documentation, you can start making your own designs.

### Ease of Use

*Graphics Designer's* commands are easy to find and use. If you happen to forget a command, you simply go to the menu displayed at the bottom of the screen. You can quickly correct errors made while entering command variables by typing [FCTN] [9]. The cursor will then return to its previous position, where you'll be able to enter a new

response. When I responded to command prompts with an inappropriate answer, the program's error-handling routines accurately identified the error and listed the range of correct values.

With its quick editing, *Graphics Designer* fulfills many of the graphics programmer's needs. If hexadecimal codes are keeping you from using your TI's graphics capabilities, this program will provide the assistance you need to get you designing your own characters. One feature of *Graphics Designer* I would like to see changed, however, is the size of the Plot Grid. Why couldn't the PLOT command place the characters or sprites exactly where they will be on an entire screen reserved for this option? Then we could really see how our designs will appear in our programs. For that matter, how about letting us see motion?

### Graphics Code Generator

Software Carousel's *Graphics Code Generator* presents another approach to the difficulties of graphics. This Extended BASIC program, available on cassette and diskette, does a lot more than its name implies. In addition to providing hexadecimal codes, it allows you to design up to six characters at a time. This is possible because *Graphics Code Generator's* design area is six times larger than that of either the program in the *TI Users Reference Guide* or the *Graphics Designer*.

Joysticks control cursor movement on this 24x16 grid. To paint in an area, press the fire button. Central to this program's operation is the idea of *overlays*. After filling the design area with up to six characters, you can select another overlay which can be placed over the original. Since all but the first overlay are considered to be sprites, this process is limited by the number of sprites TI Extended BASIC will allow on one line. Overlay colors are selected with the Color Change command.

Using the Display Image command will allow you to see any overlay in its true size. Unfortunately, you can view them only one at a time. Therefore, it is not possible to see the composite picture. If you confine yourself to the four left-hand areas, it is possible to Rotate the overlay 90 degrees counter-clockwise. Or, if you prefer, you can Relocate your image anywhere within the design area. After executing either

---

**"Using the Display Image command will allow you to see any overlay in its true size."**

---

of these instructions, you can then obtain the hexadecimal values of the shifted image through use of the Code Image command.

If you have a printer, you can get a listing of the overlays, their positions on

the design area, color codes, and hexadecimal codes. Since each printed report can be individually labeled, you'll be able to identify a particular file. If you have a cassette recorder or disk drive, you can SAVE your characters and sprites. Later, these figures can be loaded back into *Graphics Code Generator* for review or editing.

### Documentation

*Graphics Code Generator* comes with a four-page instruction manual. Anyone unfamiliar with cassette or disk operation will find the loading instructions helpful. The manual presents enough essential information on program operation to get you started working with graphics. The commands are catalogued in the same order in which they appear in the Action Menu. Command explanations are detailed and lucid. Wherever necessary, [ALPHA LOCK] prompts are included: up for joystick operation and down for printed reports. Also included in the documentation is a short program that will automatically extract your character's hexadecimal codes from disk and input this information into your program.

### Human Engineering

*Graphics Code Generator* can be used by anyone who has had even moderate exposure to computers and graphics. The program is menu-driven. Where it is

---

**"If you have a printer, you can get a listing of the overlays, their positions on the design area, color codes, and hexadecimal codes."**

---

inconvenient to display the main Action Menu, a smaller option list directs you to either a command or the main menu. The program lets you save character definitions so you'll be able to build a library of custom characters. Most programmers will probably enjoy "painting" on *Graphics Code Generator's* large design area. Because it is possible to work with four sprites at once, the benefits of this oversized design area will be obvious to those who use the Magnify 3 or Magnify 4 option.

The *Graphics Code Generator* program does have one flaw. Its error-handling routines could be improved. Entering the wrong number can cause the program to terminate. If this happens, your painting will be lost.

Despite this pitfall, *Graphics Code Generator* has plenty of features to assist anyone struggling with graphics creation. If you need more information on program operation, or if you'd like to see a unique demonstration of *Graphics Code Generator*, a very interesting demonstration tape is available from Software Carousel.

## One-Of-A-Kind

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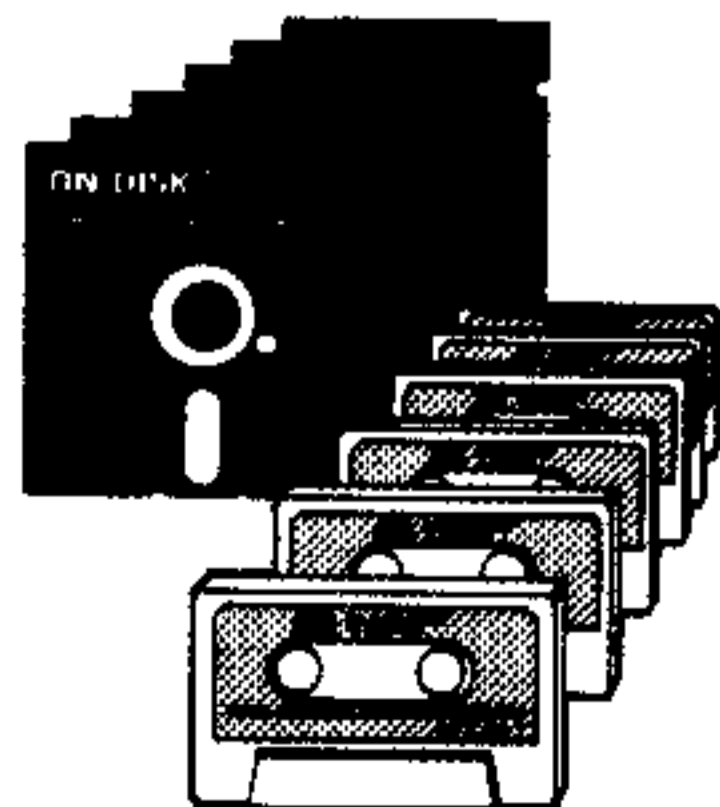


