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# COMPUTE!

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The Leading Magazine Of Home, Educational, And Recreational Computing

**Commentary:**  
**Is Memory Expansion**  
**Just A**  
**Status Symbol?**

**Crosswords:**  
**A Puzzle-Generating**  
**Program For Atari,**  
**VIC-20, TI-99/4A,**  
**And Others**

**Jumping Jack:**  
**A Unique Game**  
**For VIC-20, Atari,**  
**Texas Instruments,**  
**And Commodore 64**

**Instant Art On**  
**The Commodore 64**

**BASIC Utilities**  
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They're a group of people representing a large, well-balanced cross section of disciplines—from academia, government agencies, and the computer industry. People from places like IBM, Hewlett-Packard, 3M, Lawrence Livermore Labs, The U.S. Department of Defense, Honeywell and The Association of Computer Programmers and Analysts. In short, it's a bunch of high-caliber nitpickers whose mission, it seems, in order to make better disks for consumers, is also to

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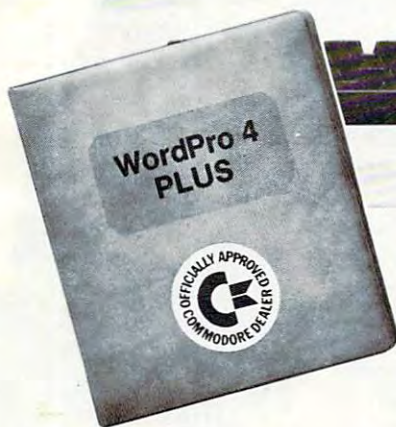
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**Finally,  
aliens your kids can  
reason with  
instead of destroy.**





**This year, thousands of kids will be searching for the most amazing thing.**

At Spinnaker, we don't believe in the "kill or be killed" concept behind most computer games. In fact, we believe computer games should be instructive. Not destructive. But just as importantly, they should be fun.

That's why **IN SEARCH OF THE MOST AMAZING THING™** is designed to let your kids negotiate with aliens instead of destroying them. Because given the opportunity, kids enjoy using their minds.

#### **It's Amazingly Fun.**

The Most Amazing Thing is out there somewhere. Finding it won't be easy.

But relax, your kids will have the help of their old uncle Smoke Bailey. He'll give them a B-liner (sort of a cross between a hot air balloon and a dune buggy) to use on their journey. They'll have to learn how to fly the B-liner and navigate it through storms and fog. But before they do

anything, your kids will have to talk to Old Smoke. He'll tell them about the Mire People and the strange language that they speak. He'll also tell them to avoid the dangerous Mire Crabs and how to get fuel for the B-liner.

Your kids will visit the Metalican Auction where they'll trade with the aliens for valuable chips. Your kids will then use these chips to buy things they'll need for their trip. And your kids will learn how to fly over the planet using their jet pack.

The Most Amazing Thing holds great powers, but it will take great skill, persistence and imagination to find it.

#### **It's Amazingly Educational.**

**IN SEARCH OF THE MOST AMAZING THING** is written by Tom Snyder, educator and author of the best-selling *Snooper Troops™* Detective Series.

And like all Spinnaker games, **IN SEARCH OF THE MOST AMAZING THING** has real educational value. For instance, your kids will sharpen their ability to estimate distances and

quantities. And since they'll be navigating their B-liner, they'll become aware of distance, direction and time. They'll also develop a knack for economic and monetary principles through trading with the aliens. And they'll solve problems through trial and error.

They'll learn all of these things, plus they'll learn that nothing is impossible if you put your mind to it.

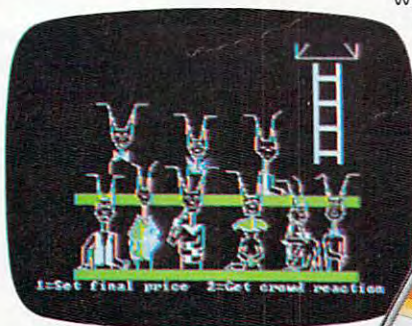
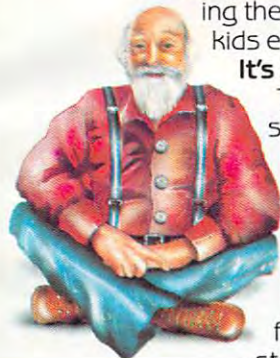
#### **A Novel Approach to Computer Games.**

Besides offering your children all of the above, **IN SEARCH OF THE MOST AMAZING THING** gives them an opportunity to develop their reading skills. Because included with the game is Jim Morrow's new novel *The Adventures of Smoke Bailey.\** So your children will have hours of fun reading the book or playing the game. And they'll be learning at the same time.

#### **Parental Discretion Advised.**

If you're a parent who would rather see your kids reason with aliens than destroy them, you've got plenty of reasons to ask your local software retailer for **IN SEARCH OF THE MOST AMAZING THING**. It's compatible with Apple,® IBM,® Atari,® and Commodore 64™ computers. And it offers so much fun you'll probably be tempted to play it yourself. Or you can write us directly at: Spinnaker Software, 215 First Street, Cambridge, MA 02142.

You'll find this is one computer game that won't alienate you from your children.



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AT  
ATN/64/AP

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P/AT/AP/TI/V  
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AP Apple, AT Atari, P PET/  
CBM, V VIC-20, O OSI, C  
Radio Shack Color Com-  
puter, 64 Commodore 64,  
S/T Sinclair ZX-81, TI Texas  
Instruments, \*All or several  
of the above.

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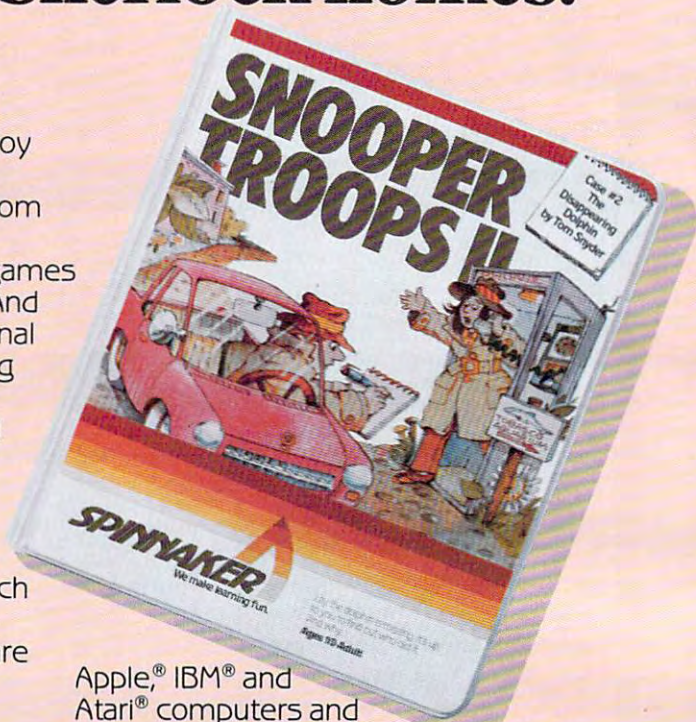
Where can you find educational games that your kids will really enjoy playing?

Elementary, my dear Watson. From Spinnaker.

Our Snooper Troops detective games are fun, exciting and challenging. And best of all, they have real educational value. So while your kids are having fun, they're learning.

As a Snooper Trooper, your child will have a great time solving the mysteries. But it will take some daring detective work. They'll have to question suspects, talk to mysterious agents, and even search dark houses to uncover clues.

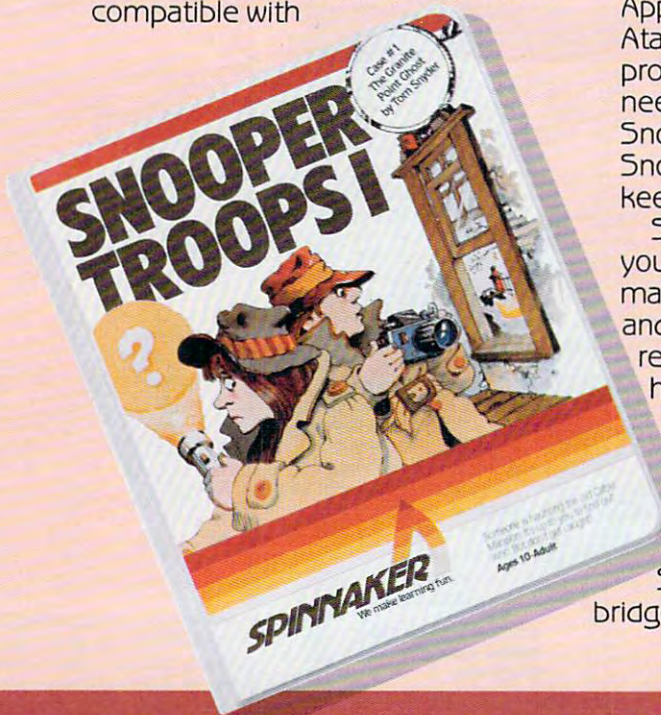
The Snooper Troops programs are compatible with



Apple®, IBM® and Atari® computers and provide your kids with everything they need: a SnoopMobile, a wrist radio, a SnoopNet computer, a camera for taking Snoopshots and even a notebook for keeping track of information.

Snooper Troops detective games help your children learn to take notes, draw maps, organize and classify information and they help develop vocabulary and reasoning skills. All while your kids are having a good time.

So if you want to find educational games that are really fun, here's a clue: Snooper Troops games are available at your local software store, or by writing to: Spinnaker Software, 215 First Street, Cambridge, MA 02142.



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# Spinnaker's early learning games will help make your children as smart as you tell everyone they are.



Your kids are pretty smart. After all, they're *your* kids.

Spinnaker can help make them even smarter. With a line of educational software that kids love to play.

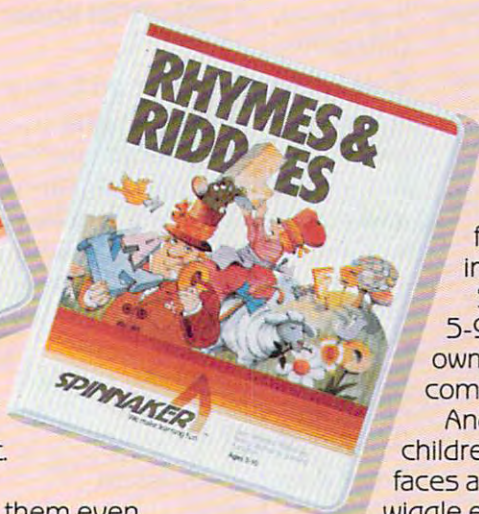
Spinnaker games make the computer screen come to life with full color graphics and sound. And they're fun. Lots of fun. But they also have real educational value.

Some of our games help exercise your child's creativity. Others improve memory and concentration. While others help to improve your child's writing, vocabulary, and spelling skills.

And every Spinnaker game provides familiarity with the computer and helps your children feel friendly with the computer. Even if they've never used a computer before.

And Spinnaker games are compatible with the most popular computers: Apple®, Atari® and IBM®.

Our newest game, KinderComp™ (Ages 3-8) is a collection of learning exercises presented in a fun and exciting manner.



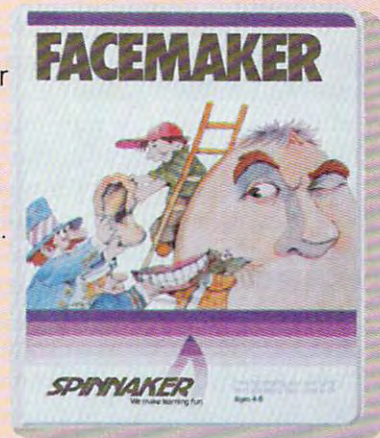
Rhymes and Riddles™ (Ages 4-9) is a letter guessing game featuring kids' favorite riddles, famous sayings and nursery rhymes.

Story Machine™ (Ages 5-9) lets children write their own stories and see them come to life on the screen.

And FACEMAKER™ lets your children create their own funny faces and make them wink, smile, wiggle ears (not your kids' ears, the ears on the screen), etc.

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# EDITOR'S NOTES

**T**he Eighth West Coast Computer Faire was another triumph for organizer Jim Warren. It's truly a consumer show, and an exciting one, given that many of us who don't have a great deal of time for shows any more continue to make time to get to this one. The Civic Center was packed (not only were the hallways full of booths this year, but the freight unloading area as well). No one's quite sure why the Faire doesn't head for San Francisco's spacious new Moscone Convention Center, but we suppose there must be a reason. There is a reason, isn't there, Jim?

The Faire provides the opportunity for us to meet many of our readers and authors, giving us the chance to tie names to faces. The excitement of the show always stays with us for weeks.

Response to our call for editors in the January issue of **COMPUTE!** has been excellent, and we're quite pleased to announce the addition of several new staff members. Since you'll become much more familiar with them over the months ahead, through both the book and magazine divisions here, we thought we'd tell you a bit about their backgrounds now, and their own personal computers as well:

Orson Scott Card, Editor, **COMPUTE! Books** Division  
Science fiction fans will already know Scott. The rest of you should know that he won the Campbell Award as Best New Science Fiction Writer of the year in 1978. And he was a four-time runner-up for the Hugo Award. Having also been an editor, Scott brings a wealth of

experience to **COMPUTE! Books**. (Atari 800.)

Gail Walker, Production Editor  
After several years of work in technical editing, communications, and corporate publishing and research in Texas and Iowa, Gail has joined our staff with primary responsibility for supervision of copy editing and coordination of scheduling and planning between our editorial and production departments. (Commodore 64.)

Tony Roberts, Assistant Managing Editor

Tony specializes in scheduling writers, bringing **COMPUTE!** the skilled training developed after many years of daily newspaper work, both as a reporter and as an editor. Tony's excitement about the personal computer revolution brought him to **COMPUTE!**, where he'll be assisting with the review of submitted manuscripts, editing, and helping supervise editorial scheduling. (TI-99/4A; TRS-80.)

Dan Carmichael, Assistant Editor  
After spending several years programming mainframe computers and developing documentation, Dan moved from IBM Assembler to "VIC-20 Assembler." His experiences and enthusiasm for the VIC led him to **COMPUTE!**. VIC owners can look forward to his monthly column in the new **COMPUTE!'s Gazette**, and **COMPUTE!** readers should watch for regular contributions in these pages. (VIC-20.)

Stephen Levy, Assistant Editor  
Stephen came to our attention via a series of excellent articles he'd written for **COMPUTE!**. After fifteen years as a public school

teacher, he decided to bring his skills to us. His sensitivity to the needs of the average computer user make him a valuable addition to our editorial staff. (Atari 800.)

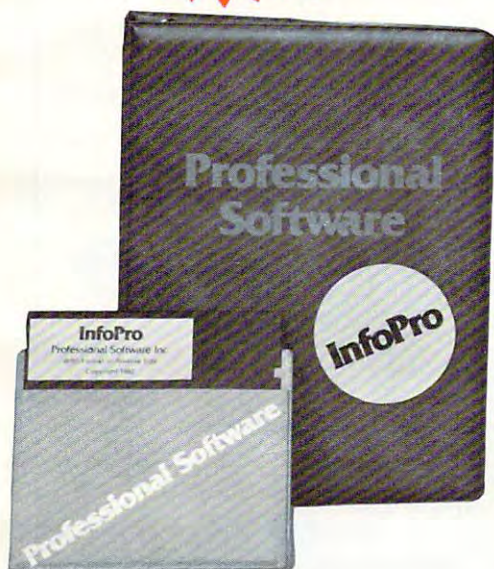
## Random Bits

Rumor has it that we'll see Atari introducing a revised and expanded version of the 1200, with more features. Looks aren't *everything*. The recent moves by Texas Instruments to lock up the cartridge "marketing" market would seem to pose at least one clear danger. Rather than locking up that market, they may simply have it all to themselves. TI has refused to license the rights to their graphics ROM (GROM), and thus is the only manufacturer capable of producing TI cartridges. We suspect that smaller vendors may choose to support other computers rather than attempt to resolve the maze of dealing directly with TI. On the other hand, they do have a far more effective marketing reach than independent vendors usually do.

As the price of the VIC-20 and Commodore 64 charge downward, we hear that Commodore will be placing more and more emphasis on the development of the 64 market. And Commodore dealers, many of whom are upset over the placement of the 64 into the mass distribution chains, will be forced to concentrate their energies on the new P and B series machines.







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management to the area of word processing, allowing the user to manipulate, sort, and select data by certain criteria, which can then be inserted into "personalized" letters, documents, overdue notices, etc. **InfoPro** will also allow you to ADD, DELETE or CHANGE your information "fields" any time you wish. This means that as your business changes, **InfoPro** has the flexibility to change with it.

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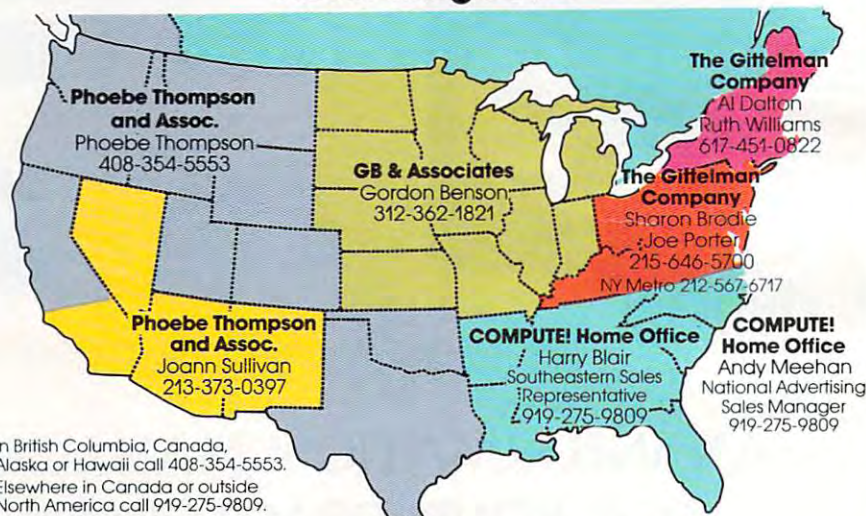
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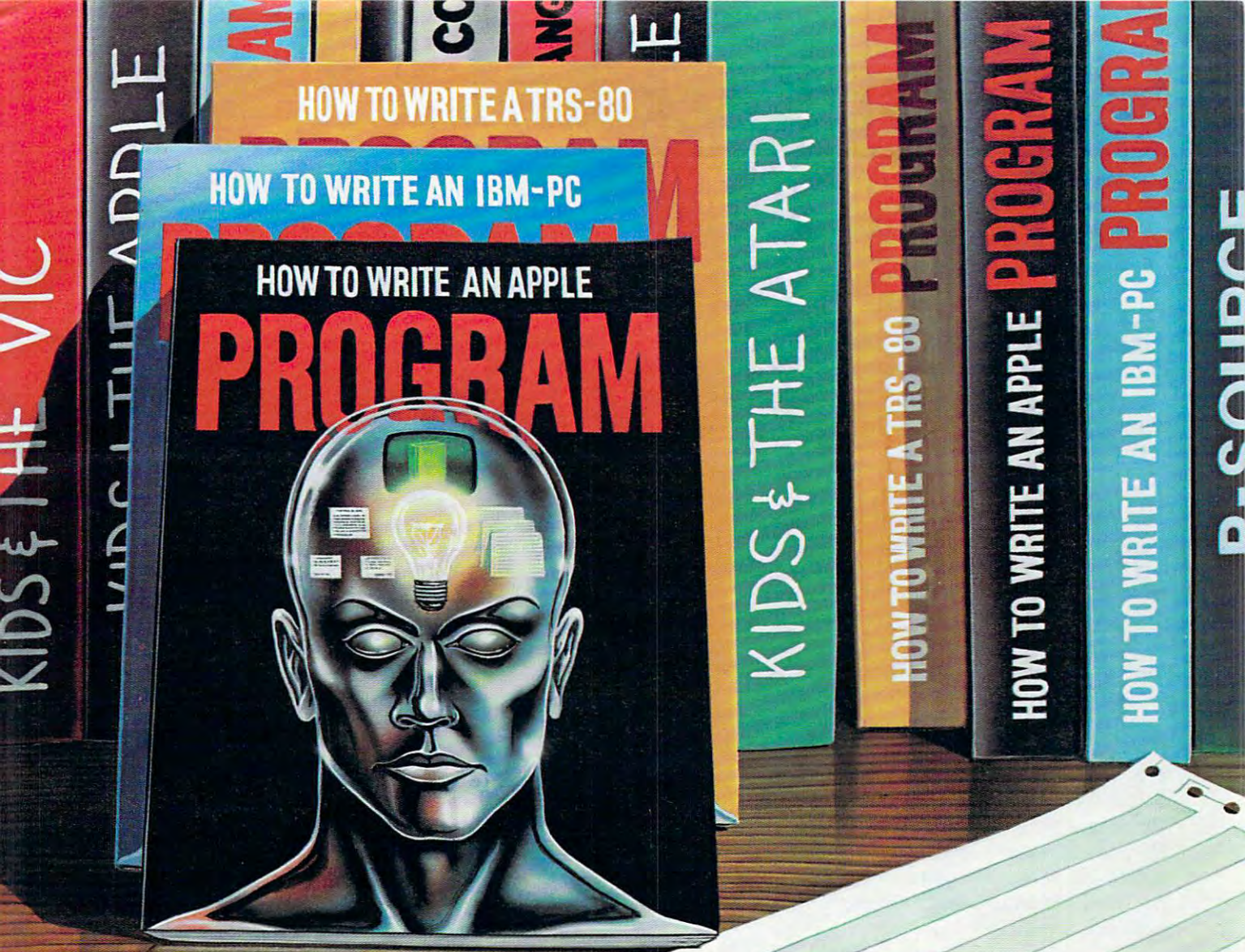
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# READERS' FEEDBACK

The Editors and Readers of **COMPUTE!**

## What Does A Light Pen Do?

I own a VIC-20. In **COMPUTE!** I see advertisements for a new light pen for the VIC. I am not sure what a light pen does exactly. What does it do? Do you recommend buying one?

Rich Cope

*The display on a video screen is not nearly as static as it appears. It is actually "re-drawn" many times per second by an electron beam. Moreover, it is not a solid picture, but rather a stack of closely spaced horizontal lines like a jigsaw puzzle made up entirely of long, thin rectangular pieces. An important characteristic is that the beam always "draws" the entire screen, and at a constant speed. Thus the drawing always takes the same amount of time, whether the display is blank or filled with an intricate pattern.*

*The light pen is a light detection device. It "sees" the electron beam as it draws the lines across the screen. By checking to see how much time passes between when the beam starts drawing the picture and when the pen detects the beam, the computer can determine how far the beam has drawn, and thus where on the screen the light pen is positioned.*

*A light pen is useful for pointing to things on the screen. One of the most common uses for the pen is to select items from a list simply by pointing at the desired item. Another demonstration we have seen involves "playing" a piano by pointing with the light pen to the desired "keys" on a keyboard display. Light pens also provide you with an easy way to "sketch" on the screen.*

## TI Clock

Since there is no realtime clock built into the Extended BASIC on the TI-99/4A, is there any coding scheme to simulate one?

John J. Mahoney

*You can insert a FOR/NEXT loop wherever you wish to make some time elapse. The number of times the loop is executed can be varied depending on the timing requirements of your program. First choose some arbitrary number of times that you wish the program to run through the FOR/NEXT loop. Then time the results when the program is executed. If the time that transpires when the program is run is too long, simply use a smaller limit in the loop. This method depends on actual processing time, so if you add or delete program statements,*

*be sure to adjust the FOR/NEXT limit accordingly.*

*For example, see how long FOR T = 1 TO 5000:NEXT T takes to finish. Then change the 5000 limit to suit your needs.*

## Nüfekop Decoded

In your review of the latest games from Nüfekop Software (February 1983, p. 140), you write: "the word Nüfekop, according to the firm's early ads, has a Druid origin, and means putting an extraordinarily large amount into a small pocket or enclosure, possibly through the use of magic."

This must have been tongue-in-cheek. Surely you recognize "poke fun" spelled backwards.

J. R. Thompson, Jr.

Gary Elder, President of Nüfekop, responds:

*We were completely shocked, but it's true! We're amazed, as always, at the visionary powers of the Druids.*

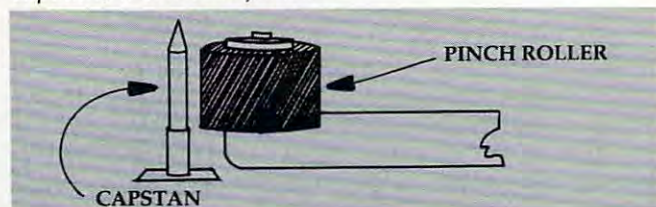
## Cassette Drive Risk

I have set my VIC on a timer. The PLAY key on the tape drive is left depressed. When the system powers up I would like for it to load and run the program on the tape. How do I do this?