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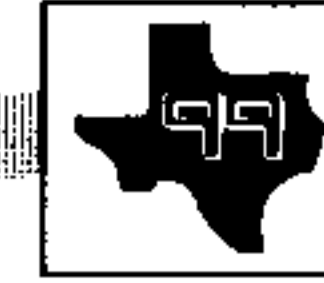
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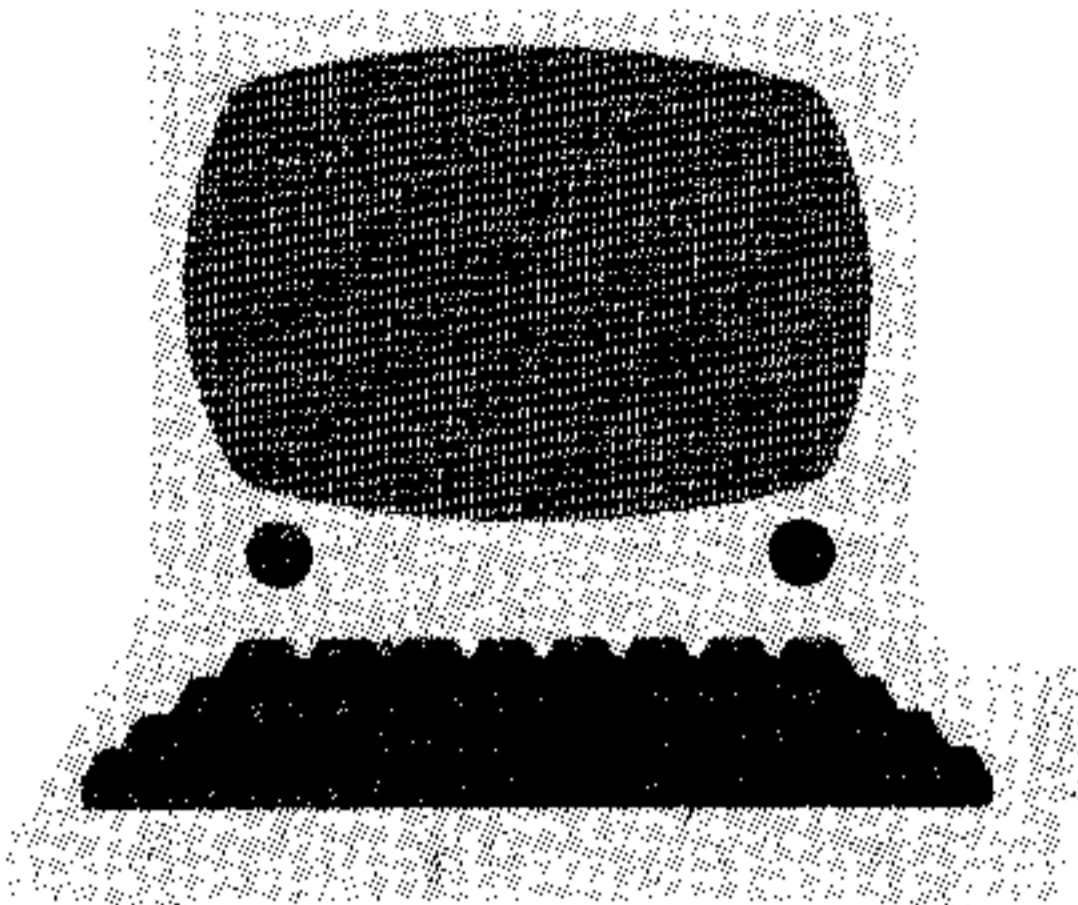




# Home Secretary

## ELECTRONIC

by Malladi Subbaiah  
and the HCM Staff



**Note:** The touch-tone phone relies on a pair of frequencies to decipher the number being pressed. These two frequencies must be mixed and placed on the telephone line at the same time. Because the Apple and the IBM PC with standard equipment are only capable of producing one tone with their built-in speakers, they aren't capable of producing the simultaneous tones necessary for dialing.



Now that you have a personal computer, you've probably been looking for ways to use it around the house. When writing software for home applications, you can create a general program that functions in a variety of household situations. The programs accompanying this article follow this design philosophy. You can create a personal phone and address directory, time events (such as elapsed connect time for long distance calls), and set up an inventory of household possessions for insurance and maintenance purposes. The TI-99/4A, Commodore 64, and IBM PCjr programs will even dial or redial any phone number in your directory.

### Data Entry

When the program is first RUN, the screen options allow the user to select one of two primary program modes; either Phone Book or Inventory. Select the mode you want by pressing the corresponding number key. Both of these modes then display a menu of nine options for manipulating and using the data.

After you select your option by pressing a corresponding number key, this user friendly program will guide you, step by step, through the different

utilities. Each option will perform a function on one of a maximum of sixty records contained in either a phone book or inventory file. Each record is further divided into five fields, with headings applicable to the type of file.

Initially you will want to use the Add option to create a data base for your files. Once this is done, you can save the file on disk (all systems) or on tape (C64, TI, and IBM).

### Sort Routine

An efficient sort subroutine is presented in the program and is called, automatically, after there is an addition of, or change made in, a file. You will be asked to select one of the five fields, and a sort will take place before the program returns to the main menu. Note that if you are in Inventory mode and sort by the value field, the sort will be inaccurate. This is because the sort is done on the ASCII code of the characters in the field and not by the actual value.

### Data Deletion and Alteration

This subroutine updates any existing data set. You can access any particular entry by its serial number (relative sorted position within the file), name field, or segment of its name. A search routine retrieves the data set with the specified name, or the next higher one if the name match is not exact. After altering the record, you have the option of searching the list for a different entry or ending the editing session. After any alteration of the file, before the directory can be displayed, the data set is always resorted.

### Use Data Option

The function of this option is dependent on the primary mode selected. If in Phone Book mode, you will first be

asked to select a record to work on. (This record is selected in the same way as the Change Data option.) Once the record you want is displayed, press a key, and the computer will generate the dual tones necessary to place a phone call. You may also redial or select the stopwatch function at this time. If you are in the Inventory mode, this option will sum up the value fields of all the records in the file and place a sum total on the screen.

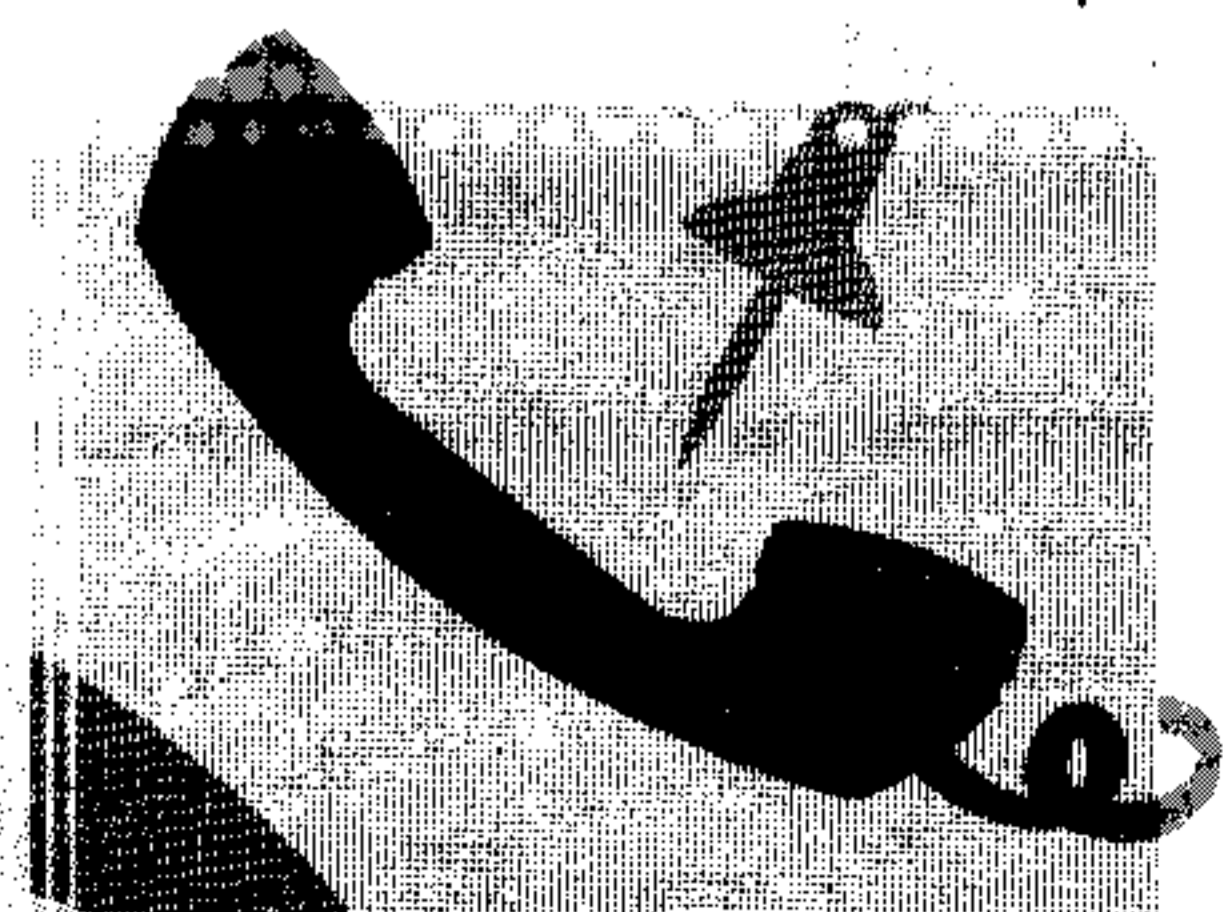
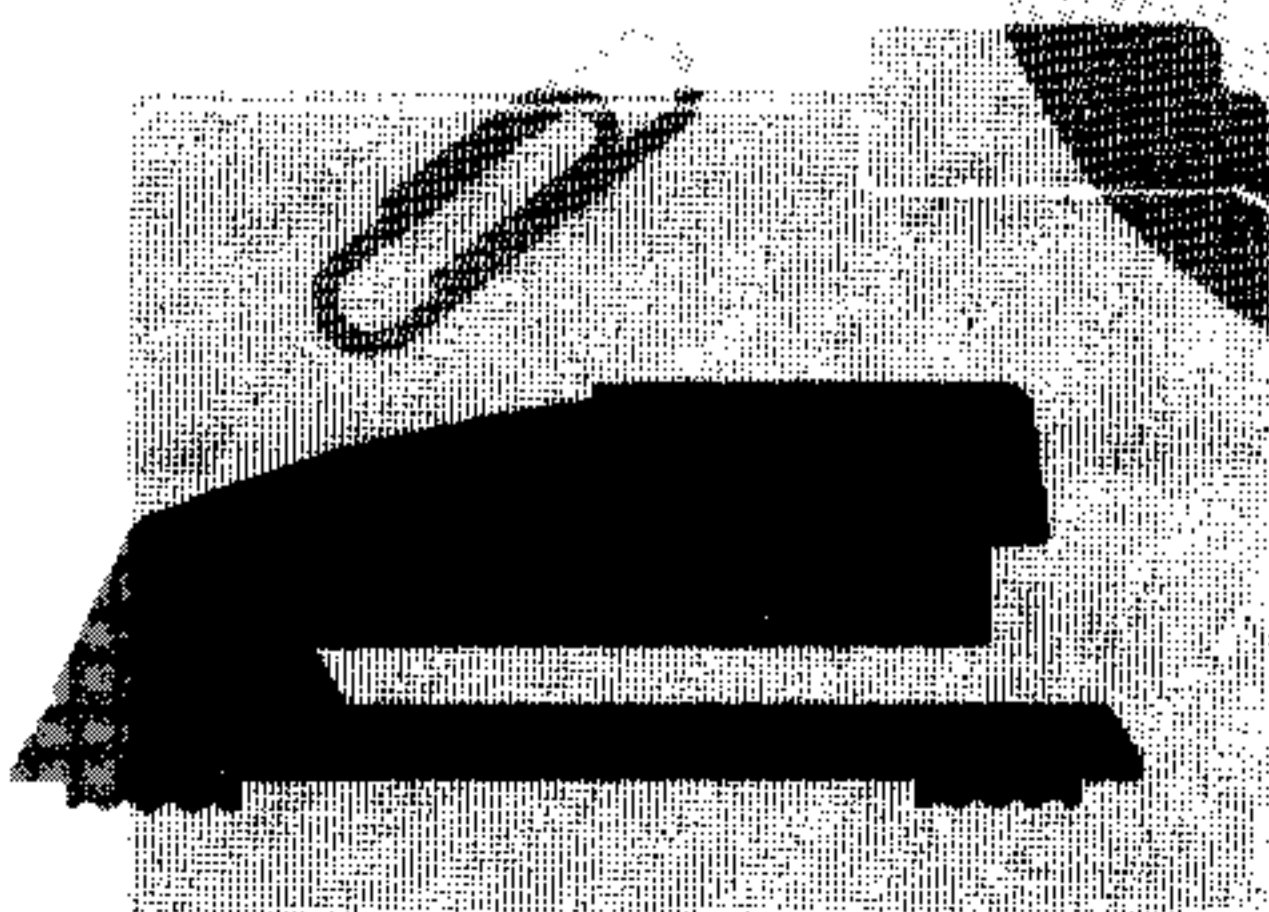
### Display of the Directory