T. H. Homer III

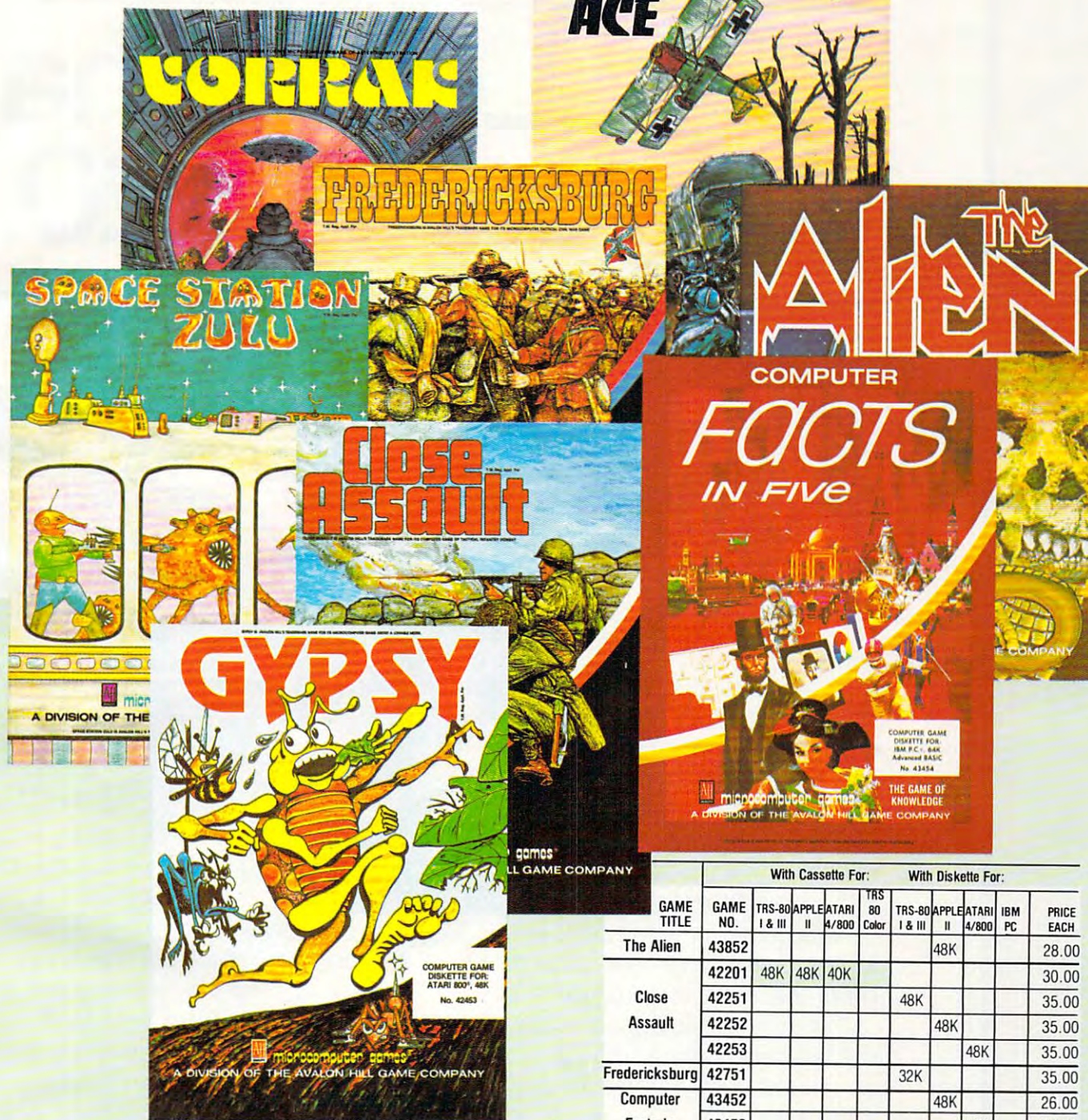
*It would be better to avoid leaving any of the tape-moving keys (REW, F.FWD, or PLAY) down while the unit is turned off. This can cause significant damage to a tape machine.*

*The tape is pulled through your drive at a uniform rate. The computer would not be able to load your programs from the tape drive if the rate deviated much from the norm. Inside the tape player are a capstan and a pinch roller (see illustration). When the PLAY button is pressed, the capstan revolves and the pinch roller holds the tape firmly against the capstan. The roller is made of hard rubber, but left pressed against a motionless capstan, it can be deformed.*





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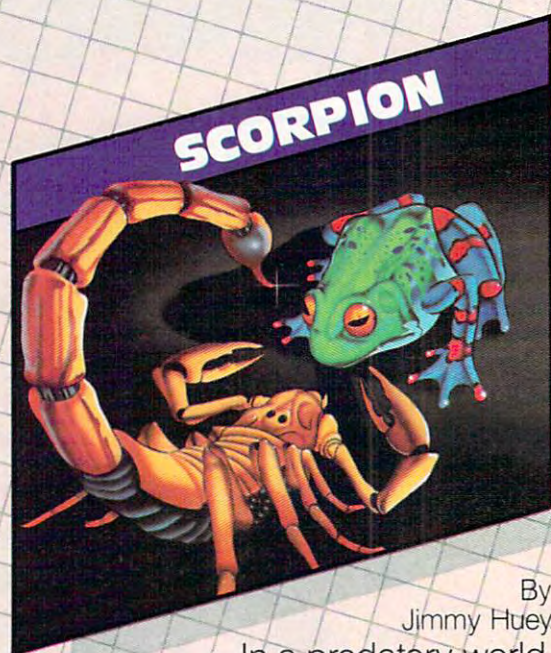
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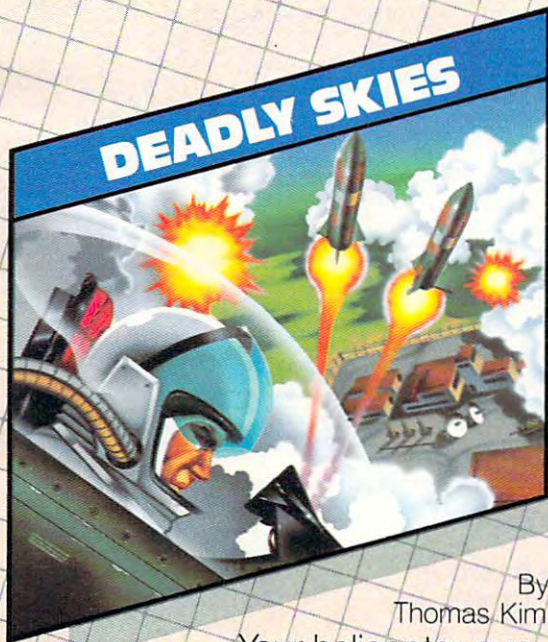


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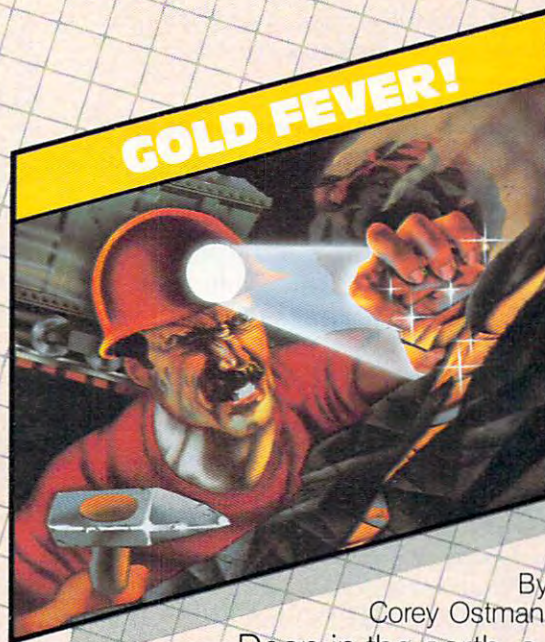


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From time to time you'll get a shopping cart at the market with a wheel that has been similarly damaged. In that situation, you're in for a noisy, bumpy trip through the store. A bad pinch roller would have far more serious effects: you would begin to have frequent load errors.

If you want a program to start running at a certain time, just set the internal clock. You don't need to involve the tape player at all. For example, to start a program that wakes you up with VIC music in eight hours:

```
10 TI$="000000": REM 00 HOURS/ 00M
  INUTES/ 00SECONDS
20 IF VAL(TI$) = 80000 THEN 40
30 GOTO 20
40 REM YOUR MUSIC PROGRAM STARTS H
  ERE
```

The VIC uses about a nickel's worth of electricity every 24 hours if you leave it on continuously. It's probably its own best timer.

## How To Use Atari's Player/Missile Features

I am an Atari 800 owner. How do you use player/missile graphics? So far, in at least ten publications I have read about enabling it and that's where they stop.

Ely Manero

Player/missile graphics are a powerful, but complex tool. There are a number of things to learn before you can take advantage of all the options that P/M graphics make available to you. It's rather like learning BASIC itself; there's no way to master it in an hour. Your best bet might be to look over and practice with the numerous P/M articles in the new *COMPUTE!'s First Book Of Atari Graphics*. The book was designed to teach Atari graphics, one step at a time. You might find one of Bill Wilkinson's contributions to that book, "Introduction To Player/Missile Graphics," especially helpful. See the **COMPUTE! Books** ads elsewhere in this issue.

## VIC PILOT Decimal Division

I teach a Computer Programming course to 8th graders at our school, Castillero Middle School, San Jose, California. We have seven Commodore PETs and a VIC-20. The language, of course, is BASIC.

But now we are also using PILOT .... from **COMPUTE!'s** December 1982 issue. Our students are finding it quite interesting to write programs in PILOT that they had previously written in BASIC.

One of my students, Mike Jennings, was intrigued with the notion that PILOT was integer only. He wondered whether it would be possible

to have PILOT do decimal division. The result was a program he wrote which does just that. The user is prompted for two numbers, and for the number of decimal places desired. One small problem is when the division works out evenly: that is, when the decimal terminates. In such cases an additional zero is printed.

I thought it was a pretty good effort for an 8th grader with only a semester of programming.

Lawrence E. Corina

```
70 T:
1 *AGAIN
2 T:
3 T:2 NUMBERS?
4 C:#T=0
5 A:#A
6 I:#A=333
7 JY:* END
8 A:#B
9 T:CARRY OUT HOW MANY PLACES?
10 A:#L
12 *MAIN PART
14 I:#A<#B
16 TY:.;
18 JN:* A>B
20 CY:#A = #A*10
22 C:#C = #A/#B
24 C:#T = #T + 1
26 C:#D = #C*#B
28 C:#E = #A-#D
30 C:#A = #E*10
32 T:#C;
33 I:#T = #L
34 JY:*AGAIN
35 I:#C=0
36 JN:22
38 JY:*AGAIN
44 * A>B
46 C:#C = #A/#B
48 T:#C.;
50 C:#D = #B*#C
52 C:#E = #A-#D
54 C:#A = #E*10
56 J:35
60 *END
```

## 64 Tape Control

I'm a beginning programmer; I'm getting a big headache trying to solve what originally seemed to be a simple problem. My program instructs the user of a Commodore 64 to press fast forward on the Datassette. When it senses that the button is down it prints OK. After a time interval I want the Datassette turned off automatically by the computer. I've tried every POKE possible and haven't got one that works. I thought that this one would work:

```
POKE(1),PEEK(1)AND 39
```

... but it doesn't.

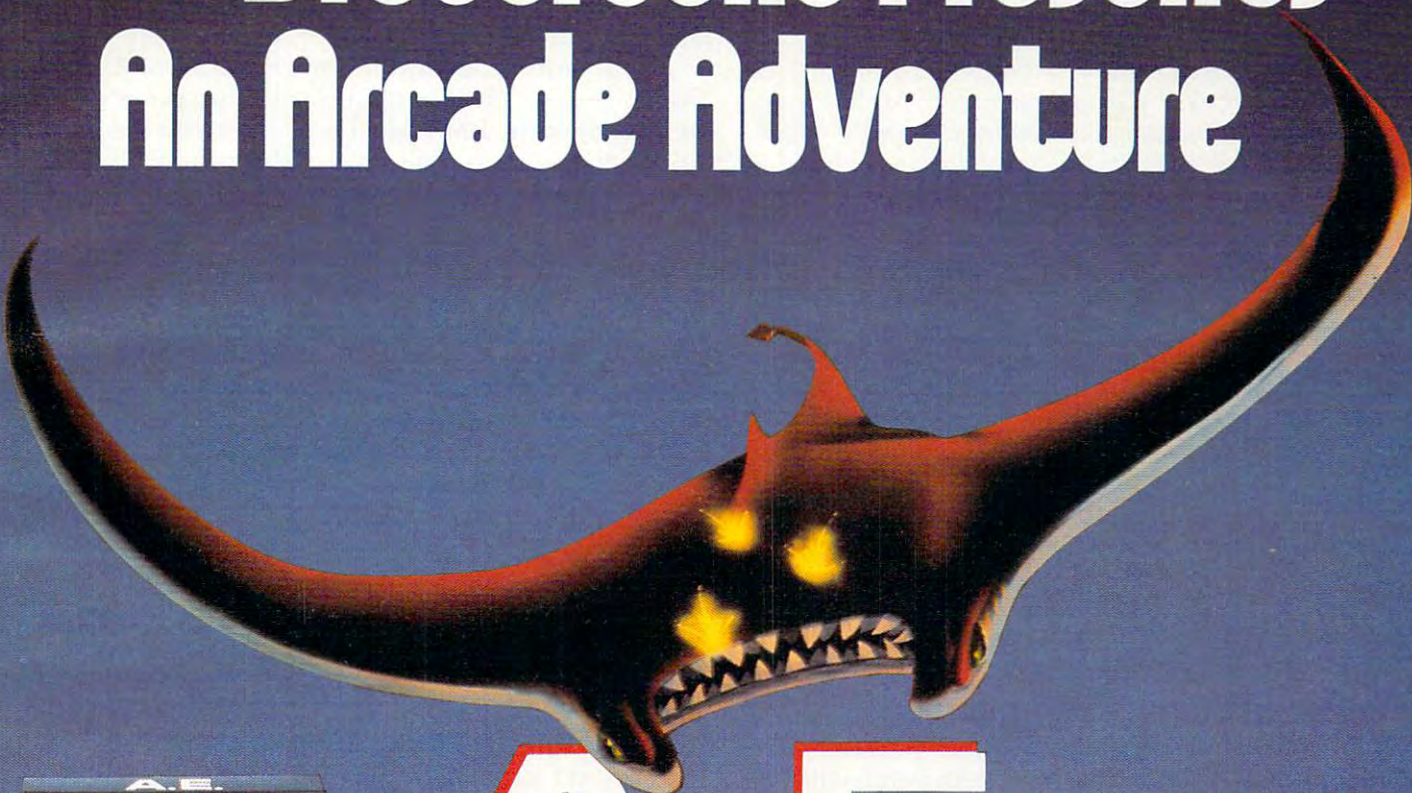
How can I do this?

Jim Butterfield replies:

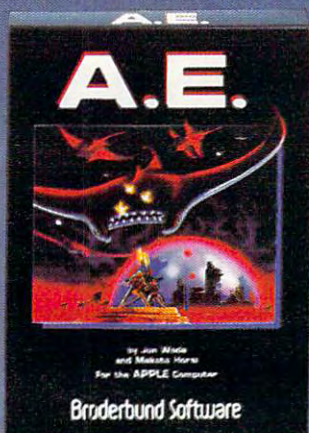
You're close. Two more things, and you'll have every-



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thing working.

First: the motor logic is inverted, so to turn the motor off, you must turn the control bit (value 32) on. To turn bits on, you need an OR function rather than an AND. So your code will be: POKE 1,PEEK(1) OR 32.

Second: the motor is also controlled by an interlock, address 192 on the VIC and Commodore 64. If this location contains a zero, you can try to turn the motor off ... but it will be turned right back on again. You must set the interlock to any non-zero value after the motor has been turned on. Then, and only then, your POKE to address 1 will shut the motor off.

The interlock location, 192, will switch back to zero automatically when the user releases the Datasette key. If this key is still down, you can turn the cassette motor back on again very easily: just release the interlock with POKE 192,0.

So your procedure is as follows:

1. Wait for the user to press the appropriate cassette key which will cause the motor to start. Then POKE 192,1.
2. When the appropriate time has elapsed, POKE 1,PEEK(1) OR 32.

---

## Zeroing Into VIC Tinymon

Why does Jim Butterfield say that a SYS to any memory location containing a zero value will invoke Tinymon? I would have thought that a SYS to the memory location containing the first byte of Tinymon would be the only way to make it run.

Roy Underhill

The zero means something special to the 6502 micro-processor chip. In its language (machine language), the zero is a BRK (break). That instruction forces control of the computer to go to an address contained in the "break interrupt vector." This is a two-byte-long "pointer" which you can change to point to any address. On the VIC, this vector is located in addresses 790 and 791 (decimal). If you make it point to the entry point in Tinymon (entry points are not always the first byte), then any time you SYS to a zero, the computer will "break" to the entry and Tinymon will be off and running.

---

## True Random Numbers For TI-99/4

Regena writes about randomness on the 99/4 in her column in the February issue. I would like to share some discoveries I have made on this subject with your readers.

First of all, there seems to be some confusion about how the RANDOMIZE statement works in TI BASIC and TI Extended BASIC. As Regena pointed out, if you do not use this statement in your program prior to using the RND function, you will receive the same sequence of numbers

each time you run the program. All your friends around the country with 99/4's will get the same numbers as you do, too. When the computer encounters the RANDOMIZE statement, it puts you back at the beginning of a new list of pseudo-random numbers.

That term "pseudo-random" is important. The 99/4A User's Reference Guide makes a point to mention that the RND function "gives you the next pseudo-random number in the current sequence of pseudo-random numbers." If you use the RANDOMIZE statement once, then, you may or may not get the same sequence of numbers. However, using the RANDOMIZE statement over and over again in the program just puts you back at the beginning of another list. In reality, there seem to be certain numbers that the computer prefers to put at the top of its lists, so in games there may be some numbers that are never generated because you never make it far enough up into the current list to get that number. The point is, repeating the RANDOMIZE statement does NOT make your program more random.

I have found that the only way to make the computer generate a *totally* unpredictable set of numbers is to use the RANDOMIZE statement once at the start of the program, then when you need to wait for the user to press a key, do this:

```
100 CALL KEY(0,K,S)
110 Z=RND
120 IF S=0 THEN 100
```

Since the time it takes a human to press a key will not be exactly the same each time the program is used, the computer will read down the list of pseudo-random numbers an unpredictable number of places.

Steve Davis

---

## TRS-80 Color Computer Group

I would like to inform your readers through your "Ask The Readers" column, that there is now a TRS-80 Color Computer Users Group in Milwaukee, WI. For more information write to:

CoCo-MUG  
c/o Tom Fandre  
2420 Misty Lane  
Waukesha, WI 53186  
(414)542-0600

Steve Koszuta

**COMPUTE!** welcomes questions, comments, or solutions to issues raised in this column. Write to: Readers' Feedback, **COMPUTE!** Magazine, P.O. Box 5406, Greensboro, NC 27403. **COMPUTE!** reserves the right to edit or abridge published letters.





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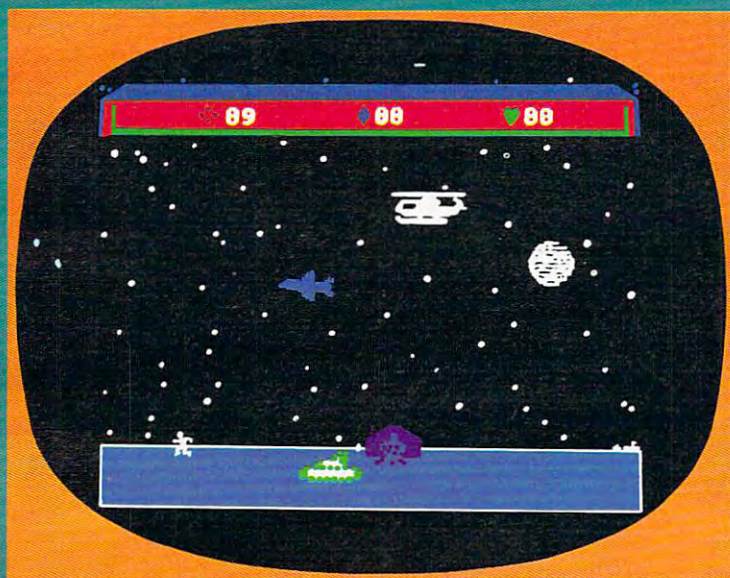
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# The New Low-Cost Printer/Plotters

Tom R. Halfhill, Features Editor

*Recent price breakthroughs are making color printer/plotters as easy to afford as the new low-end home computers. Here's a roundup of the major models now appearing on the market for Atari, Commodore, Radio Shack, and Texas Instruments computers.*

If you're a person who likes to doodle on your memo pad at work, or in the margins of your notes at school, then this article is probably for you.

Especially if you sometimes doodle in color. And if you envy the graphic designs on this page. And if you wish there were more to computer graphics printouts than black-and-white dot-matrix dumps.

Multicolor graphic designs, drawings, charts, and graphs have long been possible with peripheral devices known as *plotters*. Plotters are closely related to printers. The main difference is that printers create an image by striking the paper with a print head, while plotters actually draw on the paper with ballpoint or felt-tip pens, just as people do. Of course, because plotters are controlled by computers, they can draw with greater precision than the finest human draftsman.

Although plotters have been around for years, they haven't seen much use on home/personal computer systems because of their high cost, typically several thousand dollars. But that's about to change, thanks to a new generation of economical *printer/plotters* (so-named because they can

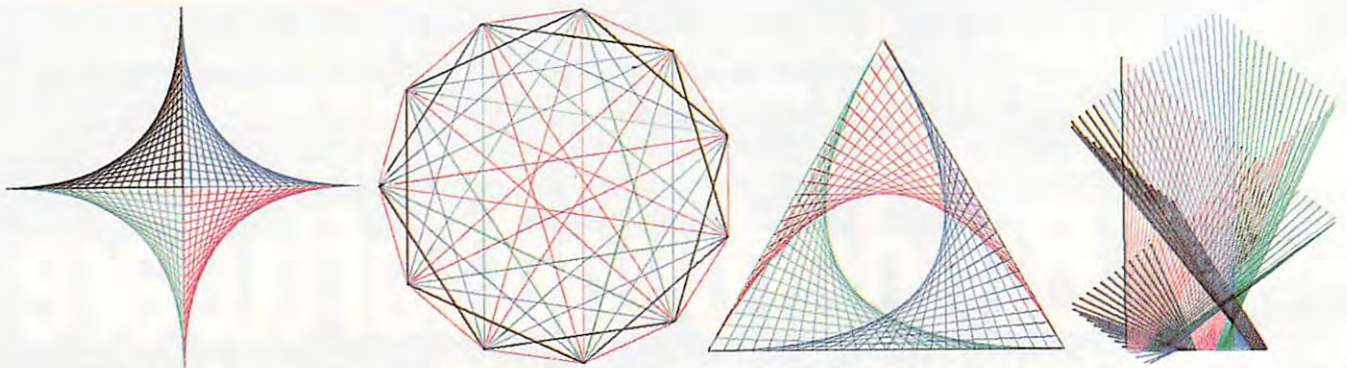
print text in addition to plotting figures). For example, the four-color designs illustrating this article were produced by the new Atari 1020 Printer/Plotter, which is just coming on the market for only \$299. Similar low-cost models for other home computers have been introduced by Commodore, Radio Shack, and Texas Instruments.

## A Revolver Loaded With Pens

Three main features separate printer/plotters from ordinary printers: the ability to draw continuous lines in any direction, the ability to draw in several colors, and the ability to scroll the paper both forward and backward as they draw.

Printers are designed primarily for printing out text and are severely limited when it comes to graphics. So-called *daisywheel* or *letter-quality* printers – those that stamp their characters on paper with a typewriter-like striker – are limited to the characters on their striking wheels or balls. By printing patterns of X's, asterisks, periods, or so forth, they can create crude figures or charts.

*Dot-matrix* printers are a little more flexible. Their print heads have a row of tiny pointed wires which are "fired" at the paper in certain patterns to form characters out of small dots. In addition to regular alphanumeric characters, most dot-matrix printers also have special graphics characters. Generally these are small shapes or blocks which can be grouped together to make figures. With special programs, most dot-matrix printers





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## HOME COMPUTER

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also can produce *screen dumps* – direct dot-by-dot copies of images on the computer screen. The limitations are that the screen dumps are only black-and-white, and have low resolution, since they are composed of masses of dots.

Plotters work on an entirely different principle. Expensive plotters usually have an arm, guided by tracks or rails, which grasps one ballpoint or felt-tip pen at a time. Beneath the arm, the sheet of paper (or plastic transparency) is held flat and stationary on the plotter. Under computer control, the arm can slide in any direction on its guide rails to draw continuous lines. When a line is supposed to end, the arm lifts the pen off the surface a fraction of an inch, moves to where the next line is to begin, and sets the pen back down to resume drawing. To change colors, the arm automatically lifts the pen, moves it off the paper, sets it in a rack, and picks up another pen from the rack. Some expensive plotters have racks with a dozen or more different-colored pens.

The new low-cost plotters for home computers take a somewhat different approach, but the result is the same. To cut costs, the complex movable arms, guide rails, and racks of pens are eliminated. Instead of drawing lines by moving an arm over flat, stationary paper, the new plotters hold the pen stationary and roll the paper beneath it. To make it possible to draw lines in any direction, the paper roller can rotate forward and backward, unlike conventional printers. And the low-cost plotters can lift the pen off the paper and set it back down to draw lines of any length similar to their more expensive cousins.

The new plotters also have a simpler way of changing pen colors. Instead of using a movable arm to pluck pens from a rack, they store four very small, colored pens in a rotating barrel. The barrel looks something like the cylinder of a revolver, except that there are spring-loaded pens where the bullets would be. To change colors, the plotter rotates the barrel, and a plunger presses the correct pen into contact with the paper.