The program allows you to display the data directory in one of two formats. The first format provides a concise, quick-reference listing of the complete directory. This includes name and phone number for the Phone Book option, and item and cost for the Inventory option.

In the second format, you can display all the data contained in any single record. Access to individual records is either by serial number in the directory or by a string search (discussed in a previous section).

Additionally, each program contains a printer option that allows you to obtain a hard copy listing of the entire file. This option may have to be modified by each user to reflect the exact hardware configuration of the individual system.

Continued on p. 134



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## Secretary . . .

### Computerized Telephone Dialing

Now let's look at touch-tone dialing. Since the telephone company prohibits direct connections to the phone line of any user equipment not approved by the FCC, the method we will use involves simple proximity: Placing the microphone from the phone handset in front of the monitor speaker dials the phone without any direct connection to the phone lines.

The touch-tone system of telephone dialing operates by sending a specific pair of audio frequency tones over the voice channel of the phone line for each digit. The switching circuits at the telephone facility decode the tones and actuate the appropriate circuits to make the connection. Each tone pair consists of a low-frequency group (ranging from 697 to 974 Hz) having four members and a high-frequency group (1209-1477 Hz) having three members (shown in Figure 1). So to dial the number 5, for instance, we have to send the audio tones at 770Hz (low frequency) and 1336 Hz (high frequency) simultaneously for a long enough time for the tone pair to be recognized by the switching circuits. There should also be a time gap between tone pairs sufficient for each pair to be registered individually as a digit of the phone number. Although theoretically, a 40-millisecond signal duration followed by a 40-millisecond silence should be adequate, a 150-200 millisecond signal duration and a gap of about 100-150 milliseconds is actually required for reliable operation with this system.

With the Commodore 64 this phone dialing routine works perfectly and requires no external hardware. But for the IBM PCjr and TI-99/4A computers we must anticipate some problems. Each of these computers can generate the dual tones of Figure 1, but if we examine the monitor's output on an oscilloscope, we can observe that the so called "pure tone" from the computer is, in fact, a square wave and not a sine wave. By Fourier analysis, the square wave can be decomposed into its constituent sine waves. (Interested readers can refer to any elementary book of calculus for the details of this analysis.)

For example, if we wanted to produce a frequency of 500 Hz, the output from the computer would be a square wave of 500 Hz, which in reality would be a combination of sine waves at 500 Hz, 1500 Hz, 2500 Hz, and so on. This can pose a problem when we try to send either of the first two members of the four-member low-frequency group (i.e., 698 Hz and 770 Hz). The third constituent harmonic of these low frequencies, 2091 Hz and 2310 Hz, respectively, are also recognized by the switching circuits, resulting in the rejection of the signal. The third harmonics of 852 Hz and 941 Hz seem to be outside the frequency response of the switching circuits and pose no problem.

There are several ways we can overcome this problem when dialing the digits 1 thru 6. One simple and inexpensive way is to use a passive low-pass filter with a cut-off frequency of about 1.5KHz in the audio line to the monitor to attenuate the higher frequencies. Figure 2 shows a block diagram for the installation. The circuit for the filter (which can be built for under five dollars) is shown in Figure 3.

### Loading a Previously Created File

To load a previously stored data file, we select the Load Data option and follow the screen displays to operate the cassette player or disk. When loaded, the name of the data file, its size, and the date of the previous revision will be displayed; the program will then return you to the master selection list.

	High Frequency Group	1209 Hz	1336 Hz	1477 Hz
Low Frequency Group				
697 Hz		1	2	3
770 Hz		4	5	6
852 Hz		7	8	9
941 Hz		*	0	#

Figure 1. Basic Frequencies for the Two-Tone System of Telephone Dialing

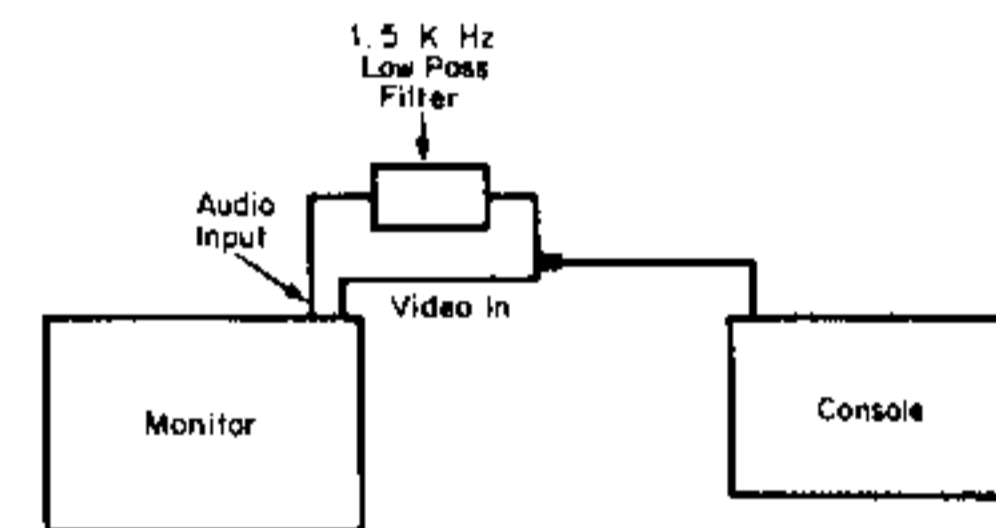


Figure 2. Schematic Layout of Filter Location

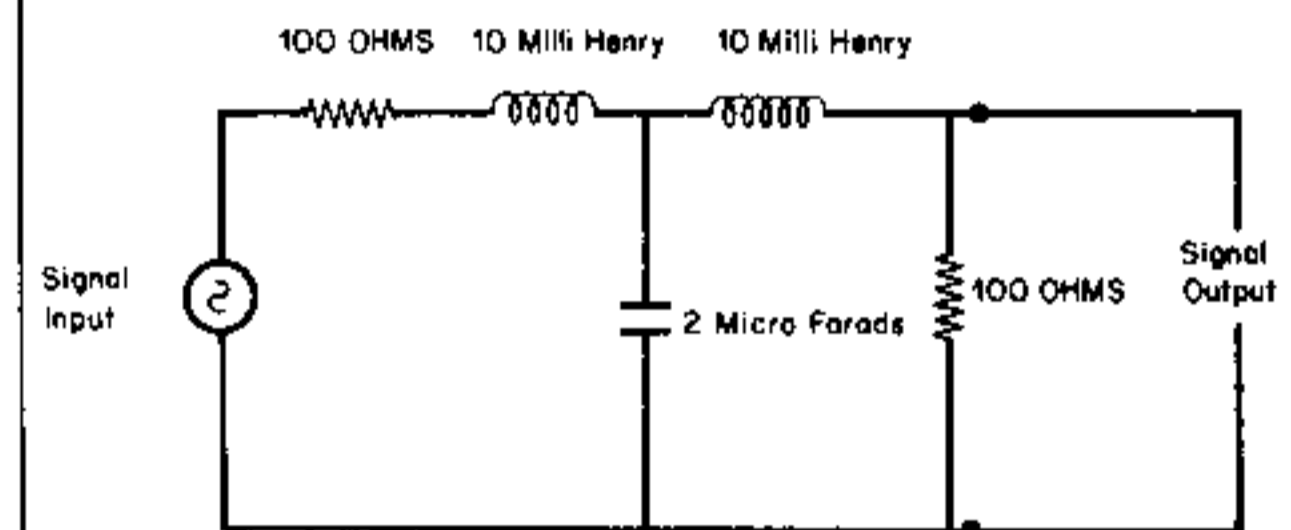


Figure 3. Circuit Diagram of the Filter

Note: On many touch-tone phone systems this filter will not be needed for correct dialing. We suggest you first try without it—Ed.



The original version of *Electronic Home Secretary* was created for the TI-99/4A. The program presented here was designed to be as versatile as possible for those who have only the 99/4A computer and a tape recorder. It is also capable of handling systems that have disk drives. This version is written entirely in TI BASIC with the only required peripheral being the tape or disk storage device to save the file. The program also provides hard copy reports for those who have printers, and the TI Extended BASIC cartridge can be used to speed the efficiency of the program.

A unique feature of this program is its ability to produce the tones necessary to dial a touch-tone telephone from the phone numbers stored in the file. To do this, it is necessary to produce two frequencies at the same time—something the 99/4A can do quite nicely. The problem is that the frequencies need to be filtered in order to be accepted through the phone. The Commodore 64 has this filtering ability built into it, so it doesn't require any external filtering. The TI-99/4A, however, does not have that capability and requires an external filter. If you are using a television to produce the sounds, you may be able to use the tone adjustment as the filter. Try this experiment with different tone settings until you find one that works. See the instructional section on building the filter if you can't get your TV or monitor to dial the phone for you.

The TI Home Computer doesn't have a built-in clock, but we can simulate a reasonably accurate one. This is done with the CALL SOUND statement. The CALL SOUND statement lets you specify the duration of the tone in thousandths of a second. Lines 3320 and 3330 set up a loop which will execute only once every second. The CALL SOUND in line 3330 will continue while the statements from line 3340 to 3510 are executing. This section of code updates the clock by adding one second and then displaying it on the screen. The routine then branches back to line 3320, which is another CALL SOUND statement. Because the durations are positive numbers, the SOUND statement in line 3320 can't start until the sound statement in line 3330 has finished. This process takes one second.