As you might guess, the whole operation requires lots of precision, and it's amazing to see such devices sell for only a few hundred dollars. To further cut costs, all the new plotters use narrower paper (about 40 columns wide), and are limited to four colors at one time – although the pens are sometimes interchangeable so that many different colors are possible.

## The Patience Of A Monk

Now that you know how a plotter draws pictures, you might be wondering how a printer/plotter prints text. After all, it doesn't have a conventional print head.

The answer is simple, though the method is

not. A printer/plotter draws characters the same way it draws pictures: one line at a time. It's fun to watch. Tediously but precisely, with the patience of a medieval monk, the plotter scrolls the paper back and forth under the pen to carefully scribe each letter, number, and symbol. Since printing is a lot slower than typing, printer/plotters take a long time to generate text. Although the characters come out looking sharper than a dot-matrix printout, you probably won't want to use a printer/plotter for listing many programs – unless you, too, have extraordinary patience.

To control a plotter, you can write a program in BASIC or in another language that may be available for your computer (Logo, PILOT, etc.). The syntax varies, but generally you specify the X (horizontal) and Y (vertical) coordinates for each line; or, in the case of languages with turtle graphics, a direction and distance (i.e., RIGHT 90:FORWARD 10). To print text, you use a PRINT-type statement similar to BASIC's "PRINT." Printer/plotters have built-in character sets, so you don't have to issue volumes of commands to form each tiny character. Some printer/plotters even have several different-sized character sets to choose from.

Besides drawing pretty graphics designs, printer/plotters also are widely used for creating illustrative figures, charts, and graphs. It's usually easy to mix graphics and text.

In alphabetical order, here's a roundup of the new generation of low-cost printer/plotters for popular home computers:

### Atari 1020

The Atari 1020 uses standard 4½ inch-wide roll paper and has text modes of 20, 40, or 80 characters per line. The text modes are selectable from the computer keyboard and can be freely mixed with



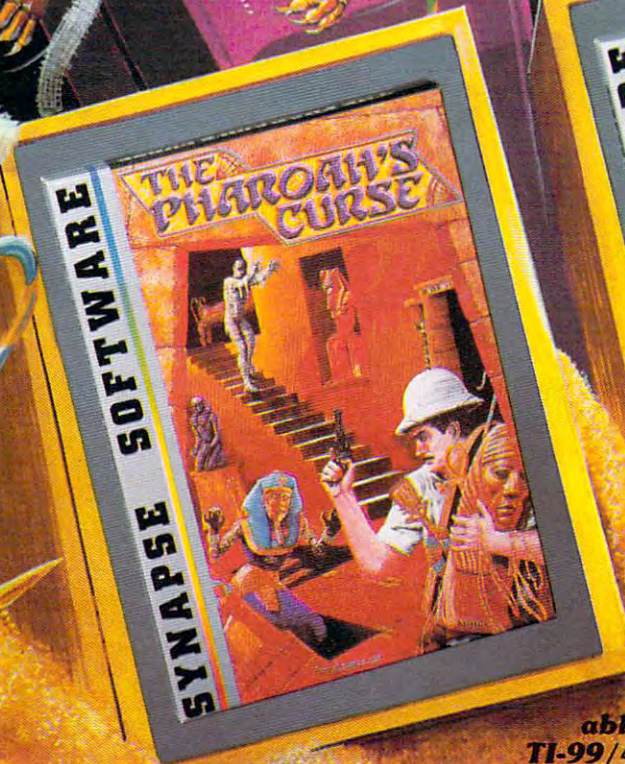
Atari 1020  
Printer/Plotter

charts, tables, and figures. In the 40-column mode, it prints at 10 characters per second (cps). There's also an international character set to complement the one on the new Atari 1200XL computer. The 1020 is styled to match the 1200XL and to fit neatly



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atop its case.

Under program control, the printer/plotter can draw to any vertical/horizontal coordinates with its four-pen print head. The standard colors are black, red, blue, and green. Eight other colors also will be available. Four buttons on the plotter control the power, pen color, pen change, and paper feed.

Atari says the 1020 should be available this spring for \$299.

### Commodore CBM 1520

The CBM 1520, announced at the Winter Consumer Electronics Show (CES), uses standard 4½ inch-wide roll paper in a 5-inch carriage. Prototypes had a four-color print head with black, purple, green, and red pens.



Prototypes also appeared to have two different-sized text modes. High-resolution figures are possible with the plotter's ability to "step" up to 480 positions horizontally and 999 positions vertically. The plotter has a power switch on the side and three topside buttons for paper feed, color change, and pen change.

The 1520 is designed primarily for the VIC-20 and Commodore 64 computers, but could be interfaced to other models as well.

Commodore says the 1520 should be available this spring for \$199.95.

### Radio Shack CGP-115

The CGP-115, already on the market, uses standard 4½ inch roll paper and comes with red, blue, green, and black pens in its four-color print head. Like Commodore's CBM 1520, the Radio Shack plotter can step up to 480 positions horizontally. However, there is no limit to the vertical steps.

There are two text modes – 40 or 80 columns at 12 cps. Under program control, other size characters can be drawn and even rotated. Topside buttons control the power, paper feed, and color



selection.

The CGP-115 sells for \$249.95.

### Texas Instruments HX-1000

The HX-1000 differs from the other printer/plotters in that it is portable and uses narrower 2¼ inch-wide roll paper. In the text mode, it can print up to 18 standard characters or 36 compressed characters per line, but eight other sizes are available as well. It prints at 12 cps.

The four-color print head comes with black, blue, red, and green pens. Ten control codes sent from the computer control various functions of the plotter. There is also an on-off/reset switch and a paper feed button.

The HX-1000 is powered by five AA-size (pen-light) batteries or an AC adapter/charger. It is designed to work directly with Texas Instruments' two newest computers, the under-\$100 TI-99/2 and the portable Compact Computer 40. The plotter also works with the TI-99/4A if connected through a \$59.95 Hex-Bus Interface.

Texas Instruments says the HX-1000 should be available this spring for \$199.95. The Hex-Bus Interface should be available shortly thereafter.





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COMPUTING POWER FEATURES						
BUILT-IN ROM	32K	12K	10K	20K	16K	8K
EXPANDABLE TO	96K	N/A	42K	N/A	32K	16K
BUILT-IN EXTENDED MICROSOFT® BASIC	YES	YES	ADDITIONAL COST	NO	YES	ADDITIONAL COST
BUILT-IN RAM	32K*	48K	16K	64K	16K	4K
EXPANDABLE TO	144K**	64K	48K	N/A	32K	16K
KEYBOARD FEATURES						
NUMBER OF KEYS	71	51	61	66	71	55
USER DEFINE FUNCTIONS	10	N/A	4	8	10	NONE
SPECIAL WORD PROCESSING	YES	NO	YES	YES	NO	NO
GENERATED GRAPHICS (FROM KEYBOARD)	YES	UPPER ONLY	YES	YES	YES	YES
UPPER/LOWER CASE	YES	UPPER ONLY	YES	YES	YES	YES
GAME/AUDIO FEATURES						
SEPARATE CARTRIDGE SLOTS	YES	NO	YES	NO	NO	NO
BUILT-IN JOYSTICK	YES	NO	NO	NO	NO	NO
COLORS	16	15	128	16	9	9
RESOLUTION (PIXELS)	256 x 192	260 x 150	320 x 192	320 x 200	256 x 192	128 x 64
SPRITES	32	N/A	4	8	N/A	N/A
SOUND CHANNELS	3	1	4	3	3	1
OCTAVES PER CHANNEL	8	4	4	9	8	10
A.D.S.R. ENVELOPE	YES	NO	NO	YES	YES	NO
PERIPHERAL SPECIFICATIONS						
CASSETTE	2 CHANNEL	1 CHANNEL	2 CHANNEL	1 CHANNEL	1 CHANNEL	1 CHANNEL
AUDIO I/O	YES	NO	YES	NO	NO	NO
BUILT-IN MIC	YES	NO	NO	NO	NO	NO
DISK DRIVE CAPACITY	256K	143K	96K	170K	N/A	170K
(LOW PROFILE)	YES	NO	NO	NO	NO	NO
CP/M® COMPATIBILITY (80 column programs)						
CP/M® 2.2	YES	NO***	NO	NO****	NO	NO
CP/M® 3.0	YES	NO	NO	NO	NO	NO

\* 16K user addressable plus 16K graphic support  
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## The Robots Are Coming

Technological advances seem to be hitting the consumer marketplace with such force and frequency that we are in danger of becoming numbed by their announcement. It is hard, for example, to believe that the personal computer field is only a few years old – or that powerful languages like Logo have become available to the home computerist only in the past two years.

As we watch these developments eclipse each other, we might ask ourselves what will happen next? What technological development could possibly hit the consumer marketplace with such force that it might displace our current technological wonders as the benchmarks of our age?

Well, I've given it a lot of thought, and I have an answer.

Domestic robots.

By now, many of you have seen news stories on the Heath HERO-1 and the Androbot TOPO. In watching these contraptions on the evening news, you might have said to yourself, "So what?" After all, we see robots in the movies all the time, and the use of robots in dangerous or boring assembly tasks has been going on for years.

The reason domestic robots are important is that, like the personal computer, they are designed for personal use by people in their own homes. This means that, for the first time, we will individually take control of robots and shape them to our personal needs, just as we did with computers.

The robots used by industry are reminiscent of the computers used by business – large specialized machines designed to perform clearly defined tasks with efficiency.

In more ways than one, the domestic robot in 1983 reminds me of the home computer in 1978. For example, in 1978 there wasn't a whole lot one could do with a personal computer. The software industry was in its infancy (residing mainly in spare rooms and garages), but the people who bought computers then were pioneers – brave souls who not only were the first to experience the computer revolution, but who also helped to

make it happen either by writing software themselves or by helping to identify those areas where software was needed.

All of which brings me to 1983 and the beginning of a new industry.

### Where Are They Headed?

The domestic robot, as this is being written, is largely a tool for discovery, experimentation, and entertainment. The Heath product is oriented to the technical educational market as a tool for learning about robotics *per se*. The buyer of the Heath HERO not only gets to assemble the device (thus learning about everything from microprocessors to wheel drive systems), but also gets to program the robot at the most basic levels. The Androbot TOPO, on the other hand, is a fully assembled device designed to be operated with turtle graphics commands from a separate computer using BASIC or Logo.

Because of philosophical differences in the design of these two products, they will serve the needs of different audiences. I expect the Heath product to have more appeal to the hardware tinkerer – the sort of person who built his or her Northstar Horizon from a kit. TOPO may appeal more to application-oriented users.

At first glance, TOPO looks about as useful as an overgrown, radio-controlled Big Trak. It is sent commands to move forward and backward by some amount, or to turn to the right or left by some angle. It is thus a physical analog to the display turtle associated with languages like Logo and Atari PILOT.

In order to understand my enthusiasm for domestic robots, you almost need to experience them for yourself. There is something quite appealing about being able to write a program that sends a three-foot tall robot on a tour of your house. After watching a robot in action, you can't help but come up with lists of applications for these devices.

In the few weeks I have had TOPO, I have used it to help teach computer programming to





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third graders and to dance to a piece of music I play at the piano. These aren't earthshaking applications, but I've had TOPO only a short time.

Where are robots like TOPO headed? There are many applications that come to mind. When equipped with a simple cart, robots can help handicapped people carry things from room to room. If properly programmed, a robot can "walk" around the house each night "looking" for intruders. (I can't imagine very many intruders who would be willing to tangle with a robot.)

Clearly, just as with personal computers, the entertainment possibilities are endless. You could design games for groups of children that use a robot as one of the players - truly picking a child at random, for example. A robot that can be programmed to move pseudo-randomly in a room can be used for another game in which the children divide into two teams. One team has the goal of always staying to the "north" of the robot, while the other must always stay to the "east." As the robot moves, the children must move with it. Any children caught outside the safe zone are "out" until the next game.

The more I think about it, robots may help counter the fear I have heard that computers are turning our children into sedentary creatures. If this were true (and I tend to doubt it), robots would help reverse this trend.

What I find interesting is that the applications I mentioned (carrying things, roaming the house, playing games) are all feasible with today's robots and just a little bit of software development.

And what about the future? Will we still look on robots as the foreboding evil mechanisms destined to eliminate the less-than-perfect carbonaceous beings that created them?

I think not.

The personal computer made computing less intimidating to us by placing the power of this machine in the hands of individuals. So it will be with robots. By creating a domestic robot industry, we all benefit, even if we choose not to use robots ourselves.

As with computers, users and non-users alike should learn about robots.

Why?

Because they are there.

## Next Time

Next month we will continue to explore this topic by looking at the promise and potential of the next generation of robots, androids that adaptively program themselves in response to their environment.

In the meantime, you might want to read Isaac Asimov's book *I, Robot*. It will be moved off the fiction shelves soon.

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# THE BEGINNER'S PAGE

Richard Mansfield, Senior Editor

People are putting their home computers to all kinds of uses. Last month – to get an overview – we separated personal computing programs into fifteen broad types: 1. Graphics, 2. Music, 3. Word Processing, 4. Education, 5. Home Applications, 6. Accounting, 7. Games, 8. Financial Simulation, 9. Data Base Management, 10. Languages, 11. Operating Systems, 12. Disk Operating Systems, 13. Utilities, 14. Telecommunications, and 15. Artificial Intelligence. We reviewed the first three, so now let's take a look at the second group.

## Education

Although fears have been expressed that Computer Assisted Instruction (CAI) could lead to a brave new world of cold, inhuman, assembly line schooling – just the opposite seems to be taking place. How the computer teaches is entirely dependent on how it's programmed to teach. A CAI program *can* be sarcastic, or teach too slowly or too quickly, or offer endless, boring drills. But this is not something inherent in *computerized* teaching; bad teachers have been doing all these things for centuries.

The opportunities for personalized, interactive, effectively paced CAI are just beginning to be explored. It wasn't long ago that we heard a good deal about attempts at new, unstructured educational styles. "Learning can be fun" was the slogan, but the results of these experiments were, to put it mildly, mixed. A part of an entire generation failed to learn fundamental spelling, arithmetic, and even reading skills.

CAI might well be the answer. After all, learning *should* be exciting and challenging. When combined with sound and animation, many learning programs are indistinguishable from games. Nearly every month, **COMPUTE!** publishes a CAI game or program. "Crosswords," in this issue, will construct crossword puzzles which can build vocabulary or teach spelling. Last month, there was "Math Fun." And as games themselves become more sophisticated, the "hidden" lessons within them will become more effective. Much remains to be discovered about CAI technique, but it seems quite possible that, via computers, math (and all the other subjects) can become fun for the average student.

## Home Applications

This is a catch-all category. Growing out of hobbies

or special needs, these programs perform a personal service such as keeping track of the birds a birdwatcher sees or the stamps a collector buys. Sometimes, home applications are just scaled-down versions of business programs. For example, the professional advertiser's mailing list program becomes, in the home, a personal Christmas/birthday card manager. It will not only address the envelopes; it can remind you when to mail the cards. Other examples include personal inventory programs (record, book, coin collections, etc.) or personal analysis (biorhythms, nutritional planning, scheduling, computerized bowling league scorekeeping, and so forth).

Big business and government have had years to computerize themselves. Some estimates suggest that computers do as much as 80 percent of the work in areas such as national defense. Home computerization is in its infancy, but the future seems to promise increasing use of "intelligent" appliances, information services, even robot vacuum cleaners. To all of us who try, with more or less difficulty, to keep our home and personal affairs in order, the offer of smart-machine domestic services can only be viewed as a major blessing.

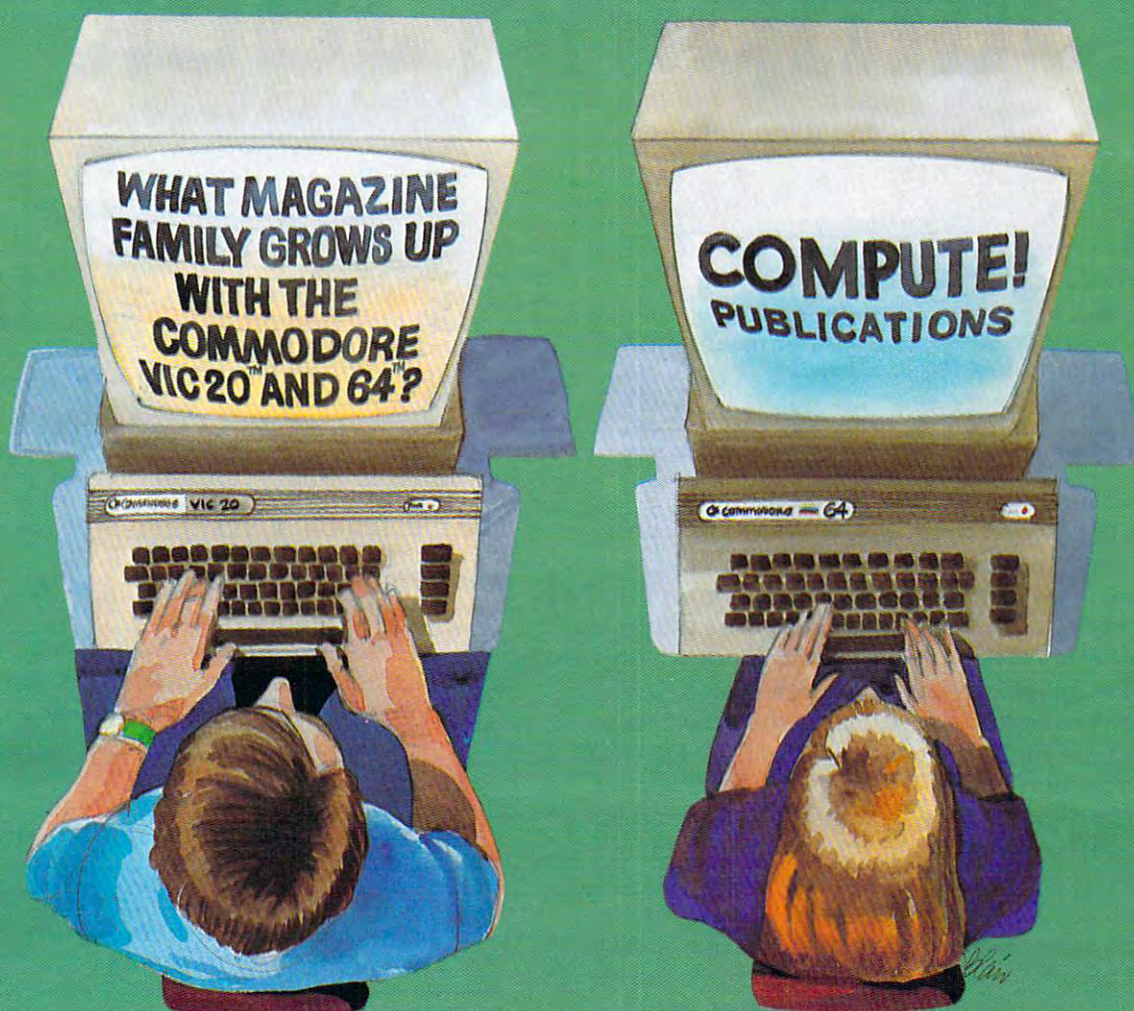
## Descending Luxury: Accountants For Everyone

Personal budgeting, retirement planning, investment analysis, and tax preparation are among the currently popular applications of computers in home accounting. Most of us don't face financial decisions of sufficient complexity to require the services of a human accountant. On the other hand, most of us could use some help with our money management. Getting this help from our home computer is yet another example of what could be called *descending luxury*.

To define that idea, let's look at another example: movies. When I was in college, we'd hear about the movie that the President or a Hollywood star had shown guests the night before. It seemed an extraordinary luxury to be able to watch a movie in your own house. Indeed, such freedom was only available to the very wealthy. Now home video equipment is making home theaters increasingly available to everyone. In a few years, the technology of high resolution, large-screen TV should be affordable everywhere. Another luxury has descended.

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# Jumping Jack

Paul Burger

*Jumping Jack, for the unexpanded VIC, Atari 400/800, Commodore 64, and TI-99/4A is a challenging game that makes full use of your computer's color and sound capabilities. Each game can be played through several levels. The Atari version has nine skill levels. This is a game that can be enjoyed by all age groups.*

Jack is running across platforms and climbing down ladders to get to the bottom of the screen. Sounds easy enough, right?

There's just one problem: these platforms are not very sturdy at all, and at any time they can collapse in certain places. You must be ready to press the space bar causing Jack to jump. If your timing is right, Jack will clear the hole and land safely on his feet. If not, Jack will fall into the collapsed section of the platform.

If you are not quite quick enough on the space bar, you still have a chance to clear the hole. Here's how: If the space bar is pressed immediately after Jack gets over the hole, you can make a saving jump. However, Jack must be over the hole while in the air to get points for jumping the hole, so no points are scored for using a saving jump to get over a hole. This method can also be used to jump two holes in a row. Simply make a saving jump as described above for the first hole, and Jack will fly over the second hole (this scores points only for the second hole, however.)

## Program 1: VIC-20 Version

```
0 M=3:T=150:D=5:X=25:P=61:POKE55,160:POKE56,29:S=36876:POKE36878,15:GOTO10012
1 C=27:F%=5:FORI=7680TO8185:POKEI,59:NEXT
2 FORI=7702TO7723:POKEI,53:NEXT:FORI=7812TO7833:POKEI,53:NEXT:FORI=7900TO7921:POKEI,53:NEXT
3 POKE36879,C:FORI=8032TO8053:POKEI,53:NEXT:FORI=8142TO8163:POKEI,53:NEXT
4 FORI=38400TO38884+21:POKEI,4:NEXT
5 FORI=38488TO38510+21:POKEI,F%:NEXT
6 FORI=38576TO38598+21:POKEI,F%:NEXT
7 FORI=38708TO38730+21:POKEI,F%:NEXT
8 FORI=38818TO38840+21:POKEI,F%:NEXT:GOSUB10020:FORI=1TO1000:NEXT
9 I=7790
10 IFI/2=INT(I/2)THENPOKEI-1,59:GOSUB110
11 IFI/2=INT(I/2)THENPOKEI,55:FORJ=1TOT:NEXT:EXT:GOTO14
13 POKEI-1,59:POKEI,56:FORJ=1TOT:NEXT:B=7812:GOSUB510
14 IFPEEK(197)=32THENGOSUB20
15 IFPEEK(I+22)=54THENPOKEI,59:GOTO30
16 IFPEEK(I+22)=60THEN500
17 I=I+1:IFI>7811THENI=7790:POKE7811,59
18 GOTO10
20 I=I-21:POKEI+21,59
21 IFPEEK(I+22)<>59ORPEEK(I+44)<>53THENSCL=SC+X:POKEI-22,P:GOSUB112:POKEI-22,59
23 POKEI,55:FORJ=1TOT:NEXT:I=I+23:IFI>7811THENI=7790:POKE7811,59
24 POKE7789,59:POKE7790,59
25 FORJ=1TOT:NEXT:POKEI-23,59:POKEI,55:RENTURN
30 I=7898
31 IFI/2=INT(I/2)THENPOKEI+1,59:GOSUB110
32 IFI/2=INT(I/2)THENPOKEI,58:FORJ=1TOT:NEXT:GOTO34
33 POKEI+1,59:POKEI,57:FORJ=1TOT:NEXT:B=7900:GOSUB510
34 IFPEEK(197)=32THENGOSUB40
35 IFPEEK(I+22)=54THENPOKEI,59:GOTO50
36 IFPEEK(I+22)=60THEN500
37 I=I-1:IFI<7878THENI=7898:POKE7878,59
38 GOTO31
40 I=I-23:POKEI+23,59
41 IFPEEK(I+22)<>59ORPEEK(I+44)<>53THENSCL=SC+X:POKEI-22,P:GOSUB112:POKEI-22,59
43 POKEI,58:FORJ=1TOT:NEXT:I=I+21:IFI<7878THENI=7898:POKE7878,59
44 POKE7856,59:POKE7855,59
45 FORJ=1TOT:NEXT:POKEI-21,59:POKEI,58:RENTURN
50 I=8010
51 IFI/2=INT(I/2)THENPOKEI-1,59:GOSUB110
52 IFI/2=INT(I/2)THENPOKEI,55:FORJ=1TOT:NEXT:GOTO54
53 POKEI-1,59:POKEI,56:FORJ=1TOT:NEXT:B=8032:GOSUB510
54 IFPEEK(197)=32THENGOSUB60
55 IFPEEK(I+22)=54THENPOKEI,59:GOTO70
56 IFPEEK(I+22)=60THEN500
57 I=I+1:IFI>8031THENI=8010:POKE8031,59
58 GOTO51
60 I=I-21:POKEI+21,59:IFPEEK(I)<>59THENSCL=SC+300
61 IFPEEK(I+22)<>59ORPEEK(I+44)<>53THENSCL=SC+X:POKEI-22,P:GOSUB112:POKEI-22,59
63 POKEI,55:FORJ=1TOT:NEXT:I=I+23:IFI>8031THENI=8010:POKE8031,59
64 POKE8009,59:POKE8010,59
65 FORJ=1TOT:NEXT:POKEI-23,59:POKEI,55:RENTURN
70 I=8140
71 IFI/2=INT(I/2)THENPOKEI+1,59:GOSUB110
72 IFI/2=INT(I/2)THENPOKEI,58:FORJ=1TOT:NEXT:GOTO74
```





# IS GRIDRUNNER™ UNBEATABLE?

No one, not even the author, has ever achieved the last Gridrunner. It is an extremely fast-paced arcade-quality game designed to test your coolness under fire and challenge your reflexes.

As the pilot of the Gridrunner, a combat ship, you must annihilate the various enemies traveling along the "Grid." High scores are possible only through the mastery of the patterns of the X/Y Zappers and the Gridsearch Droids which, when destroyed, mutate into potentially lethal Pods.

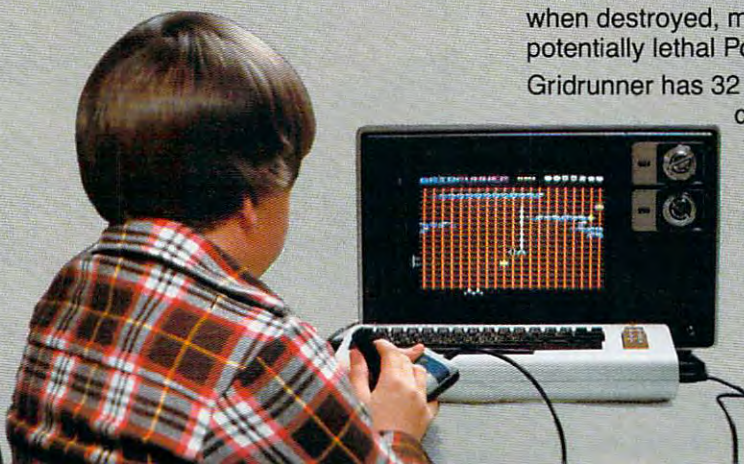
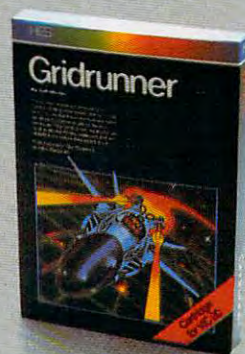
Gridrunner has 32 levels of difficulty (20 levels in the VIC 20 version). To this date, the 13th level has been the highest achieved.

**Gridrunner is available for VIC 20, Commodore 64 and Atari 400/800.**

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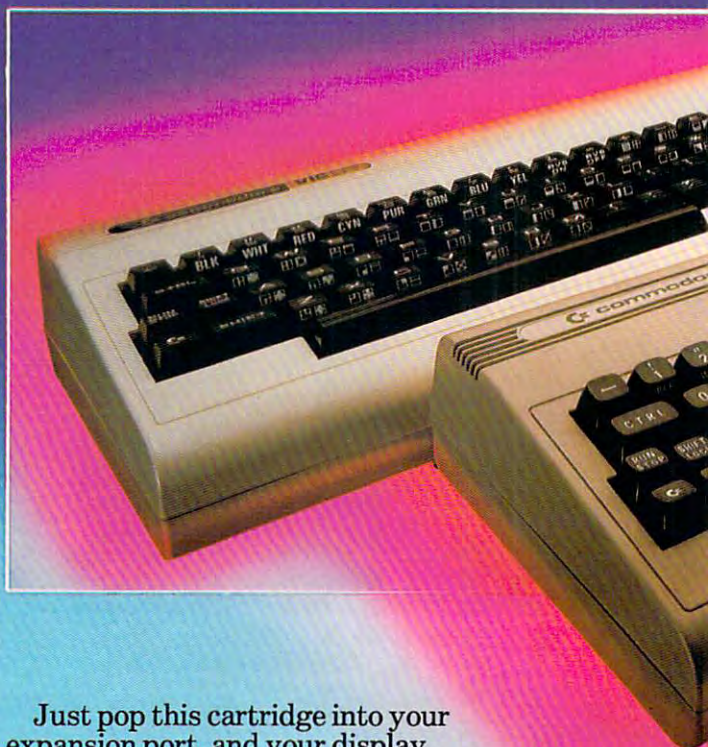
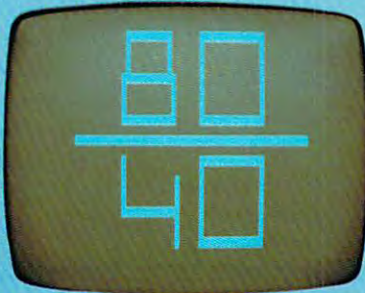
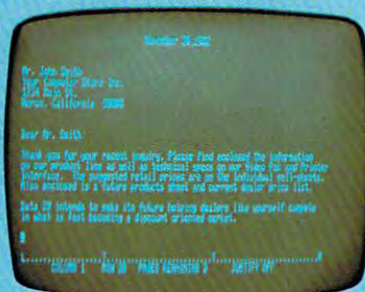
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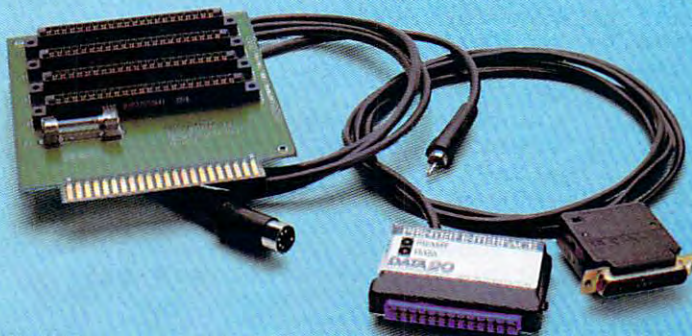
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terminal emulator mode and screen print feature with software we include. And this is a great package for word processing—particularly with our free WORD MANAGER software.

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**VIDEO CABLE** completes the installation. It's the easy way to connect your VIC 20 or Commodore 64 monitor to VIDEO PAK. And a must for 80-column use.



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```

73 POKEI+1,59:POKEI,57:FORJ=1TOT:NEXT:B=8
  142:GOSUB510
74 IFPEEK(197)=32THENGOSUB80
75 IFPEEK(I+22)=54THENPOKEI,59:GOTO100
76 IFPEEK(I+22)=60THEN500
77 I=I-1:IFI<8120THENI=8140:POKE8120,59
78 GOTO71
80 I=I-23:POKEI+23,59
81 IFPEEK(I+22)<>59ORPEEK(I+44)<>53THENSE
  =SC+X:POKEI-22,P:GOSUB112:POKEI-2
  2,59
83 POKEI,58:FORJ=1TOT:NEXT:I=I+21:IFI<812
  0THENI=8140:POKE8120,59
84 POKE8098,59:POKE8097,59
85 FORJ=1TOT:NEXT:POKEI-21,59:POKEI,58:RE
  TURN
100 P=P+1:IFP=64THENP=61
101 D=D-1:T=T-50
102 X=X+50:IFX>125THENX=25:D=8:T=150:C=27:
  F%=5
103 IFX=75THENC=232:F%=0
104 IFX=125THENC=8:F%=7
105 GOTO2
110 POKES,140:FORY=1TO10:NEXT:POKES,0:RETU
  RN
111 POKES+1,190:FORY=1TO25:NEXT:POKES+1,0:
  RETURN
112 FORO=1TO15:POKES,200+O:NEXTO:POKES,0:R
  ETURN
113 FORO=20TO0STEP-1:POKES,230+O:FORY=1TO2
  5:NEXTY,O:POKES,0:RETURN
500 GOSUB113:M=M-1:IFM=0THEN502
501 P=61:X=25:D=6:C=27:T=150:F%=5:POKEI,59
  :GOTO2
502 POKE36869,240:PRINTCHR$(147);SPC(225);
  "GAME OVER!":PRINT:PRINT"YOUR SCO
  RE WAS ";SC
503 PRINT:PRINT"PLAY AGAIN?"
504 K=PEEK(197):IFK=32ORK=64THEN504
505 IFK=11THENRUN
506 END
510 IFINT(RND(1)*D)+1<>1THENRETURN
511 L=INT(RND(1)*21)+1:IFL=20ORL=1THEN511
512 POKEB+L,60:GOSUB111:RETURN
10000 DATA255,129,66,66,36,36,24,255
10002 DATA66,126,66,66,66,126,66,66
10003 DATA12,8,13,62,44,12,18,33
10004 DATA24,16,24,24,24,16,16,24
10005 DATA24,8,24,24,24,8,8,24
10006 DATA24,8,88,62,26,24,36,66
10007 DATA0,0,0,0,0,0,0,0
10008 DATA129,66,66,66,98,34,34,34
10009 DATA7,10,27,17,27,0,0,0
10010 DATA59,10,11,9,11,0,0,0
10011 DATA91,74,91,81,91,0,0,0
10012 RESTORE:FORI=7592TO7679:READA:POKEI,
  A:NEXT
10015 POKE36869,255
10016 GOTO1
10020 FORI=7832TO7898STEP22:POKEI,54:NEXT:
  FORI=7901TO8011STEP22:POKEI,54:NEXT
10021 FORI=8052TO8140STEP22:POKEI,54:NEXT:
  FORI=38552TO38618STEP22:POKEI,6:NEXT
10022 FORI=38621TO38731STEP22:POKEI,6:NEXT:
  FORI=38772TO38860STEP22:POKEI,6:NEXT
10023 POKE8143,54:POKE8165,54:POKE38863,6:
  POKE38885,6:RETURN
141 OPEN #1,4,0,"K"
142 DIFF=1:DL=PEEK(560)+256*PEEK(561
  )
145 FOR J=1 TO 10:FOR I=100 TO 112:P
  OKE DL,I:POKE 53274,PEEK(53770):
  SOUND 0,I+J-100,10,J:NEXT I:NEXT
  J
150 SOUND 0,0,0,0:CHSET=(PEEK(106)-8
  )*256:IF PEEK(CHSET+8)<>8 THEN G
  OSUB 1080
160 GRAPHICS 17:SETCOLOR 4,16*RND(0)
  ,12:POKE 756,CHSET/256:POSITION
  6,23: ? #6;"LEVEL";DIFF
162 IF DIFF>1 THEN 170
165 POSITION 4,0: ? #6;"SPEED? 01-99"
  ;:GET #1,A:SPEED=A-48:IF SPEED<1
  OR SPEED>9 THEN 165
167 COLOR 32:PLOT 4,0:DRAWTO 19,0
170 DIR=1:HOLE=7+128:LADDER=6+32+128
  :SETCOLOR 1,15,6:SETCOLOR 3,4,6
180 PR=0
190 FOR I=2 TO 22 STEP 4
200 COLOR 5+32:PLOT 0,I:DRAWTO 19,I
210 IF I>20 THEN 270
220 R=INT(RND(0)*14+4)+DIR
230 IF SGN(R-PR)<>DIR THEN 220
240 COLOR LADDER:PLOT R,I:DRAWTO R,I
  +4
250 PR=R
260 DIR=-DIR
270 NEXT I
280 COL=2
290 ROW=1
300 CHAR=1
310 OLDCOL=1
320 OLDROW=1
340 DIR=1
350 COLOR 32:PLOT OLDCOL,OLDROW
360 IF RND(0)>DIFF/10 THEN 430
370 R=INT(4*RND(0))*4+6
380 C=INT(RND(0)*19)+1
390 LOCATE C,R,A
400 IF A=LADDER THEN 430
410 COLOR HOLE:PLOT C,R
420 SOUND 0,100,12,8:FOR W=1 TO 10:N
  EXT W:SOUND 0,0,0,0
430 COLOR CHAR+2*(DIR<0):PLOT COL,RO
  W
440 SOUND 0,0,0,8:FOR W=1 TO 5:NEXT
  W:SOUND 0,0,0,0
450 IF ROW>20 THEN 990
460 OLDCOL=COL
470 OLDROW=ROW
480 COL=COL+DIR
490 IF COL>0 AND COL<20 THEN 540
500 COL=COL-DIR
510 ROW=ROW+4
520 DIR=-DIR
530 GOTO 350
540 LOCATE COL,ROW+1,CHECK
550 ST=PEEK(764)
560 IF ST<255 THEN POKE 764,255:GOTO
  640
570 IF CHECK=HOLE THEN 770
580 IF CHECK<>LADDER THEN 610
590 DIR=-DIR
600 ROW=ROW+4
610 CHAR=3-CHAR
620 SCORE=SCORE+0.5
625 FOR SLOW=1 TO (9-SPEED)*10:NEXT
  SLOW
630 GOTO 350
640 IF CHECK<>HOLE THEN 1030

```

## Program 2: Atari Version

```

100 REM ATARI JUMPING JACK
140 GRAPHICS 18:POSITION 7,6: ? #6;"J
  UMPEIKG":POSITION 8,7: ? #6;"jEIR"

```



# For Heroes Only!

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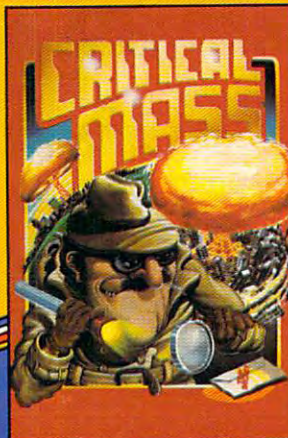
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On Jan. 1st at 10:00 am, the U.N. received this message: "Good Morning, in exactly 9 days, the world's 5 largest cities will be destroyed by thermal nuclear weapons." At 10:03 am, you received this assignment: STOP ... THIS ... LUNATIC!

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**TYPE ATTACK**



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```

650 COLOR 32:PLOT OLDCOL,OLDROW
660 COLOR 1+2*(DIR<0):PLOT COL,ROW-1
670 FOR W=50 TO 0 STEP -1:SOUND 0,W,
    10,8:SOUND 0,W+10,10,8:NEXT W
700 COLOR 9+32:PLOT COL,ROW-1
710 SCORE=SCORE+25
720 FOR W=15 TO 0 STEP -1:SOUND 0,10,
    10,W:SOUND 1,20,10,W:NEXT W
740 COLOR 32:PLOT COL,ROW-1
750 COL=COL+DIR
760 GOTO 490
770 IF PEEK(764)<255 THEN POKE 764,2
    55:GOTO 640
790 COLOR 32:PLOT OLDCOL,OLDROW
800 COLOR 10:PLOT COL,ROW
810 FOR I=100 TO 250
820 SOUND 0,I,10,8
830 NEXT I
840 COLOR 32:PLOT COL,ROW
850 COLOR 136:PLOT COL,ROW+1
860 FOR W=15 TO 0 STEP -0.5:SOUND 0,
    W,12,W:NEXT W
880 GRAPHICS 18:SETCOLOR 4,1,12
900 POSITION 2,4:?"#6:"your score wa
    s:":POSITION 9-LEN(STR$(INT(SCOR
    E)))/2,6:?"#6:INT(SCORE)
910 POSITION 1,10:?"#6:"PLAY AGAIN?
    (Y/N):";
920 K=PEEK(764):IF K<>35 AND K<>43 T
    HEN 920
930 POKE 764,255
950 IF K=35 THEN 980
960 SCORE=0:DIFF=1
970 GOTO 160
980 END
990 DIFF=DIFF+1:SPEED=SPEED+0.5
1000 SCORE=SCORE+50
1020 GOTO 160
1030 FOR I=150 TO 140 STEP -1
1040 SOUND 0,I,10,4
1050 NEXT I
1060 SCORE=SCORE-25
1070 GOTO 580
1080 CHSET=(PEEK(106)-8)*256:FOR I=0
    TO 511:POKE CHSET+I,PEEK(57344
    +I):POKE 708+3*RND(0),PEEK(5377
    0):NEXT I
1081 RESTORE 1085
1082 READ A:IF A=-1 THEN RETURN
1083 FOR J=0 TO 7:READ B:POKE CHSET+
    A*8+J,B:POKE 708+3*RND(0),PEEK(
    53770):NEXT J
1084 GOTO 1082
1085 DATA 1,8,20,24,80,62,24,20,34
1086 DATA 2,8,20,24,18,124,152,36,72
1087 DATA 3,16,40,24,8,124,26,40,68
1088 DATA 4,16,40,24,72,62,25,36,18
1089 DATA 5,255,66,36,24,24,36,66,25
    5
1090 DATA 6,126,66,126,66,126,66,126
    ,66
1091 DATA 7,129,66,68,34,0,36,74,255
1092 DATA 8,189,90,84,34,0,36,74,255
1093 DATA 9,0,119,20,119,65,119,0,0
1094 DATA 10,0,28,93,42,28,28,20,34
1095 DATA -1
20 C=7:F%=5:FORI=1024TO2041:POKEI,59:NEXT
30 POKE53280,C:FORI=1064TO1103:POKEI,53:N
    EXT:FORI=1264TO1303:POKEI,53:NEXT
33 FORI=1424TO1463:POKEI,53:NEXT:POKE1425
    ,54:POKE1702,54:POKE1865,54
40 FORI=1664TO1703:POKEI,53:NEXT:FORI=186
    4TO1903:POKEI,53:NEXT
50 FORI=55296TO56176+39:POKEI,4:NEXT
60 FORI=55456TO55496+39:POKEI,F%:NEXT
70 FORI=55616TO55656+39:POKEI,F%:NEXT
80 FORI=55856TO55896+39:POKEI,F%:NEXT
90 FORI=56056TO56096+39:POKEI,F%:NEXT:GOS
    UB1000:FORI=1TO1000:NEXT
100 I=1224:POKE1302,54:POKE1425,54:POKE170
    2,54:POKE1865,54
110 IFI/2=INT(I/2)THENPOKEI-1,59:GOSUB720
120 IFI/2=INT(I/2)THENPOKEI,55:FORJ=1TOT:N
    EXT:GOTO140
130 POKEI-1,59:POKEI,56:FORJ=1TOT:NEXT:B=1
    264:GOSUB830
140 IFPEEK(197)=60THENGOSUB190
150 IFPEEK(I+40)=54THENPOKEI,59:GOTO240
160 IFPEEK(I+40)=60THEN760
170 I=I+1:IFI>1263THENI=1224:POKE1263,59
180 GOTO110
190 I=I-39:POKEI+39,59
200 IFPEEK(I+40)<>59ORPEEK(I+80)<>53THENS
    C=SC+X:POKEI-40,P:GOSUB740:POKEI-4
    0,59
210 POKEI,55:FORJ=1TOT:NEXT:I=I+41:IFI>126
    3THENI=1224:POKE1263,59:POKE1223,
    59
220 POKE1403,59:POKE1404,59
230 FORJ=1TOT:NEXT:POKEI-41,59:POKEI,55:RE
    TURN
240 I=1422
250 IFI/2=INT(I/2)THENPOKEI+1,59:GOSUB720
260 IFI/2=INT(I/2)THENPOKEI,58:FORJ=1TOT:N
    EXT:GOTO280
270 POKEI+1,59:POKEI,57:FORJ=1TOT:NEXT:B=1
    424:GOSUB830
280 IFPEEK(197)=60THENGOSUB330
290 IFPEEK(I+40)=54THENPOKEI,59:GOTO380
300 IFPEEK(I+40)=60THEN760
310 I=I-1:IFI<1384THENI=1422:POKE1384,59
320 GOTO250
330 I=I-41:POKEI+41,59
340 IFPEEK(I+40)<>59ORPEEK(I+80)<>53THENS
    C=SC+X:POKEI-40,P:GOSUB740:POKEI-4
    0,59
350 POKEI,58:FORJ=1TOT:NEXT:I=I+39:IFI<138
    4THENI=1422:POKE1384,59:POKE1344,
    59
360 POKE1344,59:POKE1343,59
370 FORJ=1TOT:NEXT:POKEI-39,59:POKEI,58:RE
    TURN
380 I=1624
390 IFI/2=INT(I/2)THENPOKEI-1,59:GOSUB720
400 IFI/2=INT(I/2)THENPOKEI,55:FORJ=1TOT:N
    EXT:GOTO420
410 POKEI-1,59:POKEI,56:FORJ=1TOT:NEXT:B=1
    664:GOSUB830
420 IFPEEK(197)=60THENGOSUB470
430 IFPEEK(I+40)=54THENPOKEI,59:GOTO520
440 IFPEEK(I+40)=60THEN760
450 I=I+1:IFI>1663THENI=1624:POKE1663,59:P
    OKE1623,59
460 GOTO390
470 I=I-39:POKEI+39,59:IFPEEK(I)<>59THENS
    C=SC+300
480 IFPEEK(I+40)<>59ORPEEK(I+80)<>53THENS

```

### Program 3: C64 Version

```

0 REM JUMPING JACK FOR 64
5 GOSUB3000:PRINT"{CLEAR}";"{11 RIGHT}IN
    ITIALIZING"
10 M=3:T=10:D=5:X=25:P=61:POKE55,16:POKE5
    6,64:S=54272:POKE53281,1:GOTO970

```



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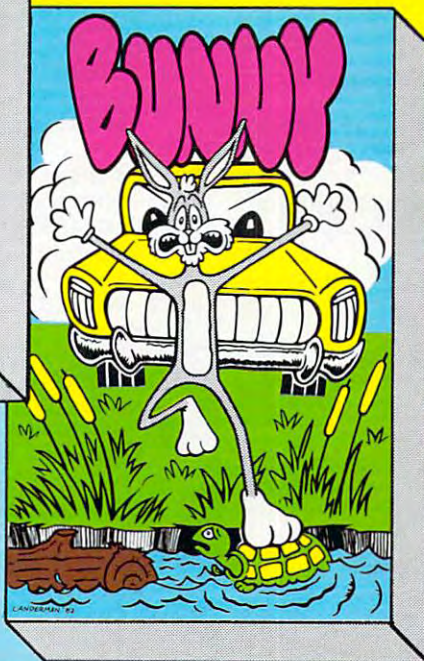
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```

=SC+X:POKEI-40,P:GOSUB740:POKEI-4
0,59
490 POKEI,55:FORJ=1TOT:NEXT:I=I+41:IFI>166
3THENI=1624:POKEI663,59
500 POKEI641,59:POKEI624,59:POKEI623,59
510 FORJ=1TOT:NEXT:POKEI-41,59:POKEI,55:RE
TURN
520 I=1862
530 IFI/2=INT(I/2)THENPOKEI+1,59:GOSUB720
540 IFI/2=INT(I/2)THENPOKEI,58:FORJ=1TOT:N
EXT:GOTO560
550 POKEI+1,59:POKEI,57:FORJ=1TOT:NEXT:B=1
864:GOSUB830
560 IFPEEK(197)=60THENGOSUB610
570 IFPEEK(I+40)=54THENPOKEI,59:GOTO660
580 IFPEEK(I+40)=60THEN760
590 I=I-1:IFI<1824THENI=1862:POKEI824,59
600 GOTO530
610 I=I-41:POKEI+41,59
620 IFPEEK(I+40)<>59ORPEEK(I+80)<>53THENSC
=SC+X:POKEI-40,P:GOSUB740:POKEI-4
0,59
630 POKEI,58:FORJ=1TOT:NEXT:I=I+39:IFI<182
4THENI=1862:POKEI824,59
640 POKEI784,59:POKEI783,59
650 FORJ=1TOT:NEXT:POKEI-39,59:POKEI,58:RE
TURN
660 P=P+1:IFP=64THENP=61
670 D=D-1:T=T-.1
680 X=X+50:IFX>125THENX=25:D=8:T=10:C=5:F%
=5
690 IFX=75THENC=0:F%=0
700 IFX=125THENC=8:F%=7
710 GOTO30
720 POKES+4,17:POKES+5,132:POKES+6,132:POK
ES+24,6
721 H0=28:L0=49:POKES+1,H0:POKES,L0:FORZ=1
TO200:NEXT:GOSUB2000:RETURN
740 POKES+24,15:POKES+4,17:POKES+5,132:POK
ES+6,132
741 FORH1=21TO126:POKES+1,H1:LI=181:POKES,
L1:NEXT:GOSUB2000:RETURN
760 POKES+24,15:POKES+4,17:POKES+5,33:POKE
S+6,132:H2=233
765 H2=H2-5:POKES+1,H2:L2=181:POKES,L2
766 POKEI,58:POKEI-40,59:POKEI+54272,0:I=I
+40:IFI<1983THEN765
767 GOSUB2001
769 M=M-1:IFM=0THEN780:POKES+1,H2:L2=181:P
OKES,L2:NEXT:GOSUB2001
770 P=61:X=25:D=6:C=27:T=10:F%=5:POKEI,59:
GOTO30
780 POKE53272,21:PRINTCHR$(147);SPC(205);"
{09 RIGHT}GAME OVER!":PRINT
785 PRINT"{DOWN}{11 RIGHT}YOUR SCORE WAS";
SC
790 PRINT:PRINT"{DOWN}{13 RIGHT}PLAY AGAIN
?"
800 K=PEEK(197):IFK=60THEN800
810 IFK=25THENPRINT"{CLEAR}":RUN
820 IFK=39THENPRINT"{CLEAR}{10 DOWN}{08 RI
GHT}GOODBYE!!":FORW=1TO500:NEX
T:PRINT"{CLEAR}":END
825 GOTO800
830 IFINT(RND(1)*D)+1<>1THENRETURN
840 L=INT(RND(1)*39)+1:IFL=20ORL=1THEN840
850 POKEB+L,60:GOSUB720:RETURN
860 DATA255,129,66,66,36,36,24,255
870 DATA66,126,66,66,66,126,66,66
880 DATA12,8,13,62,44,12,18,33
890 DATA24,16,24,24,24,16,16,24
900 DATA24,8,24,24,24,8,8,24
910 DATA24,8,88,62,26,24,36,66

```