There is one limitation to using this method. The code between the CALL SOUND statements must take less than one second to execute. If the code between the CALL SOUND statements takes more than one second, the first SOUND statement will finish before the second SOUND statement is reached, defeating the purpose. The timing may vary slightly from machine to machine. To find out how accurate your machine is, run the Stop Watch option after the computer dials a number and time it against an accurate watch over a sufficient period of time. Several minutes will usually do the trick. To adjust the clock's speed, change the duration value in line 3330 from 900 to another value. A smaller value will speed the clock up, while a larger value will slow the clock down.

Continued on p. 143



The major difference in the Apple version of *Electronic Home Secretary* stems from its lack of a multi-tone sound system. The TI-99/4A, PCjr, and C-64 are all able to approximate the dual tones necessary to activate touch-tone dialing, while the Apple is unable to easily produce two tones simultaneously without

added hardware such as a sound board for one of the expansion slots. Consequently, touch-tone dialing is not available for the Apple version of the program. We did, however, include the timer function as part of the USE THE DATA option with the electronic phone book. To calibrate your timer, vary the maximum value in the FOR-NEXT loop in line 1790.

The only other difference occurs in the way disk files are managed with the Apple. *Electronic Home Secretary* is actually two programs in one: a phone book and an inventory system. Each of these options allows you to save your records to disk. A problem that might arise is saving your inventory records over your phone book records or vice versa. To eliminate this possibility, the program adds an extension to the file name composed of a period and three letters (e.g., .PHO). Let's say you are about to save your phone book file, and when the program prompts you for the file name, you type in LIST1 as your file name. The program automatically ends the file name with .PHO. That way if your inventory file were also named LIST1, it would not be overwritten because it would have the extension .INV.

When you CATALOG your disk you will see these extensions on the filenames (i.e., LIST1.PHO). However, you should not add them when prompted because they are added by the program. If you did add them, your file name would not be LIST1.PHO, but LIST.PHO.PHO—there isn't anything wrong with that file name, but it could be a bit confusing.

If you attempt to load .PHO file while doing INVENTORY (or an .INV file when accessing the PHONE BOOK) you will get the error message EITHER FILE NOT FOUND OR WRONG TYPE, and you will be given the option of CATALOGING your disk to see whether you have simply misspelled a filename or tried to load the wrong type.

Continued on p. 138



The *Electronic Home Secretary* contains an interesting subroutine that will place phone calls for you from numbers you place in its directory. Actually, it doesn't place them for you, but merely relieves your fingers from pressing the buttons. To place a phone call, hold the phone receiver up to the television speaker, press a key, and your Commodore will produce the dual tones required for each number in the sequence. This article outlines the hardware filtering required to produce the exact tones. All of the hardware needed to implement this "phone dialer filter" is already contained inside the Commodore 64 in the form of the versatile Sound Interface Device (SID). This integrated circuit ultimately produces all the sounds initiated by our computer programs when they POKE certain values into its control

Continued on next page

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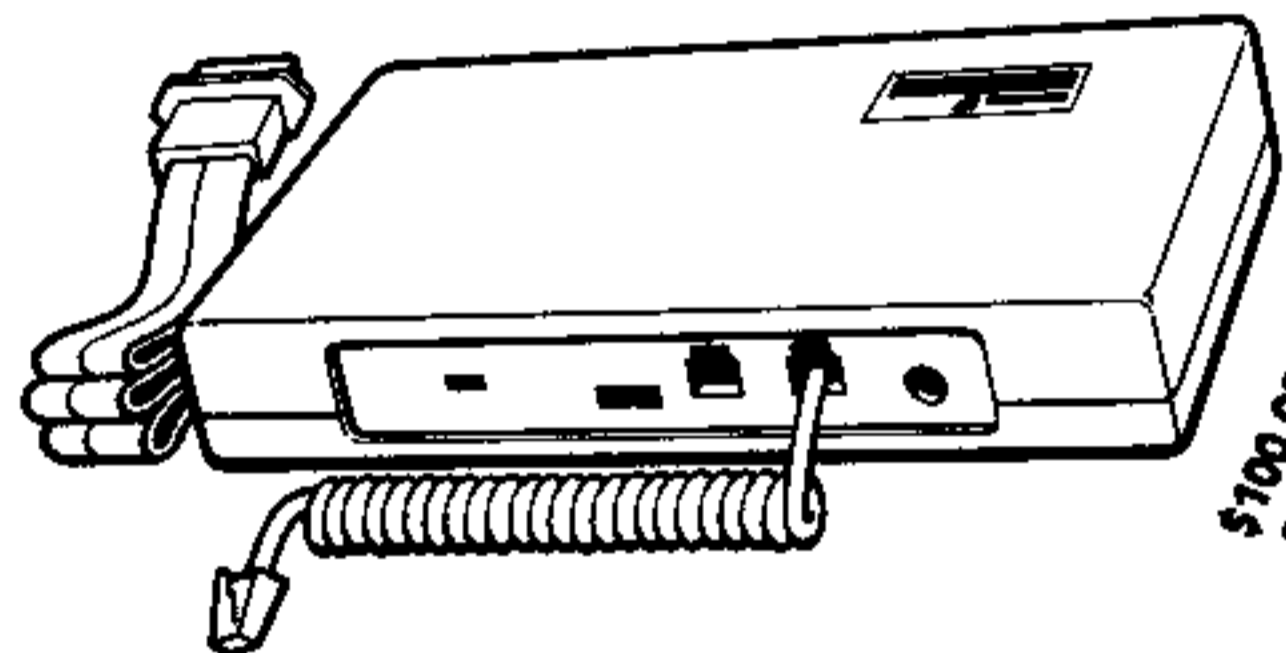
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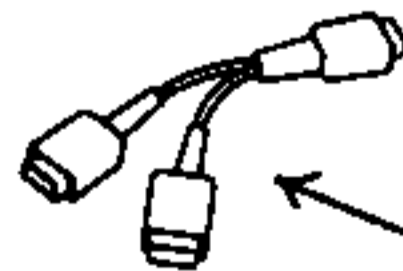
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## Spellakazam . . . from p. 122

try to follow the bouncing Magician instead of trying to figure out how to spell the word all by yourself.