```

920 DATA0,0,0,0,0,0,0,0
930 DATA129,66,66,66,98,34,34,34
940 DATA27,10,27,17,27,0,0,0
950 DATA59,10,11,9,11,0,0,0
960 DATA91,74,91,81,91,0,0,0
970 POKE53272,(PEEK(53272)AND240)+12
971 POKE56334,PEEK(56334)AND254
972 POKEI,PEEK(1)AND251
973 FORI=0TO511:POKEI+12288,PEEK(I+53248):
NEXT
974 POKEI,PEEK(1)OR4
975 POKE56334,PEEK(56334)OR1
976 RESTORE:FORI=12288+53*8TO12288+64*8:RE
ADA:POKEI,A:NEXT
990 GOTO20
1000 FORI=1302TO1422STEP40:POKEI,54:NEXT:FO
RI=1425TO1625STEP40:POKEI,54:NEXT
1010 FORI=1702TO1862STEP40:POKEI,54:NEXT
1015 FORI=55574TO55694STEP40:POKEI,3:NEXT
1020 FORI=55697TO55897STEP40:POKEI,3:NEXT:F
ORI=55974TO56134STEP40:POKEI,3:NE
XT
1030 POKEI865,54:POKEI905,54:POKE56137,3:PO
KE56177,3:RETURN
2000 POKES+4,0:POKES+5,0:POKES+6,0:RETURN
2001 POKES+6,15:POKES+4,129:POKES+5,132:POK
ES+6,132
2002 H3=10:L3=143:POKES+1,H3:POKES,L3:FORT=
1TO1000:NEXT:GOSUB2000:RETURN
3000 PRINT"{CLEAR}{02 DOWN}TO GET POINTS, Y
OU MUST JUMP OVER HOLES SO THAT T
HE MAN IS AT ";
3002 PRINT"THE HIGHEST POSITION OVER ~
THE HOLE."
3010 PRINT"{02 DOWN}THE NUMBER OF POINTS IN
CREASES WITH THE NUMBER OF SCREEN
S COMPLETED
3020 PRINT"{02 DOWN}25 PTS PER HOLE (1ST SC
REEN)"
3025 PRINT"{02 DOWN}75 PTS PER HOLE (2ND SC
REEN)"
3030 PRINT"{02 DOWN}125 PTS PER HOLE (3RD S
CREEN)"
3040 PRINT"{03 DOWN}TO JUMP PRESS THE SPACE
BAR"
3050 PRINT"PRESS SPACE BAR TO CONTINUE"
3060 GR=PEEK(197):IFGR<>60THEN3060
3070 RETURN

```

## Program 4: TI-99/4A Version

```

100 REM TI JUMPING JACK
110 DIFF=1
120 RESTORE
130 RANDOMIZE
140 CALL CLEAR
150 GOSUB 1080
160 PRINT "LEVEL: ";DIFF
170 DIR=1
180 PR=0
190 FOR I=2 TO 22 STEP 4
200 CALL HCHAR(I,1,96,32)
210 IF I>20 THEN 270
220 R=INT(RND*26+4)+DIR
230 IF (SGN(R-PR)<>DIR)THEN 220
240 CALL VCHAR(I,R,104,4)
250 PR=R
260 DIR=-DIR
270 NEXT I
280 COL=2
290 ROW=1
300 CHAR=112
310 OLDCOL=1
320 OLDROW=1

```



```

330 OLDCHAR=32
340 DIR=1
350 CALL HCHAR(OLDROW,OLDCOL,32)
360 IF RND>DIFF/10 THEN 430
370 R=INT(4*RND)*4+6
380 C=INT(RND*32)+1
390 CALL GCHAR(R,C,A)
400 IF A=104 THEN 430
410 CALL HCHAR(R,C,120)
420 CALL SOUND(100,-1,4)
430 CALL HCHAR(ROW,COL,CHAR-2*(DIR<
0))
440 CALL SOUND(-5,-7,4)
450 IF ROW>20 THEN 990
460 OLDCOL=COL
470 OLDROW=ROW
480 COL=COL+DIR
490 IF (COL>0)*(COL<33) THEN 540
500 COL=COL-DIR
510 ROW=ROW+4
520 DIR=-DIR
530 GOTO 350
540 CALL GCHAR(ROW+1,COL,CHECK)
550 CALL KEY(0,K,ST)
560 IF ST THEN 640
570 IF CHECK=120 THEN 770
580 IF CHECK<>104 THEN 610
590 DIR=-DIR
600 ROW=ROW+4
610 CHAR=225-CHAR
620 SCORE=SCORE+.5
630 GOTO 350
640 IF CHECK<>120 THEN 1030
650 CALL HCHAR(OLDROW,OLDCOL,32)
660 CALL HCHAR(ROW-1,COL,112-2*(DIR
<0))
670 CALL SOUND(5,250,10)
680 CALL SOUND(5,200,10)
690 CALL SOUND(5,300,10)
700 CALL HCHAR(ROW-1,COL,128)
710 SCORE=SCORE+25
720 CALL SOUND(-500,500,1,510,10,52
0,20)
730 CALL SOUND(1,110,30)
740 CALL HCHAR(ROW-1,COL,32)
750 COL=COL+DIR
760 GOTO 490
770 CALL KEY(0,K,ST)
780 IF ST THEN 580
790 CALL HCHAR(OLDROW,OLDCOL,32)
800 CALL HCHAR(ROW,COL,116)
810 FOR I=1000 TO 1020
820 CALL SOUND(-1,I,0)
830 NEXT I
840 CALL HCHAR(ROW,COL,32)
850 CALL HCHAR(ROW+1,COL,121)
860 CALL SOUND(1000,-2,4,110,4)
870 CALL SOUND(1,110,1)
880 CALL CLEAR
890 CALL SCREEN(12)
900 PRINT "YOUR SCORE WAS: ";INT(SCO
RE)
910 PRINT "PLAY AGAIN? (Y/N) ";
920 CALL KEY(3,K,ST)
930 IF (K<>ASC("Y"))*(K<>ASC("N")) T
HEN 920
940 PRINT CHR$(K)
950 IF K=ASC("N") THEN 980
960 SCORE=0
970 GOTO 110
980 END
990 DIFF=DIFF+1
1000 SCORE=SCORE+50

```

```

1010 CALL CLEAR
1020 GOTO 160
1030 FOR I=150 TO 140 STEP -1
1040 CALL SOUND(-1,I,1)
1050 NEXT I
1060 SCORE=SCORE-25
1070 GOTO 580
1080 REM INITIALIZE GAME, CHARACT
ERS
1090 READ A
1100 IF A=-1 THEN 1250
1110 READ A$
1120 CALL CHAR(A,A$)
1130 GOTO 1090
1140 DATA 96,FF422418182442FF
1150 DATA 104,7E427E427E427E42
1160 DATA 112,1028302478B82442
1170 DATA 113,102830A27C782448
1180 DATA 114,102818483C3A4884
1190 DATA 115,1028184A3C3C4824
1200 DATA 116,001C5D2A1C1C1422
1210 DATA 120,81814222242400C3
1220 DATA 121,BDBD5A22242400C3
1230 DATA 128,0077147741770000
1240 DATA -1
1250 FOR I=9 TO 13
1260 READ A
1270 CALL COLOR(I,A,1)
1280 NEXT I
1290 DATA 6,4,14,10,12
1300 CALL SCREEN(16)
1310 RETURN

```

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# Atari's New Add-On Computer For VCS 2600 Game Machine

Tom R. Halfhill, Features Editor

*A new add-on keyboard unit from Atari will turn the world's most popular video game machine into a home computer – for under \$90.*

Atari's announcement of a plug-in computer keyboard for the VCS 2600 game machine adds yet another contender to the growing field of sub- \$100 home computers. But more than that, this may well be a move to capture the huge number of VCS owners who are considered prime candidates to buy a home computer.

Since 1977, when the VCS (Video Computer System) was first introduced, more than ten million have been sold – far more than any other game machine. That massive "installed base," as it's called by marketing people, represents a lucrative market for the new computer keyboard. What's more, by announcing the product so far in advance (the keyboard is not scheduled for delivery until September 1) perhaps Atari hopes that many of these ten million potential customers will put off buying a competing model in the meantime.

## My First Computer

So how will the new computer stack up against the competition? Atari's early specifications

indicate it will be a solid contender, unless new computers introduced this summer by competitors radically change the under- \$100 market.

Atari's official name for the keyboard unit is "My First Computer."

Expected to retail for under \$90, My First Computer clamps onto the VCS piggy-back-style, plugging into the game machine's cartridge slot. No other connections are needed.

The marriage is more or less permanent, since the VCS can still be used as a game machine by plugging cartridges into an expansion slot on the side of the computer.

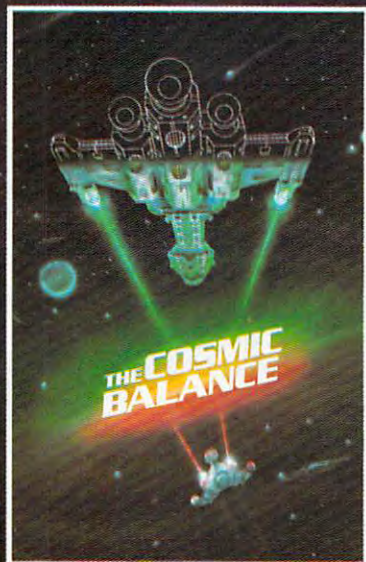
My First Computer's keyboard consists of 56 moving rubber keys, arranged typewriter-style (QWERTY). Although not quite a full-stroke typewriter keyboard, the partial-stroke rubber keys do have a better feel than the Atari 400's flat membrane keyboard. The rubber keys are very similar to those found on several other low-end home computers recently introduced (see "New Home Computers At The Winter Consumer Electronics Show," **COMPUTE!**, March 1983).

Standard features include 8K of Random Access Memory (RAM), expandable to 32K RAM; 16K of Read-Only Memory (ROM), which includes





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an 8K BASIC programming language; upper- and lowercase characters; a 16-color display, with eight luminances (shades) per color, for a total of 128 hues; screen format of 32 columns by 24 rows; maximum graphics resolution of 192 by 160 pixels (screen dots); two sound generators; a built-in interface for storing programs on any standard cassette recorder; and an expansion slot for plugging in game cartridges, memory expanders, and peripherals.

## Microsoft Strings

The new computer's Central Processing Unit – the microprocessor chip that is the central brain of a microcomputer – is the widely used 6502. This chip is also found in Atari's existing home computers, the 400, 800, and 1200XL, as well as in some competitors. However, My First Computer will not be software or hardware compatible with Atari's other computers. The 8K BASIC in the new computer will be a cross between the existing Atari BASIC and the more generally used Microsoft BASIC. The string-handling, for example, will conform more closely to Microsoft BASIC than Atari BASIC's nonstandard approach. Although design work on the BASIC and Operating System is not finished, one of Atari's goals is to include special statements for graphics and sound in the language, as found in Atari BASIC.

Since the existing Atari peripherals will not work with My First Computer, a new line of low-cost add-ons is being planned. This will include a printer and some type of fast mass storage device, either a minifloppy disk drive or some other alternative. Atari is not ruling out the possibility of a microfloppy disk drive or a stringy floppy wafer-tape drive, because it wants to keep the cost of the peripherals comparable to the cost of the computer. Atari's current disk drive for its 400/800/1200XL models retails for about \$500.

"We don't see a lot of rationale in offering a \$500 add-on for a base unit that will sell for under \$90," says Bill Simmeth, project manager for My First Computer. "Some other types of technologies look attractive to us."

## Graphics

Simmeth said it is still too early to say if My First Computer will have advanced graphics capabilities such as programmable characters and player/missile graphics (sprites). But he did say that it will have several graphics modes, that more than two voices will be possible through programming, and that the VCS's chips will be handling some graphics processing to relieve the 6502's workload. "It will be like a dual-processing system, similar to the [existing Atari] computers, although not exactly alike. People will not be buying just a toy. They're buying quite a nice, and a quite compar-

able, real computer."

Atari plans to introduce about 20 cartridges for My First Computer when it is delivered, including a new line of enhanced games and home application programs. Software may also be sold on cassettes.

Interestingly, Atari says it does not consider its main competition for the new computer to be the similar add-on keyboards for competing game machines, the \$150 Mattel Intellivision and \$170 Colecovision attachments. Instead, Atari is aiming its new model at home computers such as the \$99 Timex/Sinclair, the new \$99 Texas Instruments TI-99/2, and the Commodore VIC-20, which may drop below \$100 by the time My First Computer is ready. To complicate this low-end market still further, later this year Atari may introduce a keyboard attachment for its newer, more advanced game machine, the 5200. However, no details of this project are being released.

Atari also says My First Computer will not compete with its own Atari 400, which is selling for less than \$200. "My First Computer is the missing link between video games and computers," says Michelle Simpson, an Atari spokesperson. "We don't see it as competing with our own computers. We see them as different models, like the different models produced by a car company." ©

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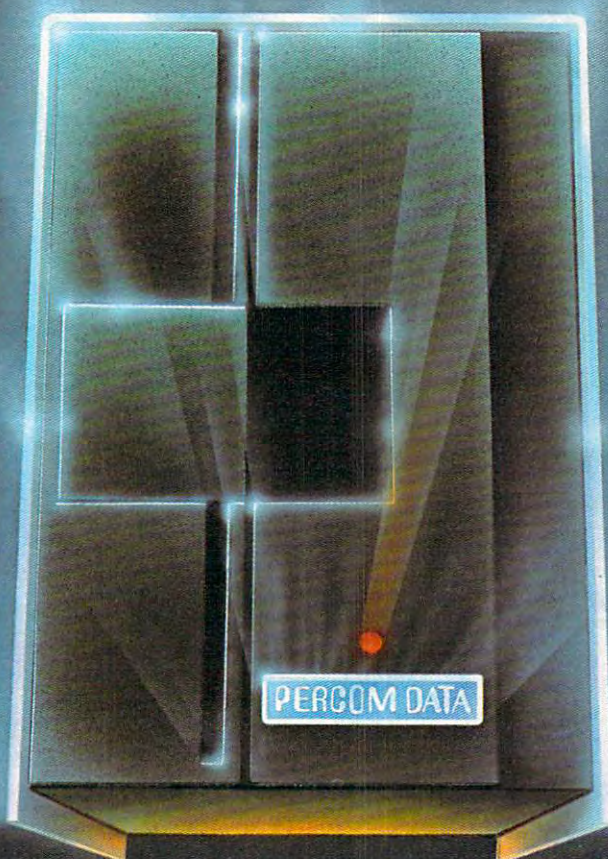
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# One On One

Chris York

*"One On One" is easy to learn, but not easy to master. Written originally for the Atari, it has been translated for VIC, 64, and Apple. The VIC and 64 versions include two skill levels and a suggestion for changing the object of the game.*

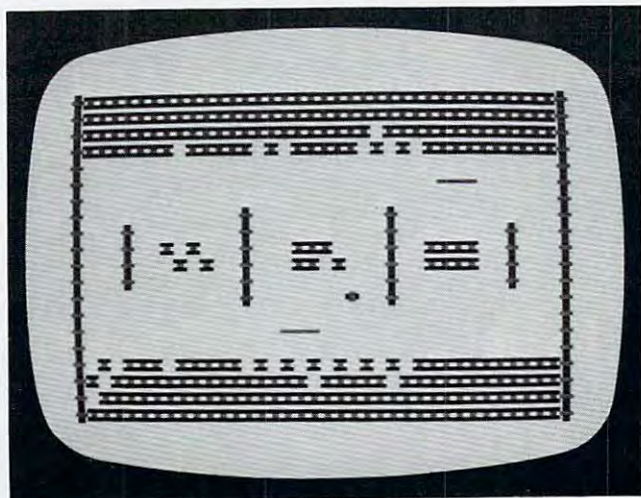
In "One On One," two players go head to head in an attempt to knock down the wall their opponent is protecting.

The Atari version can be played with joysticks, plugged into control ports one and two, or with paddles, plugged into port number one. In the game, player one tries to protect the wall at the top of the screen, and player two defends the wall at the bottom.

The player's paddle (horizontal line closest to the middle section of the screen) is used to intercept the ball before it hits his wall and destroys a section. When the ball hits either player's paddle, it bounces toward the opponent's wall. En route, the flight of the ball may be changed or impeded by barriers or additional sections of wall which serve to make the game faster and more exciting.

Eventually, one or both players will lose enough wall so that the ball can go through it. The first player to get the ball past his opponent's wall wins the game and receives an appropriate victory message.

One On One is easy to learn and challenging. You'll keep coming back to play it again and again.



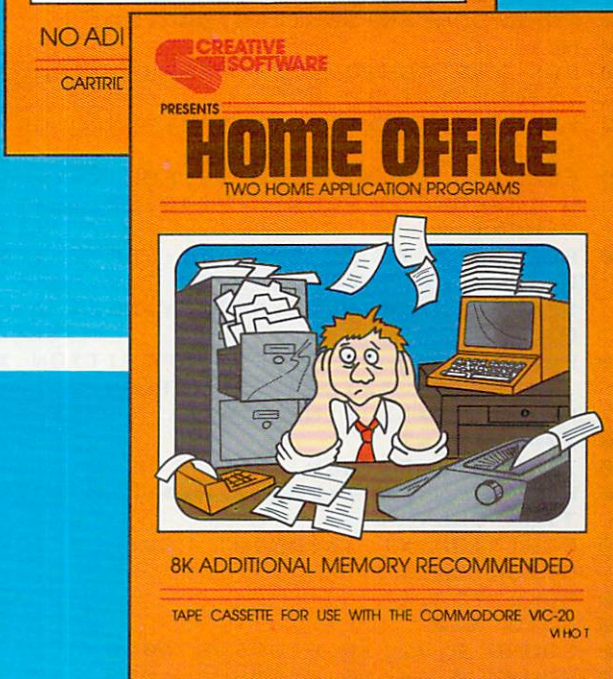
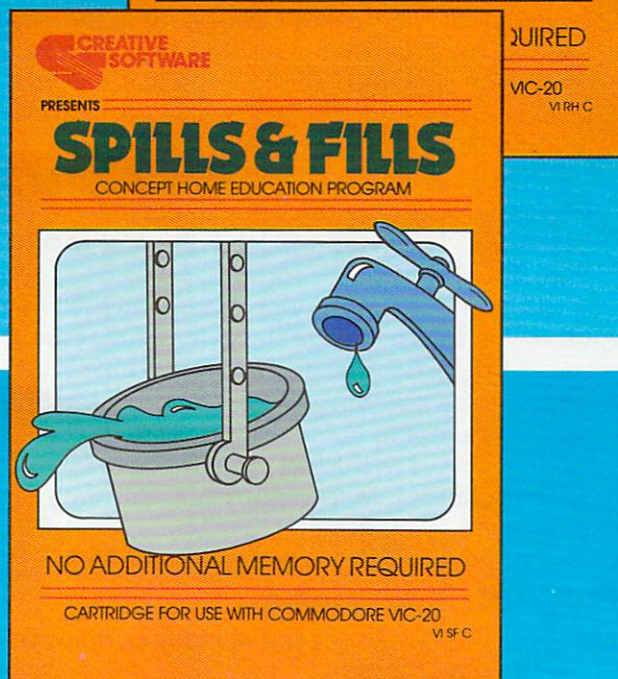
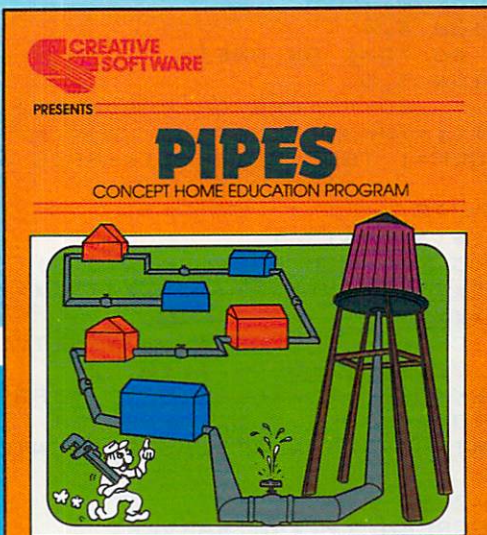
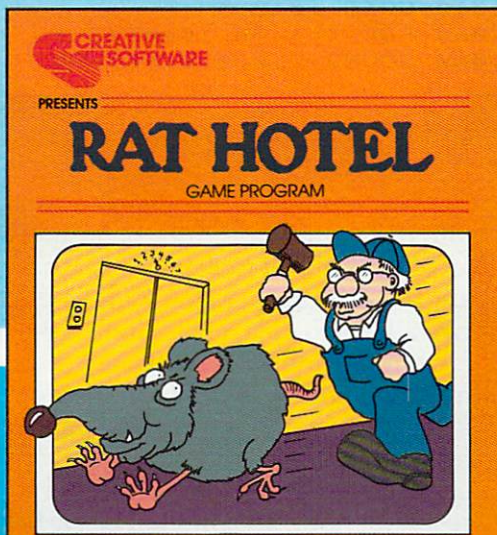
*A multicolored character mode is used to brighten up the screen in the Atari version of "One on One." (Other versions similar.)*

## Program 1: Atari Version

```
1000 SCREEN=PEEK(88)+256*PEEK(89):GOT
    O 580
1100 REM JOYSTICK SUBROUTINE
1200 XOLD0=X0
1300 IF STICK(0)=11 THEN X0=X0-3*SGN(
    X0-2)
1400 IF STICK(0)=7 THEN X0=X0+3*SGN(3
    5-X0)
1500 IF X0=XOLD0 THEN 170
1600 POSITION XOLD0,7:PRINT "
    (3 SPACES)"
1700 POSITION X0,7:PRINT P1$
1800 XOLD1=X1
1900 IF STICK(1)=11 THEN X1=X1-3*SGN(
    X1-2)
2000 IF STICK(1)=7 THEN X1=X1+3*SGN(3
    5-X1)
2100 IF X1=XOLD1 THEN 230
2200 POSITION XOLD1,16:PRINT "
    (3 SPACES)"
2300 POSITION X1,16:PRINT P1$
2400 RETURN
2500 REM PADDLE SUBROUTINE
2600 XOLD0=X0
2700 X0=35-INT(PADDLE(0)/6.75)
2800 IF X0=XOLD0 THEN 300
2900 POSITION XOLD0,7:PRINT "
    (3 SPACES)"
3000 POSITION X0,7:PRINT P1$
3100 XOLD1=X1
3200 X1=35-INT(PADDLE(1)/6.75)
3300 IF X1=XOLD1 THEN 350
3400 POSITION XOLD1,16:PRINT "
    (3 SPACES)"
3500 POSITION X1,16:PRINT P1$
3600 RETURN
3700 POSITION 6,0:PRINT "PRESS SPACEB
    AR TO START GAME"
3800 POKE 764,255
3900 IF PEEK(764)=33 THEN 410
4000 GOSUB BLINE:GOTO 390
4100 POSITION 6,0:FOR X=1 TO 32:PRINT
    " ";:NEXT X:POKE DL-1,4+64
4200 SOUND 0,50,10,8:FOR X=1 TO 75
4300 NEXT X:SOUND 0,0,0,0
4400 BX=INT(8*RND(1))+16:BY=9:DX=1:DY
    =1
4500 IF RND(0)<0.5 THEN DX=-1
4600 IF RND(0)<0.5 THEN DY=-1:BY=14
4700 POSITION BX,BY:PRINT " ";
4800 BX=BX+DX:BY=BY+DY:POSITION BX,BY
    :PRINT "{T}";:REM BALL(CNTL-T)
4900 IF L=88 AND OLDL=88 THEN 510
5000 IF L=88 THEN SOUND 0,50,10,10:FO
    R X=1 TO 15:NEXT X:SOUND 0,0,0,0
    :DY=-DY
5100 GOSUB BLINE:IF BY<2 OR BY>21 THE
    N 870
```



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```

520 OLDL=L
530 LOCATE BX+DX, BY+DY, L
540 IF L=32 THEN 470
550 IF L=19 THEN SOUND 0,100,10,10:F
OR X=1 TO 15:NEXT X:SOUND 0,0,0,
0:DX=-DX:GOTO 530
560 IF L=18 THEN SOUND 0,100,10,10:F
OR X=1 TO 15:NEXT X:SOUND 0,0,0,
0:DY=-DY
570 GOTO 470
580 GRAPHICS 2:SETCOLOR 2,0,0
590 SETCOLOR 0,7,10
600 POSITION 4,4
610 PRINT #6;"ONE ON ONE!"
620 POSITION 3,5
630 PRINT " JOYSTICKS OR PADDLES (1
OR 2)";:INPUT BLOCK
640 IF BLOCK=1 THEN BLINE=110:GOTO 6
60
650 BLINE=240
660 DIM P1$(3),A$(36)
670 P1$="{ 3 R}":REM PADDLE(CNTL-R)
680 A$="XXXXXXXXXXXXXXXXXXXXXXXXXXXX
XXXXXXXXXX"
690 GRAPHICS 0:SETCOLOR 4,0,12:SETCO
LOR 2,2,10:SETCOLOR 1,15,10
700 DL=PEEK(560)+256*PEEK(561)+4:FOR
I=2 TO 24:POKE DL+I,4:NEXT I
710 BARVERT=83:REM VERTICAL BAR(CNTL
-Y)
720 FOR I=2 TO 21
730 POKE SCREEN+1+I*40,BARVERT
740 POKE SCREEN+38+I*40,BARVERT
750 NEXT I
760 FOR Y=2 TO 18 STEP 16:POSITION 2
,Y:FOR X=1 TO 4
770 PRINT A$:NEXT X:NEXT Y:SETCOLOR
1,12,7
780 FOR X=5 TO 34 STEP 29:FOR Y=10 T
O 13:POKE SCREEN+X+Y*40,83:NEXT
Y:NEXT X
790 FOR X=14 TO 25 STEP 11:FOR Z=9 T
O 12 STEP 3:FOR Y=Z TO Z+2:POKE
SCREEN+X+Y*40,83:NEXT Y:NEXT Z:N
EXT X
800 FOR X=8 TO 28 STEP 10:POSITION X
,11:PRINT "XXXX";:POSITION X,12:
PRINT "XXXX";:NEXT X
810 X0=29:X1=2
820 IF BLOCK=2 THEN 370
830 POSITION X0,7:PRINT P1$:REM JOYS
TICK ONLY
840 POSITION X1,16:PRINT P1$:REM JOY
STICK ONLY
850 POKE 752,1
860 GOTO 370
870 SOUND 0,72,10,8:GOSUB 1050
880 SOUND 0,64,10,8:GOSUB 1050
890 SOUND 0,60,10,8:GOSUB 1050
900 SOUND 0,72,10,8:GOSUB 1050
910 SOUND 0,64,10,8:GOSUB 1050
920 SOUND 0,72,10,8:GOSUB 1050
930 WW=WW+1:IF WW<3 THEN 870
940 WW=0
950 POSITION BX,BY:PRINT " ";
960 POKE DL-1,2+64:POSITION 2,0
970 IF BY>21 THEN PRINT "!!!!!!VICTO
RY GOES TO PLAYER 1!!!!!!";
980 IF BY<2 THEN PRINT "!!!!!!VICTOR
Y GOES TO PLAYER 2!!!!!!";
990 FOR I=12 TO 13:POKE DL+I,2:NEXT
I

```

```

1000 POSITION 2,11:PRINT "TO PLAY AG
AIN, PRESS THE FIRE BUTTON":PRI
NT "ON EITHER JOYSTICK. PRESS Q
TO QUIT."
1010 IF STRIG(0)=0 OR STRIG(1)=0 THE
N 690
1020 IF PTRIG(0)=0 OR PTRIG(1)=0 THE
N 690
1030 IF PEEK(764)=47 THEN POKE 764,2
55:GRAPHICS 0:PRINT "TYPE <NEW>
TO ERASE PROGRAM.":END
1040 GOTO 1010
1050 FOR X=1 TO 10:NEXT X
1060 SOUND 0,0,0,0:RETURN

```

## VIC Version

The VIC version uses game paddles plugged into the control port. It has two skill levels. At level one, all ball movement is at a 45 degree angle with respect to the X and Y axis. Level two allows the players to double the horizontal increment of the ball by striking it with a moving paddle. The subroutine from lines 160 to 220 determines if the paddle has changed from its last position. If the paddle position changes just before the ball strikes it, then the resulting horizontal motion of the ball becomes twice as fast. The vertical increment of the ball, however, always stays the same. Either player can slow the ball to the usual diagonal motion by allowing the ball to strike a stationary paddle.