Because of loading difficulties (Commodore version only), customizing features, and the various ways the game can be played, parents and educators will want to supervise the use of *Spellakazam*.

## Graphics

Many educational games have merely cosmetic graphics...not *Spellakazam*. The screen has the appearance of a board game with its bold letters, colorful barriers and little characters that represent you, the spaces in words, and apostrophes. The magic birds that send the magician back to the start are placed to please the eye of artist and strategist alike. The friendliest aspects of the graphics are the repetition of the player's name and the animated reward graphics that pop out of the magic hat.

## At Home With Spelling

Whether playing in a living room or classroom learning center, with their own list or the game's built-in list, children will enjoy practicing their spelling, reading, and reasoning skills using *Spellakazam*.

HCM

## Adventures . . . from p. 115

graphics awaiting those who successfully escape from the castle.

## Ease Of Use

Most users will be able to play the game immediately without consulting the folding-card documentation. The card is useful for quick reference, particularly the Things To Remember list and the list of what the function keys do. For the most part though, the on-screen prompts are sufficient to guide you through the game.

Users who are good at solving math problems in their heads might be comfortable staying with the default option of entering the answers left to right. However, to make the software easier to use and more consistent with the training most youngsters receive in math, parents might want to use the function keys to make the entry order of the answer right to left. We noticed that the adults who played this game liked to give their mental math muscles more exercise by solving the problems left to right.

## In School Or At Home

*Adventures in Math* is an educational game that teachers will use with students during the day and take home for their own children at night. Families can enjoy playing it together, and it's a good game to fill rainy days during Spring Break. Because it is not geared specifically to male or female interests, it could make math more attractive to more children. We'd like to see more of this kind of game because *Adventures in Math*, and games like it, will provide not hours but years of "edutainment" for youngsters.

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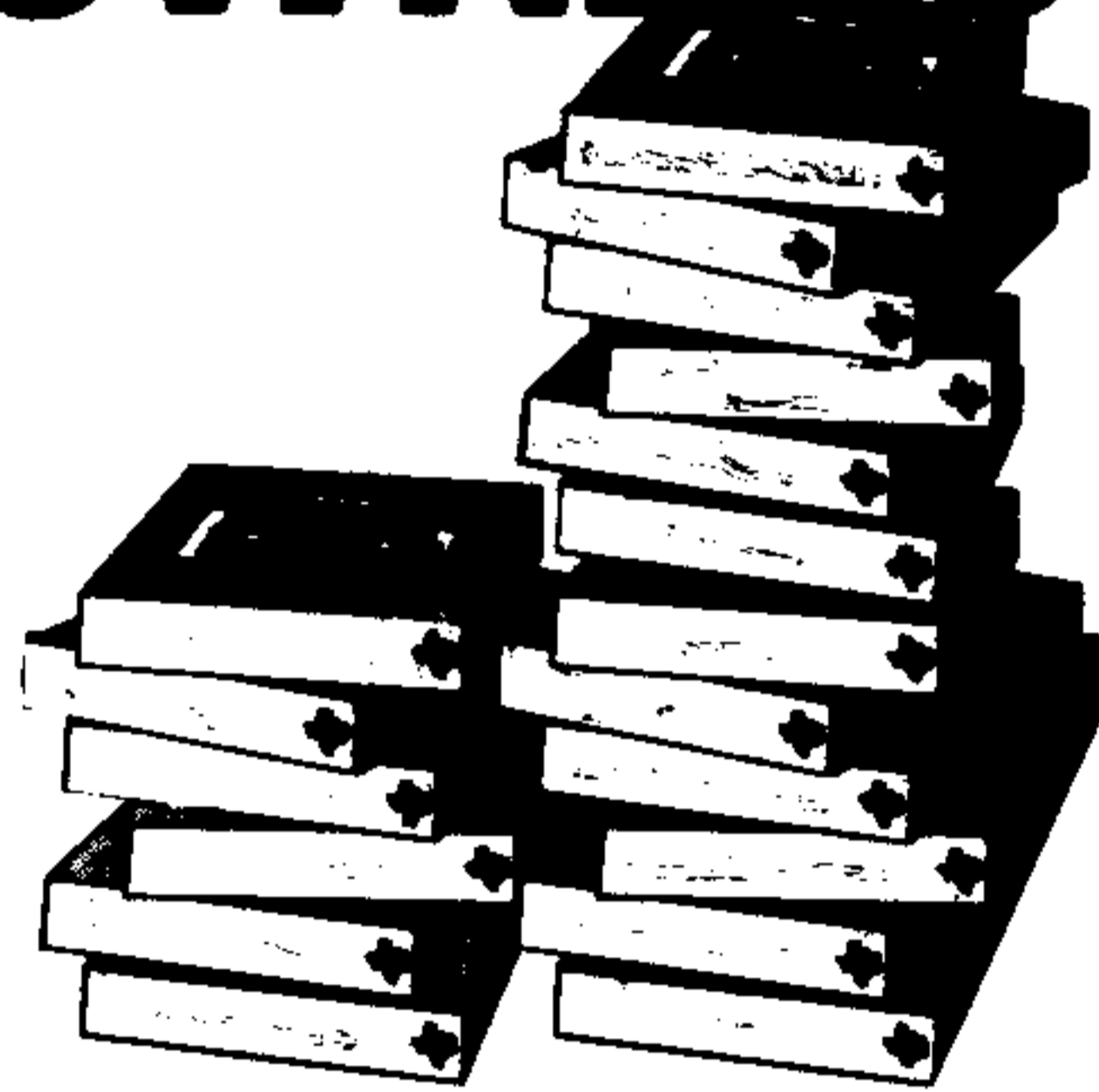
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# Index to Advertisers