The wall that each player must defend is generated with random brick colors in lines 420 to 440. The game will look different each time it is played.

If you become truly proficient at One On One, you might change the game so that the object is to break through the wall *behind* your paddle. This speeds up the action considerably, as you attempt to maintain control of the ball. Giving control of the ball to your opponent, of course, allows him to destroy his wall and defeat you even sooner.

## Program 2: VIC Version

```

100 N1=1:N2=32:N3=81:N4=4:N5=248:N6=249:N7
=132:N8=352:N9=2
110 CL=37154:P5=37152:P4=37151:M1=0:M2=23:
M3=102:M4=220:M5=160:M6=15.93:G=1
8:M8=16
120 GOTO 340
130 L5=PEEK(SCREEN+X+(Y+DY)*C):IF L5=N5 OR
L5=N6 THEN DX=-DX:DY=-DY:RETURN
140 IF PEEK(SCREEN+X+DX+Y*C)=M3 THEN DX=-D
X:RETURN
150 DY=-DY:RETURN
160 IF DX=-2 THEN DX=-1
170 IF DX=2 THEN DX=1
180 IF Y+DY=M8 THEN 210
190 X0=G-INT(PEEK(P0)/M6):IF X0<>L0 THEN D
X=2*DX

```





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```

200 RETURN
210 X1=G-INT(PEEK(P1)/M6):IF X1<>L1 THEN D
  X=2*DX
220 RETURN
230 X0=G-INT(PEEK(P0)/M6):IF X0=L0 THEN RE
  TURN:REM PADDLE MOVEMENT
240 V=SCREEN+N7+L0:POKE V,N2:POKE V+A,N1
250 POKE V+N1,N2:POKE V+N1+A,N1
260 V=SCREEN+N7+X0:POKE V,N5:POKE V+A,N4
270 POKE V+N1,N5:POKE V+N1+A,N4:L0=X0:RETU
  RN
280 X1=G-INT(PEEK(P1)/M6):IF X1=L1 THEN RE
  TURN
290 V=SCREEN+N8+L1:POKE V,N2:POKE V+A,N1
300 POKE V+N1,N2:POKE V+A+N1,N1
310 V=SCREEN+N8+X1:POKE V,N6:POKE V+A,N4
320 POKE V+N1,N6:POKE V+N1+A,N4:L1=X1:RETU
  RN
330 POKE V1,15:POKES1,S5:FORI=1TO30:NEXT:P
  OKEV1,0:POKES1,0:RETURN
340 POKE 36879,31:PRINT" {CLEAR}"
350 PRINT" {08 DOWN} {05 RIGHT} ONE ON ONE!"
360 PRINT:PRINT:INPUT" {04 RIGHT} LEVEL 1 OR
  2";LV
370 SCREEN=256*PEEK(648):A=30720:X=RND(0)
380 IF PEEK(648)=16 THEN A=33792
390 V1=36878:S1=36876:P0=36872:P1=36873:C=
  22:X0=2:X1=18
400 DEFFNA(U)=SCREEN+X+C*Y:DEFFNC(U)=FNA(U
  )+A:DEFFNB(U)=INT(U*RND(1))+2
410 PRINT" {CLEAR}"
420 FOR Z=1TO18STEP 17
430 FOR Y=ZTO Z+3:FOR X=2 TO 19:POKE FNA(0
  ),160
440 POKE FNC(0),FNB(6):NEXT: NEXT: NEXT
450 FORZ=0TO20STEP20:FORX=ZTOZ+1:FORY=0TO2
  2:POKE FNA(0),102:POKE FNC(0),2
460 NEXT: NEXT: NEXT
470 FORZ=6TO13STEP7:FORX=ZTOZ+2:FORY=10TO1
  2:POKEFNA(0),102
480 POKE FNC(0),2: NEXT: NEXT: NEXT
490 GOSUB 260:GOSUB 310
500 PRINT" {UP} {02 RIGHT} PRESS {GRN}S{BLK}
  TO START";
510 GET A$:IF A$="S" THEN 530
520 GOSUB 230:GOSUB 280:GOTO 510
530 FOR I=1 TO 17:PRINT" {02 LEFT}";:FORJ=
  1 TO50:NEXT: NEXT
540 REM START GAME
550 X=11:Y=11:DX=1:DY=1
560 IF RND(1)<.5 THEN DX=-1
570 IF RND(1)<.5 THEN DY=-1
580 GOTO 660
590 POKE FNA(0),N2:POKE FNC(0),N1:L6=PEEK(
  SCREEN+X+DX/2+(DY+Y)*C)
600 IFABS(DX)=2ANDL6<>M3ANDL6<>N5ANDL6<>N6
  THEN 620
610 X=X+DX:Y=Y+DY:GOTO 630
620 X=X+DX/2:Y=Y+DY:POKEFNA(0),N2:POKEFNC(
  0),N1:X=X+DX/2
630 POKE FNA(0),N3:POKE FNC(0),N4:IF Y>4 A
  ND Y<18 THEN FL=0
640 IF(L=M5ANDOLDL=M5)OR(L=M5ANDFL=1)THEN ~
  S5=M5:GOSUB 330:GOTO 660
650 IF L=M5 THEN S5=M5:GOSUB 330:DY=-DY:IF
  Y<5ORY>17 THEN FL=1
660 GOSUB 230:GOSUB 280:IF Y=M1 OR Y=M2 TH
  EN 740
670 OLDL=L
680 L=PEEK(SCREEN+X+DX+(Y+DY)*C)
690 IF L=N2 THEN 590
700 IFL=M3THEN S5=M4:GOSUB330:GOSUB 130:GO
  TO 680
710 IFL=N5ORL=N6)ANDLV=1THEN S5=M4:GOSUB ~
  330:DY=-DY
720 IFL=N5ORL=N6)ANDLV=2THEN S5=M4:GOSUB ~
  330:GOSUB 160:DY=-DY:GOTO 680
730 GOTO 590
740 IF Y=M2 THEN PRINT" {HOME} {02 RIGHT} !!P
  LAYER 1 WINS!!!"
750 IF Y=M1 THEN PRINT" {HOME} {02 RIGHT} !!P
  LAYER 2 WINS!!!"
760 GOSUB 830
770 PRINT" {12 DOWN} {RIGHT} PRESS FIRE BUTTO
  N TO":PRINT" {RIGHT} PLAY AGAIN,{GR
  GRN}Q{BLK} TO QUIT"
780 POKE CL,127:P=PEEK(P5)AND128
790 FR=-(P=0):POKE CL,255:P=PEEK(P4):FL=-(
  (PAND16)=0)
800 IF FL=1 OR FR=1 THEN 340
810 GET A$:IF A$<>"Q" THEN 780
820 PRINT" {CLEAR}":END
830 POKEV1,15:FORI=230TO252STEP2:POKE36875
  ,I:FORJ=1TO50:NEXT: NEXT
840 POKE 36875,0:POKE V1,0:RETURN

```

## CBM-64 Version

The Commodore 64 version of One On One is designed to be played using two joysticks. Since barriers are placed in symmetrical positions in the central portion of the screen, the ball may rebound four or five times before reaching an opponent. This provides for a more challenging defensive strategy and a faster moving game. If you would like to adapt this program for use with paddles, substitute these lines:

```

11 AL=(36-(INT(F2/8.5)+3))
  THEN 17
19 F2=PEEK(54297):GOTO10
51 AR=(36-(INT(F1/8.5)+3))
  THEN 57
59 F1=PEEK(54298):GOTO 50

```

## Program 3: CBM-64 Version

```

0 REM:ONE ON ONE FOR CBM-64
1 POKE646,1
2 PRINT" {REV} {CLEAR} {11 RIGHT} {10 DOWN} ~
  ONE ON ONE!!!"
3 PRINT" {REV} {17 LEFT} {03 DOWN} PRESS SPA
  CE TO PLAY {OFF}";
4 POKE53281,0:IFPEEK(197)<>60THEN4
5 GOTO100
9 AL=15:GOTO19
10 ODDAL=AL
11 AL=AL+F2:IFAL=ODDALTHEN17
12 IFAL<4 THENAL=3
13 POKEG+ODDAL,32:POKEG+ODDAL+1,32:POKEG+
  ODDAL+2,32:POKEG+ODDAL+3,32
14 IFAL>=33THENAL=33
15 POKEG+AL,120:POKEG+AL+1,120:POKEG+AL+2
  ,120:POKEG+AL+3,120
16 POKEG+AL+D,7:POKEG+AL+D+1,7:POKEG+AL+2
  +D,7:POKEG+AL+3+D,7
17 RETURN

```



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```

19 ON( (PEEK(56321)AND12)/4)GOTO20,30,40:
20 F2=3:GOTO10
30 F2=-3:GOTO10
40 F2=0:GOTO10
49 GOTO59
50 ODDAR=AR
51 AR=AR+F1
52 IFAR<4 THENAR=3
53 POKEF+ODDAR,32:POKEF+ODDAR+1,32:POKEF+
   ODDAR+2,32:POKEF+ODDAR+3,32
54 IFAR>=33THENAR=33
55 POKEF+AR,121:POKEF+AR+1,121:POKEF+AR+2
   ,121:POKEF+AR+3,121
56 POKEF+AR+D,7:POKEF+AR+D+1,7:POKEF+AR+2
   +D,7:POKEF+AR+3+D,7
57 RETURN
59 ON( (PEEK(56320)AND12)/4)GOTO60,70,80:
60 F1=3:GOTO50
70 F1=-3:GOTO50
80 F1=0:GOTO50
100 B=1026:E=1060:D=54272:POKE53281,1:POKE
   53280,1:PRINT" {CLEAR} ";:C=1226:F=
   1260
102 F=1024+40*6:SCR=1024:G=1024+40*14
110 FORL=1TO4:B=B+40:E=E+40
120 FORI=BTOE:POKEI,160:POKEI+D,(8*RND(1))
   +2:NEXT
130 NEXT:IF Z=1THEN150
140 B=1626:E=1660:Z=1:GOTO110
150 FORS=1024TO1877STEP40:POKES,127:POKES+
   37,127:POKES+D,0:POKES+37+D,0:NEX
   T
151 FORS=1025TO1877STEP40:POKES,127:POKES+
   37,127:POKES+D,0:POKES+37+D,0:NEX
   T
160 REM SCREEN & BACKGROUND
165 FORC=1TO30STEP4:POKE1428+C,90:POKE1428
   +C+D,0:NEXT
171 POKEG+15,120:POKEG+15+1,120:POKEG+15+2
   ,120:POKEG+15+3,120
172 POKEG+15+D,7:POKEG+15+D+1,7:POKEG+15+2
   +D,7:POKEG+15+3+D,7
173 POKEF+15,121:POKEF+15+1,121:POKEF+15+2
   ,121:POKEF+15+3,121
174 POKEF+15+D,7:POKEF+15+D+1,7:POKEF+15+2
   +D,7:POKEF+15+3+D,7
180 Y=11:DX=1:DY=1:X=11
190 IFRND(1)<.5THENDX=-1
200 IFRND(1)<.5THENDY=-1
201 AR=15:AL=15
208 POKE1024+X+40*Y,32:POKE1024+X+40*Y+D,0
209 X=X+DX:Y=Y+DY:POKE1024+X+40*Y,81:POKE1
   024+X+40*Y+D,8
235 IFL=160ANDOLDL=160THEN245
237 IFL=160THENDY=-DY:GOSUB500
245 GOSUB49:GOSUB19:IFY=0ORY=23THEN990
250 OLDL=L
260 L=PEEK(SCR+X+DX+(Y+DY)*40)
270 IFL=32THEN208
280 IFL=127THENDX=-DX:GOSUB500:GOTO260
290 IFL=121ORL=120ORL=90THENDY=-DY:GOSUB50
   0
300 GOTO208
500 S=54272:FORQ=STOS+24:POKEQ,0:NEXT:POKE
   S+5,88:POKES+24,15:POKES+1,10
510 POKES,143:FORRD=1TO50:NEXT:RETURN
990 POKE646,0
1000 IFY<1THENPRINT" {12 RIGHT} {09 DOWN} {
   REV}PLAYER 1 WINS!! {OFF} ":GOTO250
   0
1010 FORA=1TO30:GETA$:NEXT

```

```

2000 IFY>22THENPRINT" {11 RIGHT} {09 DOWN} {
   REV}PLAYER 2 WINS!! {OFF} ":GOTO250
   0
2010 FORA=1TO30:GETA$:NEXT
2500 PRINT" {10 RIGHT} {12 DOWN} {REV}PLAY AGA
   IN? Y OR N {OFF} "
2510 IFPEEK(197)=25THEN2515
2511 IFPEEK(197)=39THEN2520
2512 GOTO2510
2515 IFPEEK(197)=25THENPOKE646,1:RUN
2520 END

```

## Apple Version

On the Apple, One On One is played with the paddles and has two skill levels. At level one, all ball movement is strictly 45 degrees with respect to the X and Y axis. After a short period of play, you'll probably be ready to move on to level two, where the ball angle can be altered.

At level two, the flight of the ball can be changed from the usual diagonal motion by moving the paddle just prior to the moment the ball strikes it. If this is successfully accomplished (as detected in lines 18 to 28), the X increment of the ball is doubled so that the ball moves twice as fast horizontally. Vertical ball movement, on the other hand, remains the same. In order to return to normal ball motion, the ball must strike a stationary paddle.

An especially pleasing feature of the Apple version is the random choice of wall colors each time a new game is played. This is carried out in the short subroutine at line 30.

A different sort of game can be played if you try to break through the wall behind you rather than defend it. The player who maintains control of the ball longer will ultimately break through his wall more quickly.

## Program 4: Apple Version

```

10 GOSUB 2000: GOTO 50
12 IF SCRN( X,Y + DY) = 1 THEN DX = -
   DX:DY = - DY: RETURN
13 IF SCRN( X + DX,Y) = 15 THEN DX =
   - DX: RETURN
14 DY = - DY: RETURN
18 IF DX = - 2 THEN DX = - 1
19 IF DX = 2 THEN DX = 1
22 IF Y + DY = R1 THEN 26
23 X0 = INT ( PDL (0) / M6) + 2: IF X0
   < > L0 THEN DX = 2 * DX
25 RETURN
26 X1 = INT ( PDL (1) / M6) + 2: IF X1
   < > L1 THEN DX = DX * 2
28 RETURN
30 D = INT ( RND (1) * 13) + 2: IF D =
   DL OR D = 13 THEN 30
40 RETURN
50 M6 = 7.73:X0 = 2:X1 = 34:R0 = 7:R1 = 32