Abbey Tape Duplicators	52	Mikel Laboratories, Inc.	64
Allman Systems	55	Millers Graphics	95
American Software Design & Distribution Co.	104	Mok, Berniel	104
Apropos Technology	80	Morning Star Software	131
Atarisoft	3	MULTICOM, Inc.	68
Axiom Corporation	156	Myarc, Inc.	70
Bach Co., The	56	Navarone Industries	69, 88
Basic Home Computing	54	Newport Controls	93
Bel Ayr Software	94	Nebula Software	53
Ben Hur Software	54	Not Polyoptics	77
Best Software	61	Parallel Systems	79
Bizware, Inc.	62	Parker Brothers	9
Borland International	50	Platinum City Software	55
Bradbury, Peter	105	RB's Software	55
CMS Systems	118	RC Distributing Company	16
CR Distributing	49	Realization Software	45
Casas Adobes Software	94	Ro-Cal Associates	60
Centroplex Computer	23	Rocketman	52
Commodore Computer Systems Division	164	SST Software, Inc.	52
CompuAdd Corp.	48	Scott CompWare	60
CompuWare Inc.	61	Siren Software	72
Cumberland Technology	92	Smith-Ware	72
D & D Publishing Co.	145	Soft Art, Inc.	35
Dean Software	68	Softext, Inc.	18, 19
Dennison Computer Supplies, Inc.	2	Softies, The	95
Dow, John T.	77	Software Advances	65
EASy	37, 70	Software Support, Inc.	128
Educational Software Products	134	Sprite-O-Lite	77
El Dorado Trading Group	38	Star Micronics	163
Emerald Valley Publishing Co.	124	Sun City Software	92
Euroware	54	SunWare, Ltd.	22
Extended Software Company	73	Supply Co.	135
Federal Hill Software	92	Symbiotech, Inc.	49
Gary Phillips and Associates	96	Systems Interface	134
Genesis Star Software	136	TBR, Inc.	95
Harris House Software	86	TSS Software	53
Hayden Book Company	13	Tenex Software	25, 76
Heritage Computer Services	135	Tex-Comp	29, 46, 140, 150
Home Computer Magazine	106, 145, 147, 162	TImagination	144
Information Associates	120	TImore Products	45
Information Research Association, Inc. (Infra)	79	Ti Soft	66
J & K H Software	45	Unisource Electronics, Inc.	85
KCR Corporation	136	User-Happy Simulations	94
K. R. Rullman Company	134	VMC Software	105
Kaleidoscope Programs	67	Whiplash Software	120
KIDware	53	World Class Software	89
Konrad Komputerware	136	Woodinville Computer Center Inc.	133
Letendre, Bruce	104	York 10	119
Magnum Programs	144	99/4(A) Program Exchange	87
Micromagic Software	72	99'er-WARE	125

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**HCM:** Has the development of the PowerPad and related software been a major project? What sort of time has it taken?

**RR:** I almost hesitate to tell you how quickly the hardware was developed. The first software packages took us about seven weeks from inception to out-the-door. There are some aspects other than the initial software and hardware that took a lot longer. For instance, after a period of time, usually between 1 million and 10 million lives, any touch sensitive membrane will begin to wear. The dielectric spacers on any membrane, whether digital or analog, will begin to wear down. When it wears down and collapses on an analog membrane like a Koala, you're dead in the water, but we have a digital surface, and we've built a fairly extensive error checking and error correcting routine into our software that can keep the surface functioning even after wear has begun.

**HCM:** Are there any new software developments you see yourself utilizing?

**RR:** Oh yes, there will be additional enhancements both to the hardware and software announced in the spring.

**HCM:** Are there any new directions or products you see yourself moving to?

**RR:** There are several areas that we are actively investigating. One is what other things we need to do to make it easier for the user to interface with the computer. We've thought of using an infrared link like the PCjr's keyboard has. We will be considering other ways of getting information into the computer. Obviously Koala was also thinking the same way when they went to the light pen. We have a whole bunch of stuff floating around the back room that we're playing with. We will be developing other devices for getting information into the computer.

**HCM:** Do you see any software applications outside the entertainment-education venue?

**RR:** Yes, for both the Micro Illustrator graphics package and Super Graphics. Super Graphics is being used by several commercial artists here in Atlanta on a test basis for doing computer art and for package work. It looks highly

successful, especially when coupled with a color output plotter or a printer. And at the CES we demonstrated a graphics package coupled with an ink-jet printer that has some business applications. Though our thrust is primarily toward the home and educational market, we will be producing a combination of things for the professional as well.

HCM

**Bugs—problems that cause programs not to function properly—are an inevitable consequence of programming. Programs are complex systems that are difficult to test exhaustively. And occasionally bugs slip through even the best testing procedures. When such a bug in one of our programs comes to our attention, we print a correction in this column so that our readers can correct their programs as soon as possible.**



HCM Program Bug

## DeBUGS on Display

In the article *Movable Feast* from the last issue, a bug was found in the *Menu Planner* program at line 170. Change the last portion of the line which reads:

```
:IF B>A THEN B=A-1 to read as follows: :IF B>A THEN B=A:A=A+1
```

This will allow the program to print out the matching recipes under all conditions of selection.

Readers have informed us that the article in last issue entitled *Challenging the Tower of Hanoi* lacked the instructions on how to move a ring from one post to another via the computer keyboard. The answer is quite simple: To select the post to move the selected ring from, enter the post number (1, 2, or 3). Following that single key entry, the post to move to is entered as a single key stroke too (1, 2, or 3). See, as easy as 1,2 or 3,1 or 1,3...