```



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```

110 GOTO 1000
112 REM PADDLE 0 SUBROUTINE
115 X0 = INT ( PDL (0) / M6) + 2: IF X
    0 = L0 THEN RETURN
120 COLOR= 0: HLINE L0,L0 + 3 AT R0
130 COLOR= 1: HLINE X0,X0 + 3 AT R0
140 L0 = X0: RETURN
145 REM PADDLE 1 SUBROUTINE
150 X1 = INT ( PDL (1) / M6) + 2: IF X
    1 = L1 THEN RETURN
155 COLOR= 0: HLINE L1,L1 + 3 AT R1
160 COLOR= 1: HLINE X1,X1 + 3 AT R1
170 L1 = X1: RETURN
250 FOR I = 1 TO 5: A = PEEK ( - 16336
    ): NEXT I: RETURN
260 RETURN
280 POKE 768,1: POKE 769,10: CALL 770:
    RETURN
1000 TEXT : HOME : VTAB 11: HTAB 10:
    FLASH : PRINT "O N E O N O N E
    !": NORMAL
1010 VTAB 17: PRINT SPC( 13);"LEVEL 1
    OR 2 ";: INPUT LV: IF LV > 2 OR L
    V < 1 THEN 1010
1020 HOME : GR : PRINT : PRINT : PRINT
    : PRINT : FOR Z = 1 TO 35 STEP 34:
    FOR Y = Z TO Z + 3
1030 GOSUB 30
1035 COLOR= D:DL = D
1040 HLINE 2,37 AT Y: NEXT Y: NEXT Z
1043 FOR Z = 8 TO 28 STEP 10: FOR Y =
    19 TO 21: GOSUB 30: COLOR= D:DL =
    D
1045 HLINE Z,Z + 4 AT Y: NEXT Y: NEXT Z
    : COLOR= 15
1048 FOR I = 0 TO 38 STEP 38: VLINE 1,3
    8 AT I: VLINE 1,38 AT I + 1: NEXT I
    : IF LV = 1 THEN 1056
1049 FOR I = 7 TO 32 STEP 25: VLINE 17,
    23 AT I: VLINE 17,23 AT I + 1: NEXT
    I
1050 FOR X = 13 TO 26 STEP 13: FOR Y =
    11 TO 23 STEP 12: VLINE Y,Y + 5 AT
    X: VLINE Y,Y + 5 AT X + 1: NEXT Y:
    NEXT X: GOTO 1059
1056 FOR I = 5 TO 35 STEP 30: VLINE 17,
    23 AT I: NEXT I
1057 FOR X = 14 TO 26 STEP 12: FOR Y =
    11 TO 24 STEP 13: VLINE Y,Y + 5 AT
    X: NEXT Y: NEXT X
1059 COLOR= 1: GOSUB 130: GOSUB 160
1060 PRINT SPC( 8);"PRESS THE FIRE BU
    TTON ON": PRINT SPC( 4);"PADDLE 0
    OR 1 TO START THE GAME"
1070 P0 = PEEK ( - 16287):P1 = PEEK (
    - 16286): IF P0 > 127 OR P1 > 127
    THEN 1090
1080 GOSUB 115: GOSUB 150: GOTO 1070
1090 PRINT : PRINT : PRINT : PRINT : REM
    CLEAR TEXT WINDOW
1100 REM GAME ROUTINE
1110 X = INT ( RND (1) * 9) + 17:Y = 2
    3:DX = 1:DY = 1
1120 IF RND (1) < .5 THEN DX = - 1
1130 IF RND (1) < .5 THEN DY = - 1:Y
    = 17
1135 GOTO 1180
1140 COLOR= 0: PLOT X,Y: IF ABS (DX) =
    2 AND ( SCRN( X + DX / 2,Y + DY) <
    > 15 AND SCRN( X + DX / 2,Y + DY
    ) < > 1) THEN PLOT X + DX / 2,Y +
    DY
1150 X = X + DX:Y = Y + DY: COLOR= 13: PLOT
    X,Y: IF Y > 4 AND Y < 35 THEN FL =
    0
1160 IF (L < 15 AND L > 1 AND OLDL < 1
    5 AND OLDL > 1) OR (L < 15 AND L >
    1 AND FL = 1) THEN GOSUB 250: GOTO
    1180
1170 IF L < 15 AND L > 1 THEN GOSUB 2
    50:DY = - DY: IF Y < 5 OR Y > 34 THEN
    FL = 1
1180 GOSUB 115: GOSUB 150: IF Y = 0 OR
    Y = 39 THEN 1250
1190 OLDL = L
1200 L = SCRN( X + DX,Y + DY)
1210 IF L = 0 THEN 1140
1220 IF L = 15 THEN GOSUB 280: GOSUB
    12: GOTO 1200
1230 IF L = 1 AND LV = 1 THEN GOSUB 2
    80:DY = - DY
1235 IF L = 1 AND LV = 2 THEN GOSUB 2
    80: GOSUB 18:DY = - DY: GOTO 1200
1240 GOTO 1140
1250 REM WINNER
1270 IF Y = 39 THEN PRINT SPC( 5);"!
    !!VICTORY GOES TO PLAYER 1!!!"
1280 IF Y = 0 THEN PRINT SPC( 5);"!
    !!VICTORY GOES TO PLAYER 2!!!"
1290 FOR I = 1 TO 1000: NEXT I
1300 PRINT : PRINT SPC( 5);"PRESS A P
    ADDLE BUTTON TO PLAY": PRINT SPC(
    5);"AGAIN, Q TO QUIT":
1310 POKE - 16368,0:P0 = PEEK ( - 16
    287):P1 = PEEK ( - 16286): IF P0 >
    127 OR P1 > 127 THEN 1000
1320 IF PEEK ( - 16384) = ASC ("Q") +
    128 THEN 1400
1330 GOTO 1310
1400 POKE - 16368,0: TEXT : HOME : END
2000 REM SOUND ROUTINE
2010 FOR I = 770 TO 795: READ M: POKE
    I,M: NEXT
2020 DATA 172,01,03,174,01,03,169,04,
    32,168,252,173,48,192,232,208,253,
    136,208,239,206,0,03,208,231,96
2030 RETURN

```

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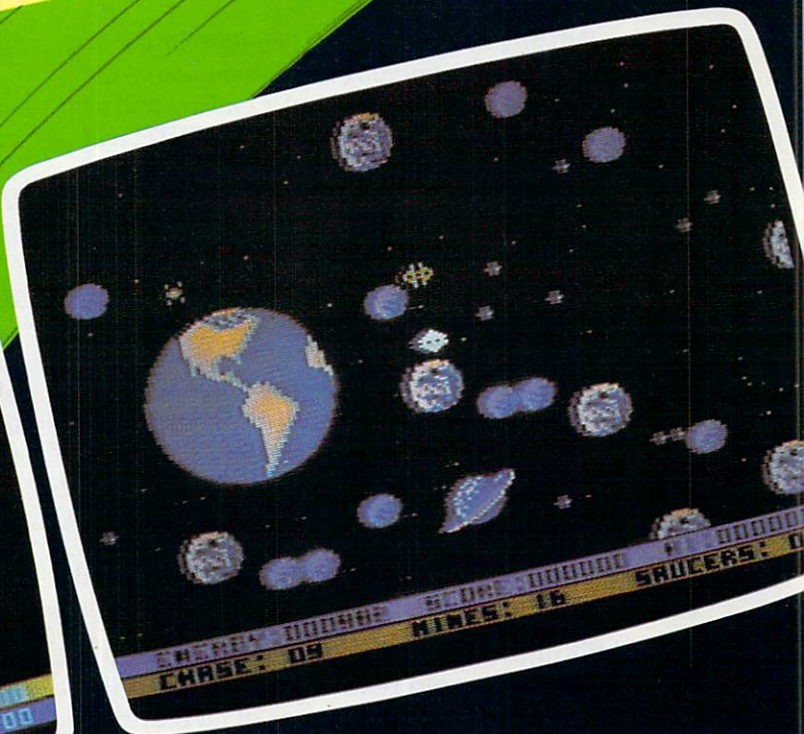
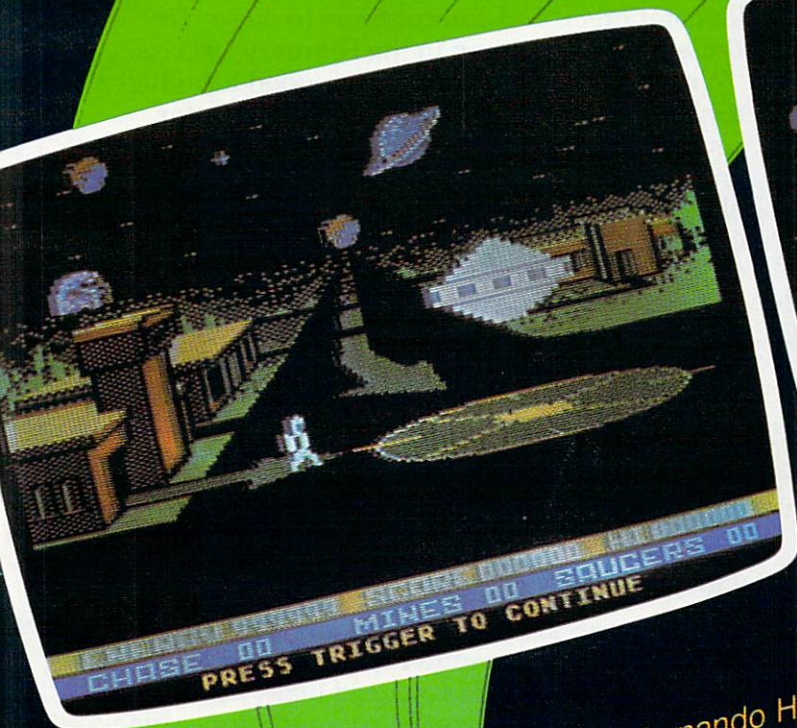
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# Questions Beginners Ask

Tom R. Halfhill, Features Editor

*Are you thinking about buying a computer for the first time, but don't know anything about computers? Or maybe you just purchased a computer and are still a bit baffled. Each month in this column, **COMPUTE!** will tackle some of the most common questions that we are asked by beginners.*

**Q** I own an Atari 400 computer and 410 recorder, and I'm very interested in programming. Lately I've been experimenting with the different graphics modes. I can draw pictures on the screen, but I don't understand how to move them around with the game controllers (joysticks, paddles, and keyboard). What command makes the joystick move the picture? If you could just explain how to use the game controllers, I would be very grateful.

**A** Although this particular question comes from a 14-year-old reader with an Atari, it is a common one asked by new users of all brands of computers. How can I animate objects on the screen with the game controllers? Unfortunately, there is no simple answer.

First, it's important to understand that *the game controllers by themselves do nothing to animate objects on the screen*. Animation is up to your program. All that a game controller does is change a number in a memory location somewhere inside the computer. That number indicates the status of the controller, such as which way a joystick is deflected, or how far a paddle knob is turned, or which key is pressed on a keyboard.

Except for returning this number, a game controller does absolutely nothing else in the way of animation. A program reads this number, uses it to figure out what action the user desires, and then responds accordingly, thereby achieving animation. This is not an easy task for beginning programmers. Many beginners are dismayed when they discover that animation is far more difficult than just plugging in a joystick and typing in a command or two that will move their pictures around.

That's why most home computer manuals and instruction books barely cover the subject. You must be on solid ground with the fundamentals of programming before attempting something

like animation.

To learn these more advanced techniques, you'll have to read many computer magazines and books. **COMPUTE!** has published numerous articles on animation for the Atari and other popular computers, and will continue to do so. *The Beginner's Page* column in the February 1983 issue, "Writing An Arcade Game," is a good introductory article. It includes example programs for several computers to demonstrate one method of animation: repeatedly drawing and erasing an object in screen memory. Other good sources are *COMPUTE!'s First Book Of Atari Graphics* and *COMPUTE!'s First Book Of VIC*.

**Q** I'm shopping around for my first home computer, and I see many ads in magazines and newspapers for low-priced computers. But when I visit the store, it seems like the sales people always try to sell me on numerous accessories and other things that end up costing more than the computer. How many accessories do I really need to get started? Isn't the computer itself enough?

**A** Chances are you will end up buying more than just the computer to get started. But how many accessories you need really depends on what you plan to use the computer for – something that should be foremost in your mind as you shop.

A computer by itself is more useful than a stereo receiver without speakers, a turntable, a tape deck, and records. But there is an analogy here. To make a computer really useful you need *software*, programs to make it run. Among the most popular uses for home computers are entertainment and education. This means you'll need game programs, educational programs, and so on. You can write programs yourself, copy them from **COMPUTE!**, or buy commercial software. But whatever you do, you'll at least need a tape player.

You'll need some way to load the programs into the computer. Some programs are built into plug-in cartridges which require no additional equipment. But most programs come on cassette tapes or disks. Loading a disk requires a disk drive, which costs \$350 to \$600. That's why most people start out with cassettes, which are far less expen-



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sive. A few computers – the Timex/Sinclair T/S 1000, for instance – work with an ordinary portable cassette recorder, which you may already own. Others require a special cassette recorder, which can cost \$65 to \$90.

Most people end up buying a starter system that includes the computer, a tape recorder, a few programs on cartridges or cassettes, and often some game controllers (joysticks or paddles). It's a good idea to hold off on buying additional equipment until you're better able to tell what you'll need. Later, you can add a printer, disk drive, additional memory, telephone modem, or other accessories as you want them. ©

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# COMPUTERS AND COMPOSITION

Joan Vesper

*As people in schools, businesses, and homes receive more and more papers and letters written by computer rather than by typewriter or pen, they may feel that the cursor has passed them by and that writing as they know it has irretrievably changed. Students in particular will notice the perfectly-formatted papers that a few of their classmates are turning in. Here are the pros and cons of word processing as reflected in an informal survey at three colleges.*

Last year, on an extended visit to Boston (Silicon Valley East), I counted myself among computer greenhorns, and I wondered what it takes to write "on-line," and if it's worth the effort. To find out the answers, I visited three Boston-area colleges (Babson, Harvard, and Massachusetts Institute of Technology) and talked with students and staff who regularly compose at terminals. In addition to interviewing computer-users at the colleges, I interviewed David Winder, assistant overseas news editor of *The Christian Science Monitor*, who has two years' full-time experience writing and editing on-line. Most of the interviews took place at campus terminal centers – large rooms equipped with several keyboards and matching screens where students drop in to use a terminal much as they might rent a typewriter. One Babson student, Linda Bailey, was interviewed in her office at Intelligent Devices, Inc., a computer-related company she and her husband started in 1979.

As these people talked about using computers to write, it became clear that:

1. Most do not use a computer during the *prewriting stage*.
2. Some do, but some do not, use it during the *writing stage*, depending on individual composing habits and on cost and availability of computers.
3. Almost all prefer to use a computer for *revising* and making final drafts.

Their reflections on using the computer at each of these stages help clarify what computers can and cannot do for writers.

## Prewriting

None of the computer-users interviewed employs a terminal for jotting down notes days before he or she writes the first draft of a paper. (A special case is Jayne West, consultant and programmer analyst at MIT, who also writes stream-of-consciousness poetry on the computer.) However, some use the computer for data analysis at this early stage. For example, David Meltzer, an English major at Harvard, used the computer before writing a term paper on Byron's *Don Juan* by counting the ratio of Byron's use of the personal pronoun "I" to the poet's use of the proper noun "Don Juan." Because of the preponderance of the word "I," Meltzer concluded that the poem is highly autobiographical.

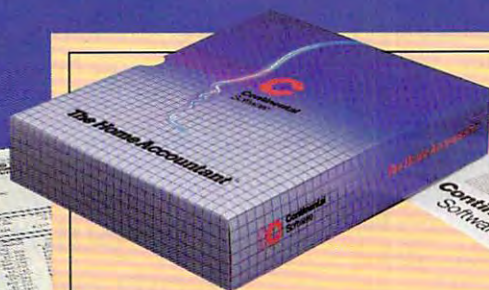
## Writing

"It's just as hard to sit down to compose in front of a blank screen as a blank sheet of paper," Meltzer observes. For this and other reasons, only the most enthusiastic computer users in this survey, a group of undergraduates on MIT's Student Information Processing Board (SIPB) who guide other MIT students in the use of MIT's terminals, use computers to write out first drafts of papers. Steeped in technology and having free access to state-of-the-art equipment, SIPB "hackers" (computer enthusiasts) compose at a terminal by preference.

But most of those interviewed do not turn to the computer to write a draft until after they have gone through the "diagramming and scratching-out phase." Others postpone their approach to the computer even longer. Whether or not writers compose on paper or at the terminal at this stage in the writing process involves two considerations: individual writing habits and computer availability. The habits include what hardware these people have used in the past for composing, how fast they think while writing, and how much disorder they can tolerate. Regarding hardware, users say either they have always composed at a keyboard – typewriter or terminal – or they have always composed with pencil or pen.



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## It sells the most, because it does the most!



In the first group is Bill York, an MIT undergraduate, who says he composed on a typewriter until he was a freshman at MIT, but has since written everything on the computer. "I never use a typewriter unless nothing else is available, like when I go home for vacations," he says. Jeff Schiller, another MIT undergraduate, concurs: "I was always a composer at the typewriter, so the transition to computer was easy." As members of the SIPB, both students meet many computer-users who compose with pencil or pen. "They did in the past, and they still do," they observe.

In this category of yellow-pad composers is Mary Phelan, a text processor at Harvard, who uses the computer only for final drafts. "I hand-write my drafts first," she says. "It's the way I've always done it." She explains that for her, "There's something about being able to touch the paper that makes me feel more in touch with what I'm writing. And I like to carry around what I've written. You can't very well put a terminal in your pocket and look at it on the subway." Another writer, Fred Pickel, who characterizes himself as a "cut-and-paste artist," puts off working at a terminal until later in the composing process because he likes to have all his work spread out around him where he can see it. "The computer limits your vision to one page at a time," he points out.

Another personal reason for using a computer during the writing stage is offered by Winder, who finds that the computer, unlike a typewriter or a pen, can keep up with his thoughts.

Tolerance for disorder is a final factor of personal composing style that enters into decisions about using the computer for early drafts. Some of those interviewed are discouraged by piles of papers with mistakes, cross-outs, and arrows. One touch of a computer's "Delete" key and such impediments vanish.

Bailey, the Babson student-entrepreneur, says, "I used to get very confused by all the ideas going through my mind. I'd write them all down in a series of drafts, and then I got confused seeing too many ideas written down. But with a computer, I keep typing at the keyboard, not making corrections, thinking of the next sentence and not worrying if I've said it correctly, knowing I can go back and remove any sentence without making a sloppy mess of the paper." Meltzer is also affected by the appearance of what he writes: "It used to be that when I wrote a sentence three times I had a mess. The computer eliminates such eyesores."

There is also the cost and availability factor. This is easy for the non-user to overlook, but it is very important in practice. Fortunate in this regard are computer owners, such as Bailey, who has four terminals in her company office. Students at colleges which supply free computer accounts for

both computer-related courses *and* independent projects, such as writing assignments, are also lucky. Students who have to pay out-of-pocket for computer time are sometimes cut off from a desirable tool. "My budget isn't big enough to use the terminal for anything but final drafts," says Pickel, an MIT doctoral student. As more and more people become sophisticated in the use

---

## **Computers free writers from retyping correct sections of the paper and allow them to concentrate on rewriting incorrect ones.**

---

of computers and want to use them for independent work, administrators of college computing services foresee more fees and/or more restrictions on use of college equipment.

Besides cost, location of terminals is another consideration. As mentioned, some people write drafts in longhand because they do not have computers at home. Others avoid computers when writing drafts because they can't concentrate in a terminal center. These rooms may be filled with 50 machines and more than 50 people, especially during rush times – such as the day before a big paper is due, the late afternoon hours when evening students arrive on campus and day students haven't yet gone home, and the end of the term. At Harvard's Science Center, the terminal room "gets very noisy and it's hard to think," math majors Bruce Molay and Jeff Tecosky point out. Hilary Hodgson, working on her M.A. in city and regional planning, adds that Harvard students sometimes have to sign up 24-hours ahead for a terminal. Of course, even alone in a quiet room with a terminal all to oneself, a writer may face interruptions in the form of messages from other users flashing across the screen. This is the situation at SIPB, whose members belong to associations of users who keep each other posted via the display screen on subjects of mutual interest.

In every case, users agree that the day a person plans to write a paper is *not* the day he should learn how to operate the computer. Most problems occur in simply getting the paper into the machine. After that, the computer is generally an advantage



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– unless the main computer is “down” (its memory is filled to capacity or it is being repaired), or you can’t get a printer.

## Revising

After the writer has a first draft, most agree that a computer is preferable (with a few minor drawbacks) to typewriter or pen for the rest of the composing process.

First, drawbacks. On a short paper, the effort of getting into the machine – logging on and creating a file with a list of specifications for formatting – isn’t worth it, even with the revision capabilities of the computer, according to two Babson users. Also, the time lag between keyboarding a revision and seeing it on screen – sometimes as long as 30 seconds – is frustrating, says Schiller. The lag, he explains, is due to time sharing, or, as he jokes, “ITS” – incompatible time sharing – where as many as 73 users may be plugged into the same computer. “There’s a lot of competition for the attention of the machine,” Pickel explains.

Another problem, when editing by computer is the time it takes for the cursor, or pointer, to move to the characters on the screen that the user wants to change. “My eye and a red pencil can move faster,” says Winder. He adds that seeing only a screen’s length of a story (120-150 words) instead of the entire work is a handicap when he wants to move around chunks of copy, and particularly when he is searching for a lead that may be buried deep in the story. Another drawback occurs when a professor specifies the type of paper he wants students to use in an assignment, such as bond with a certain rag content. To remove from the computer standard paper with tractor edges and feed in special paper is expensive and time consuming.

*[Editor’s Note: Mercifully, these delays and frustrations do not apply to word processing on personal computers.]*

In spite of these drawbacks, most users agree that computers make their greatest contribution during the revising stage: they free the writer from retyping correct sections of a paper and allow him or her to concentrate on rewriting incorrect ones. “After you learn how to use the computer – and there is a learning curve – it takes about one-third the time to edit as it would by typewriter, because with a computer, you retype only the things you want to change,” Schiller observes. But he cautions that the computer is a “two-edged sword” in this respect. While it allows a better final product, it also creates demand for a better final product. That is, as professors catch on to the computer’s abilities, “they may make you revise small sections of a paper that earlier they would have let pass.”

An added benefit of the computer during the revising stage is noted by a group of Harvard users who find that a computer is great for group work. Each member can feed his or her revisions into the machine, and then the group can request multiple copies.


Furthermore, the computer allows relatively fine strokes in the revising process. For example, some programs have spelling glossaries which store correct spellings of a few thousand words, including specialized words the user might add. The computer displays spellings in a composition that deviate slightly from the words on this list and displays correctly spelled alternatives that the user may have intended. The user selects the correct spelling, and the computer automatically inserts this spelling throughout.

## Evasion Of Displeasure

Another fine stroke is the computer’s ability to *word count*. Meltzer says he reviews his essays in this way as a check on style. For example, in an essay on Emily Dickinson, whose poetry he does not like, he found he often used phrases beginning with “of” instead of possessive nouns. “It was an evasion of displeasure,” he concluded, since the “of” construction was less direct.

While the computer can analyze text word for word, as it does when it checks spelling or word frequency, it cannot yet work at the level of syntax. “So if your problem is Baroque sentence structure, you’re out of luck,” says Love. But he’s quick to add that a group of MIT professors is working on the application of computers to the analysis of grammar.


Capping the triple ability of the computer in the revising stage – it minimizes retyping, it’s good for group work, and it allows word for word analysis – is the bonus that makes computer compositions irresistible for many writers and their readers: the final product can be 100% typographically accurate, with justified right-hand margins, and printed in a variety of type fonts. ©



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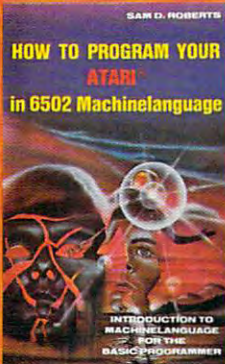
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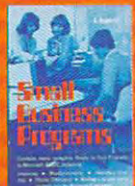


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# Deflector

Frank J. Tyniwi

*You'll find that this game is quite a brainteaser. Strategically placing your Deflector and predicting a bouncing ball's trajectory is no easy task. If you like realtime strategy, Deflector's dynamically changing playfield will provide hours of challenging fun. (Versions for the unexpanded VIC, Atari 400/800, and Apple II.)*

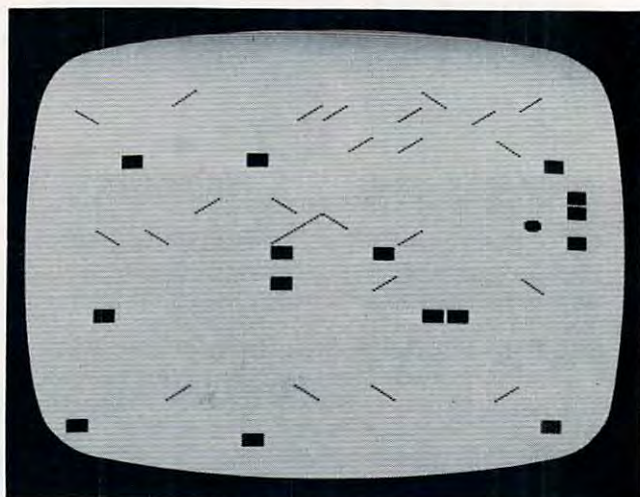
This is an adaptation for the 5K or 8K VIC of Fred Dunlap's Deflection program (from Vol. 1, Number 3, *PET User Notes*). The idea of the game is simple. A ball bounces from side to side or from top to bottom of the screen. Pressing the left arrow key above the control key will print a slash in front of the ball's path, deflecting it 90 degrees. The F1 key will print a backslash (\). Your goal is to deflect the ball into the square targets, using as few slashes as possible to achieve the highest score.

Scoring is ten points for every block hit, minus one point for every slash used and minus five points for every slash on the screen if you hit the panic button. The panic button is the British pound sign (£). If you get too many slashes on the screen or deflect yourself into a corner, hitting the panic button will remove all slashes, subtract five points per slash, and resume the game.

The subroutine at 63000 is a useful utility you may want to include in other programs. When the program starts, it asks "adjust screen? (y/n)". The screen will switch to a black border and white background, and color bars for fine tuning your set. The cursor control keys will move the entire screen up, down, left, or right to adjust for your TV.

Press D when done adjusting, and the program asks if you want instructions. Then it will ask for number of targets. The program then will select random screen locations for the targets (160-200). Lines 700-990 handle the score display and rerun lines. Lines 4300-6210 are the sound routines. This program works on the unexpanded VIC or with the 3K cartridge suggested modifications.

Instead of a block for a target, you could use programmable character functions. The targets could be germs or political symbols, or instead of a ball you could use up, down, left, and right darts, arrows, anything.



A typical game of "Deflector," VIC version. (Other versions use similar character graphics.)

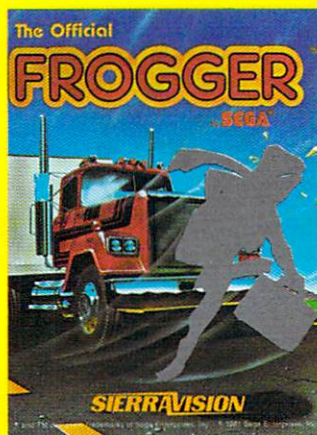
## Program 1: VIC Version

```
10 PRINT "{CLEAR}":TR=208:J=3:BC=36879:VO=
   BC-1:S4=BC-2:S3=BC-3:S2=BC-4:S1=BC-5
20 GOSUB63000:POKEBC,93:V=15
122 PRINT "{DOWN}INSTRUCTIONS? (Y/N)"
123 GETV$:IFV$=" "THEN123
125 IFV$="Y"THENGOSUB1000
130 PRINT "{CLEAR}"CHR$(142)
140 K=0:T=0:CL=5
142 INPUT "{DOWN}HOW MANY TARGETS":J:J=ABS(
   J)
144 IFJ>506THENPRINT"TOO MANY!":GOTO142
146 IFJ<10ORJ>200THENPRINT "{DOWN}BRAVE, AR
   EN'T YOU?"
155 FORI=1TO1000:NEXT:PRINT "{CLEAR}":GOSUB
   7000
157 SS=7680:SR=38400
160 FORI=1TOJ
170 A=INT(506*RND(1))
180 IFPEEK(SS+A)=TRTHEN170
185 POKES2,0:POKES3,0
190 POKES5+A,TR:POKESR+A,6:GOSUB43000
200 NEXTI
205 POKES2,0:POKES3,0
210 A=INT(506*RND(1))
230 U=A+SS
240 DI=1:IFRND(1)>.5THENDI=-1
300 GETX$
310 IFX$<>" "THEN600
320 NE=U+DI
330 IFABS(DI)=1THEN430
340 IFDI>0THEN380
350 IFNE<SSTHENDI=-DI:GOSUB6000:GOTO320
355 A=NE
360 IFPEEK(A)=77THENDI=-1:NE=NE-1
370 IFPEEK(A)=78THENDI=1:NE=NE+1
375 GOTO530
```

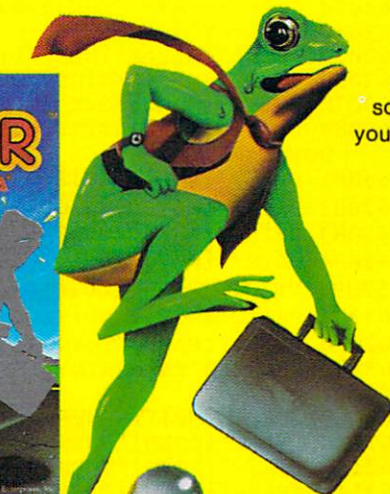


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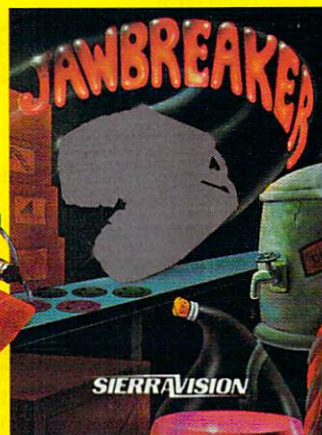
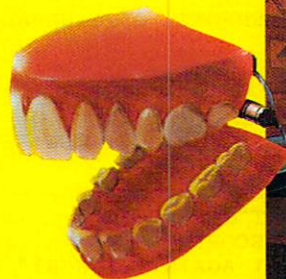
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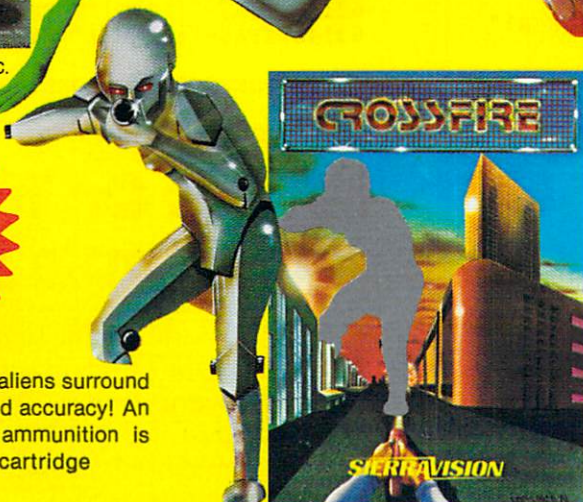
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```

380 IFNE>SS+506THENDI=-DI:GOSUB6000:GOTO320
390 A=NE
400 IFPEEK(A)=77THENDI=1:NE=NE+1
410 IFPEEK(A)=78THENDI=-1:NE=NE-1
420 GOTO530
430 IFDI>0THEN490
440 IFNE-22*INT(NE/22)=1THENDI=-DI:GOSUB62
00:GOTO320
450 A=NE
460 IFPEEK(A)=77THENDI=-22:NE=NE+DI
470 IFPEEK(A)=78THENDI=22:NE=NE+DI
480 GOTO530
490 IFNE-22*INT(NE/22)=2THENDI=-DI:GOSUB62
00:GOTO320
500 A=NE
510 IFPEEK(A)=77THENDI=22:NE=NE+DI
520 IFPEEK(A)=78THENDI=-22:NE=NE+DI
530 POKEU,32
540 IFPEEK(NE)=32THENPOKEU,81:U=NE:GOTO30
0
550 IFPEEK(NE)=TRTHENK=K+1:SC=SC+10
552 IFPEEK(NE)=TRTHENGOSUB5000
555 POKEU,170:U=NE:FORI=1TO25:NEXT
560 IFK=JTHEN700
570 GOTO300
600 IFX$="←"THENA=78:GOTO630
610 IFX$="{F1}"THENA=77:GOTO630
615 IFX$="{F"THENGOSUB2000
616 IFX$="Q"THEN990
620 GOTO320
625 GOSUB4600
630 IFPEEK(U+DI)=32THENPOKEU+DI,A:SL=SL+1:
SC=SC-1
640 GOTO300
700 REM
712 PRINT"{CLEAR}":POKEBC,125
715 IFSC>HSTHENHS=SC:PRINT"{REV} NEW ";
716 PRINT"HIGH SCORE:"HS"{LEFT} "
720 PRINT"{DOWN}IT TOOK"SL"SLASHES
730 PRINT"{DOWN}TO HIT"J"TARGETS"
905 PRINT"{DOWN}YOUR SCORE";SC
910 PRINT"{02 DOWN}TRY AGAIN?(Y OR N)"
920 GETW$:IFW$="Y"THEN920
925 IFW$="N"THEN990
926 SL=0:SC=0
930 PRINT:PRINT"HOW MANY TARGETS";:INPUTJ
940 J=ABS(INT(J))
960 PRINT"{CLEAR}":POKEBC,93:GOSUB7000:K=0
:T=0:GOTO155
990 PRINT"{CLEAR}":POKEBC,27:END
1000 PRINT"{CLEAR}"
1010 PRINTCHR$(14);" THE OBJECT OF THIS
1015 PRINT"{DOWN}GAME IS TO DEFLECT THE
1020 PRINT"{DOWN}{UP}BALL INTO THE BOXES BY

1025 PRINT"{DOWN}{UP}USING _ AND F1 KEYS
1030 PRINT"{DOWN}TO PRINT DIAGONALS IN
1035 PRINT"{DOWN}ITS PATH. IF YOU GET
1040 PRINT"{DOWN}STUCK IN A LOOP USE
1045 PRINT"{DOWN}THE \ KEY AS A PANIC
1050 PRINT"{DOWN}BUTTON.
1085 PRINT"{03 DOWN}HIT ANY KEY...
1090 GETB$:IFB$="Y"THEN1090
1100 PRINT"{CLEAR}{DOWN}SCORING IS 10 POINT
S
1110 PRINT"{DOWN}PER BLOCK HIT, ONE
1120 PRINT"{DOWN}POINT SUBTRACTED FOR
1130 PRINT"{DOWN}EVERY SLASH YOU LAY,
1140 PRINT"{DOWN}AND -5 FOR EVERY SLASH
1150 PRINT"ON THE SCREEN IF YOU
1160 PRINT"{DOWN}HIT THE PANIC BUTTON.
1170 PRINT"{04 DOWN}HIT ANY KEY TO START.."

1180 GETA$:IFA$="Y"THEN1180
1190 RETURN
2000 FORI=SSTOSS+506

```

```

2010 IFPEEK(I)<>77ANDPEEK(I)<>78THEN2030
2020 GOSUB4300:POKES2,0:POKES3,0:SC=SC-5:PO
KEI,32
2030 NEXTI
2040 RETURN
4300 SO=INT(RND(1)*100)+129
4310 POKEVO,V:POKES3,SO:POKES2,SO:FORI=1TO
35:NEXTI:RETURN
5000 POKEVO,V:FORS=128TO250STEP10
5010 POKES4,S
5020 NEXTS
5030 POKEVO,0:POKES4,0:RETURN
6000 POKEVO,V:POKES3,250:FORI=1TO25:NEXTI
:POKES3,0:POKEVO,0:RETURN
6200 POKEVO,V:POKES3,245:FORI=1TO25:NEXTI
:POKES3,0:POKEVO,0
6210 RETURN
7000 FORI=38400TO38905:POKEI,6:NEXT:RETURN
63000 REM SCREEN ADJUSTMENT
63010 POKE36879,24:PRINT"{CLEAR}":H=PEEK(368
64):V=PEEK(36865)
63020 PRINT"ADJUST SCREEN? (Y/N)"
63030 GETA$:IFA$="Y"THEN63030
63040 IFA$="Y"GOTO63060
63050 PRINT"{CLEAR}{BLK}";:RETURN
63060 PRINT"{02 DOWN}USE THE CRSR KEYS TO
63070 PRINT"{DOWN}MOVE SCREEN AND THE
63080 PRINT"{DOWN}LETTER D WHEN DONE{02
DOWN}"
63081 PRINT"{REV}{RED}RED"
63082 PRINT"{REV}{CYN}CYAN"
63083 PRINT"{REV}{PUR}PURPLE"
63084 PRINT"{REV}{GRN}GREEN"
63085 PRINT"{REV}{BLU}BLUE"
63086 PRINT"{REV}{YEL}YELLOW"
63090 GETA$:IFA$="Y"THEN63090
63100 IFA$="D"THENPRINT"{CLEAR}{BLK}";:RETUR
N
63110 IFA$="{UP}"THENV=V-1:IFV<0THENV=0
63120 IFA$="{DOWN}"THENV=V+1:IFV>40THENV=40
63130 IFA$="{LEFT}"THENH=H-1:IFH<0THENH=0
63140 IFA$="{RIGHT}"THENH=H+1:IFH>17THENH=17

63150 POKE36864,H:POKE36865,V:GOTO63090

```

## Notes On The Atari And Apple Versions

For the Atari, use the two keys with slashes on them (the plus key and the question mark) to place your slashes. The ball will deflect at a 90 degree angle. When the game begins, you should hold down [SELECT] and the screen will start to fill with targets. Let go when you think you have enough.

For the Apple, enter the number of targets you want to play with. Very few or very many targets makes for a difficult game. Use the left and right arrow keys to lay down slashes.

For either the Atari or Apple, use the ESCape key as the panic button if your ball gets trapped.



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## Program 2: Atari Version

```

100 REM DEFLECTOR-ATARI VERSION
110 GRAPHICS 1:POKE 756,226:SETCOLOR
  4,16:RND(0),12:POKE 708,PEEK(712)
120 LEFT=7:RIGHT=6:POKE 752,1:?"
  (TAB){DOWN}PRESS SELECT FOR TARGETS";
130 BALL=148:TARGET=192:COLOR TARGET
140 IF PEEK(53279)=5 THEN RX=INT(12*
  RND(0)+4):RY=INT(15*RND(0)+4):LOCATE
  RX,RY,Z:IF Z=32 THEN PLOT RX,RY:NUM=NUM+1
150 IF PEEK(53279)<>6 THEN 140
160 VX=0:VY=1:BX=9:BY=11:GRAPHICS 17
  +32:POKE 756,226:SETCOLOR 4,16:RND(0),12:POKE 708,PEEK(712)
170 IF BX<2 OR BX>18 OR BY<2 OR BY>22
  THEN VX=-VX:VY=-VY:BX=BX+VX:BY=BY+VY
175 LOCATE BX,BY,OLD:IF OLD=32 THEN
  COLOR BALL:PLOT BX,BY
177 IF OLD=TARGET THEN NBX=BX:NBX=BY:
  GOTO 600
180 NBX=BX+VX:NBX=BY+VY:IF PEEK(764)=
  28 THEN GOSUB 3000
190 LOCATE NBX,NBY,Z:IF Z=32 AND PEEK(764)<255
  THEN 500
200 IF Z=32 THEN GOSUB 700:BX=NBX:BY=
  NBY:GOTO 170
210 IF PEEK(764)=28 THEN GOSUB 3000
215 IF Z=LEFT THEN 1000
220 IF Z=RIGHT THEN 2000
230 IF Z=TARGET THEN COLOR 32:PLOT NBX,
  NBY:GOTO 600
500 REM MAKE A SLASH!
505 IF PEEK(764)<>6 AND PEEK(764)<>38
  OR BX<2 OR BX>18 OR BY<2 OR BY>22
  THEN 170
510 IF PEEK(764)=6 THEN COLOR LEFT:T=
  VY:VY=VX:VX=T
520 IF PEEK(764)=38 THEN COLOR RIGHT:
  T=VY:VY=-VX:VX=-T
521 POKE 764,255:LOCATE BX,BY,Z:IF Z=
  TARGET THEN 600
522 IF Z=LEFT OR Z=RIGHT THEN 210
525 PLOT BX,BY:BX=BX+VX:BY=BY+VY:SL=
  SL+1:LOCATE BX,BY,Z:IF Z=TARGET
  THEN 600
530 GOTO 170
600 COLOR 32:PLOT BX,BY:HIT=HIT+1:FOR
  W=15 TO 0 STEP -1:SOUND 0,W,12,W:
  NEXT W:Z=32:IF HIT<NUM THEN 200
610 GRAPHICS 2+16:POSITION 5,0:?"#6:
  "GAME OVER":?"#6:?"#6
620 ? #6:"{3 SPACES}targets ";NUM:?"#6
630 ? #6:"{3 SPACES}slashes ";SL:?"#6
640 ? #6:"{4 SPACES}SCORE ";INT(NUM*
  100/SL)-ESC:?"#6
645 IF ESC THEN ? #6;" -penalty ";ESC
650 ? #6:?"#6:" PRESS RETURN"
660 IF PEEK(764)<>12 THEN 660
670 POKE 764,255:RUN
700 LOCATE BX,BY,Z:IF Z=TARGET THEN
  600
705 IF Z<>LEFT AND Z<>RIGHT THEN COL

```

```

OR 32:PLOT BX,BY
710 RETURN
999 GOTO 999
1000 FOR W=14 TO 0 STEP -2:SOUND 0,3
  0,10,W:SOUND 1,34,10,W:NEXT W
1010 T=VY:VY=VX:VX=T:GOSUB 700:BX=NBX
  +VX:BY=NBX+VY
1020 LOCATE BX,BY,Z:IF Z=LEFT OR Z=RIGHT
  THEN 210
1025 IF Z=TARGET THEN 600
1030 GOTO 170
2000 FOR W=14 TO 0 STEP -2:SOUND 0,2
  0,10,W:SOUND 1,24,10,W:NEXT W
2010 T=VY:VY=-VX:VX=-T:GOSUB 700:BX=
  NBX+VX:BY=NBX+VY
2020 LOCATE BX,BY,Z:IF Z=LEFT OR Z=RIGHT
  THEN 210
2025 IF Z=TARGET THEN 600
2030 GOTO 170
3000 P=PEEK(712):FOR W=15 TO 0 STEP
  -0.5:Z=PEEK(53770):POKE 708,Z:POKE
  712,Z:SOUND 0,100,0,W:NEXT W
3010 SCR=PEEK(88)+256*PEEK(89):FOR I=
  0 TO 479:A=PEEK(SCR+I):POKE SCR+I,159
3020 POKE SCR+I,A*(A<70 OR A>71 OR A=
  1):NEXT I:POKE SCR+I-2,0
3030 POKE 708,P:POKE 712,P:POKE 764,
  255:ESC=ESC+1:RETURN

```

## Program 3: Apple II Version

```

100 REM APPLE DEFLECTOR
110 TEXT : HOME
115 DIM XL%(23):FOR I=0 TO 7:Z=12
  8*I:XL%(I)=Z+1024:XL%(I+8)=Z+
  1064:XL%(I+16)=Z+1104:NEXT I
117 DEF FN A(V)=XL%(BY)+BX:DEF FN P(V)=
  PEEK(FN A(V))
120 LEFT=156:RIGHT=175:INPUT "HOW
  MANY TARGETS? (1-720):";A$:NUM=ABS
  (INT(VAL(A$)))
125 IF NUM<1 OR NUM>720 THEN RUN
130 BALL=174:TG=ASC("$")
135 HOME
140 FOR I=1 TO NUM
145 BX=INT(35*RND(1))+3:BY=INT(19*
  RND(1))+3
150 IF FN P(V)<>160 THEN 145
160 POKE FN A(V),TG:NEXT I
165 VX=0:VY=-1:BX=19:BY=11
170 IF BX<2 OR BX>38 OR BY<2 OR BY>22
  THEN VX=-VX:VY=-VY:BX=BX+VX:BY=BY+VY
175 IF FN P(V)=160 THEN POKE FN A(V),
  BALL
177 IF FN P(V)=TG THEN NX=BX:NY=BY:
  GOTO 600
180 NX=BX+VX:NY=BY+VY:Z=PEEK(XL%(NY)+
  NX)
190 IF Z=160 AND PEEK(-16384)>128
  THEN 500
200 IF Z=160 THEN GOSUB 700:BX=NX:
  BY=NY:GOTO 170
210 IF PEEK(-16384)=155 THEN GOSUB
  3000
215 IF Z=LEFT THEN 1000
220 IF Z=RIGHT THEN 2000

```



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```

230 IF Z = TG THEN POKE XL%(NY) + NX,
    160: GOTO 600
500 REM MAKE A SLASH!
505 A = PEEK ( - 16384) - 128: POKE -
    16368,0: IF A < > 8 AND A < > 21
    OR BX < 2 OR BX > 38 OR BY < 2 OR
    BY > 22 THEN 170
510 IF A = 8 THEN CH = LEFT:T = VY:VY =
    VX:VX = T
520 IF A = 21 THEN CH = RIGHT:T = VY:V
    Y = - VX:VX = - T
521 IF FN P(V) = TG THEN 600
522 IF ( FN P(V) = LEFT) OR ( FN P(V) =
    RIGHT) THEN 210
525 POKE FN A(V),CH:BX = BX + VX:BY =
    BY + VY:SL = SL + 1: IF FN P(V) =
    TG THEN 600
530 GOTO 170
600 POKE FN A(V),160:HIT = HIT + 1:Z =
    160: IF HIT < NUM THEN 200
610 HOME : FLASH : FOR I = 1 TO 24: PRINT
    TAB( 39): PRINT : NEXT
615 VTAB 3: INVERSE : PRINT TAB( 15):
    "GAME OVER": TAB( 39): PRINT : PRINT

620 PRINT : PRINT : PRINT TAB( 6):"TA
    RGETS ";NUM: TAB( 39): PRINT
630 PRINT : PRINT : PRINT TAB( 6):"SL
    ASHES ";SL: TAB( 39): PRINT
640 PRINT : PRINT TAB( 8):; NORMAL : PRINT
    "SCORE "; INT (NUM * 100 / SL) - E
    SC:; INVERSE : PRINT TAB( 39): PRINT

650 IF ESC THEN PRINT : PRINT TAB( 5
    ):;"-PENALTY ";ESC: TAB( 39): PRINT
    : PRINT

```

```

660 PRINT : PRINT : PRINT : PRINT TAB(
    13):"PRESS ";; NORMAL : PRINT "RET
    URN";; NORMAL : INVERSE : PRINT TAB(
    38):; GET A$: NORMAL
670 RUN
700 Z = FN P(V): IF Z = TG THEN 600
705 IF (Z < > LEFT) AND (Z < > RIGHT
    ) THEN POKE FN A(V),160
710 RETURN
999 GOTO 999
1000 T = VY:VY = VX:VX = T: GOSUB 700:B
    X = NX + VX:BY = NY + VY
1010 Z = FN P(V): IF (Z = LEFT) OR (Z =
    RIGHT) THEN 210
1020 IF Z = TG THEN 600
1030 GOTO 170
2000 T = VY:VY = - VX:VX = - T: GOSUB
    700:BX = NX + VX:BY = NY + VY
2020 Z = FN P(V): IF (Z = LEFT) OR (Z =
    RIGHT) THEN 210
2030 GOTO 170
3000 FOR I = 0 TO 23: FOR J = 0 TO 39
3010 P = XL%(I) + J:A = PEEK (P): POKE
    P,159
3020 IF (A = LEFT) OR (A = RIGHT) OR (
    A = BALL) THEN A = 160
3030 POKE P,A: NEXT J: NEXT I:ESC = ESC +
    1: RETURN

```

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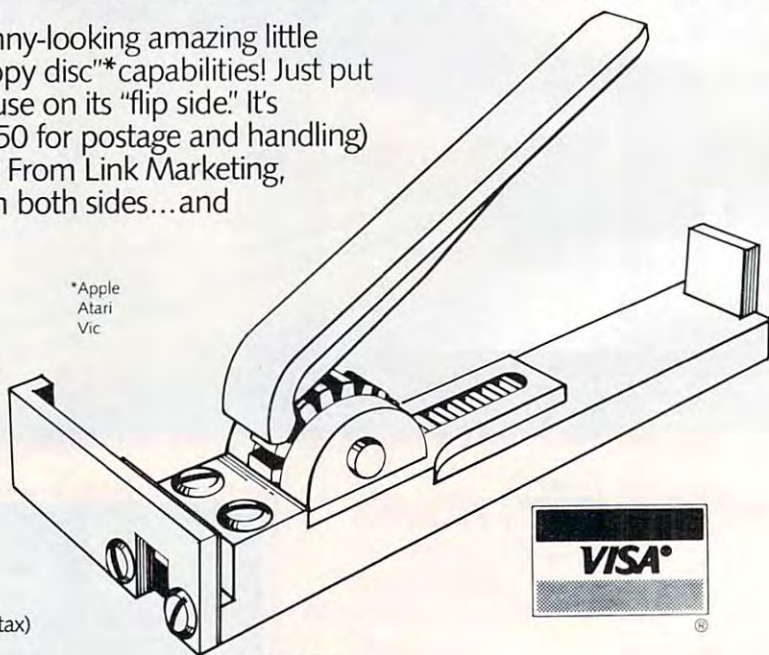
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# CROSSWORDS

William Loercher

*This program will construct crossword puzzles for you on a VIC, TI, PET/CBM, Atari, or Apple. There is an option to have a printed copy made of the final puzzle.*

If you've ever tried to make your own crossword puzzles, you know the procedure is very time-consuming. I have designed crossword puzzles for my students in chemistry and have spent many hours toiling over fitting the correct words in their correct spaces. Procedures such as these are ideally suited for the microcomputer. This program can be run on either the 40- or 80-column PET. As written, the program will run on the 40-column screen. By deleting lines 100 and 110 and removing the word "REM" in lines 130 and 140, you can run the program on the 80-column PET.

## About The Program

Lines 180-450 may be deleted if necessary since they only put a unique title on the screen.

Line 460 asks for the number of words you want to use in the puzzle. Using the maximum number makes a better puzzle, but it requires more time to complete.

Line 470 asks for the number of vertical words to be placed at random on the screen. These words are placed so that none are next to each other or on the outer border. An asterisk precedes and ends each word.

Line 480 asks if you want the results printed, assuming you have a printer. If not, you can copy the results by hand.

Line 490 dimensions the words into an array of words and an array of lengths of words. The number of words you choose to place in your "dictionary" beginning at line 2000 is limited only by computer memory.

Lines 510-520 print on the screen 23 rows of 39 blocks to be used as the test field.

Lines 530-610 test the field for proper positions and print the vertical words.

Lines 620-890 test the field for horizontal words and POKE them on the screen if the proper conditions are met.

Lines 920-970 enable the printer to make a copy of the puzzle as it appears on the screen.

Lines 980-990 are the subroutine for choosing a random screen position.

Line 1000 is a time delay for the title program.

Lines 1020-1030 are used to choose a random word from the array to be displayed on the screen.

See Program 6 for the DATA statements to be added to the program.

Lines 2010-2110 are the DATA statements containing the words used in the puzzle. If you want, you could substitute your own words for mine.

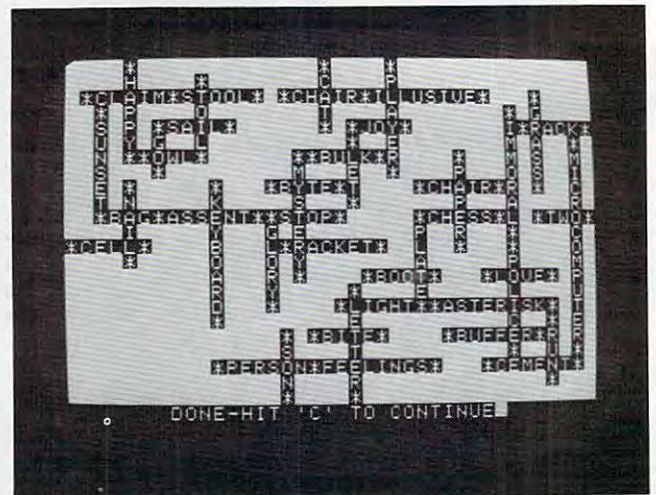
## Suggested Improvements

After completing the program, I thought of other ways to improve it. First, after all 23 rows are tested ( $Z=23$ ), you could write another section to the main program that tests the columns for word fits. This should result in a better puzzle.

Second, you could keep track of the words that fit a given location in another array and then choose the longest word from that list. If any of you come up with something interesting, write me.

If you do not like typing your own programs, I will send you a taped copy of the PET version only. Send \$3, a cassette tape, and an SASE mailer to:

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*A puzzle takes shape in the Apple version of "Crosswords." (Other versions similar).*



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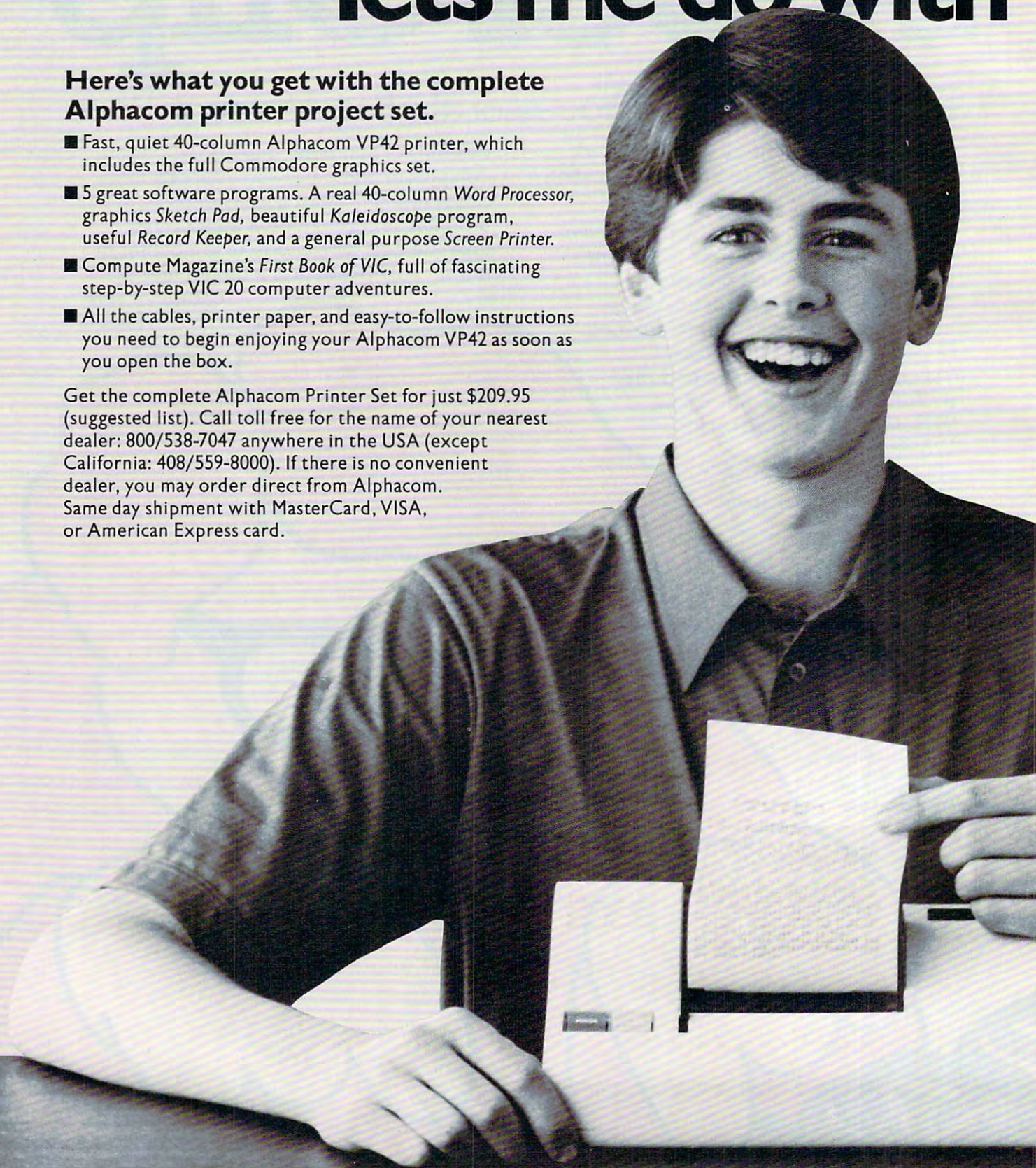


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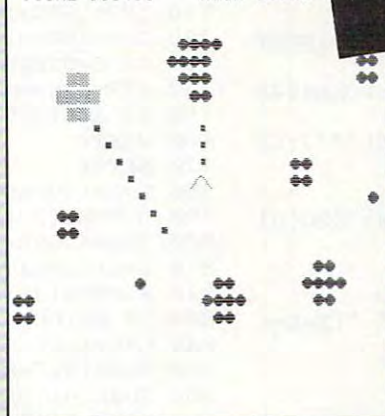
Book : I, Claudius  
Author: Robert Graves

Back in the old days of Empire the cruel Emperor Caligula murdered and a new leader, was chosen by the Praetoria (The Romans had rather odd order in those days.) The Praetorian Guard thought they had chosen a simpleton and weakling who easily manipulated to the Emperor's purposes.

Much to everyone's surprise Claudius lasted for over a decade and turned out to be a wise moderate leader. Robert Graves' I, Claudius describes the Emperor's life before he ascended the throne.

Write and print my letters, homework—just about anything. With *Word Processor* software that comes with the printer.

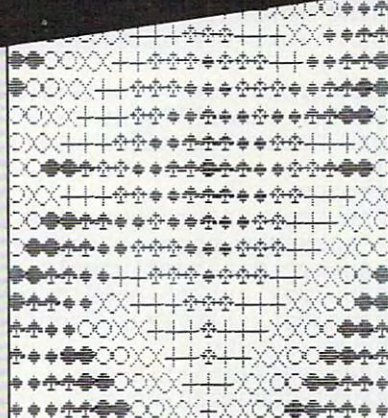
SCORE 005430 HIGH SCORE 1



Create my own custom computer games. The printer set includes the new *First Book of VIC*: it's full of great game ideas.

```
1 REM*VIC SQUIGGLE*
2 REM*FROM VIC 1001 USER'S
3 REM*TYPED, AND DEBUGGED BY
4 CS=" "
5 PRINT " "
6 DATA "I", "-", "J", "L", "r",
7 DATA 1,0,5,6
8 DATA 0,1,4,3
9 DATA 3,6,2,0
10 DATA 4,5,0,2
11 DIM A$(5), B(5,5)
12 FOR I=0 TO 5
13 READ A$(I)
14 NEXT I
15 FOR J=1 TO 4
16 FOR K=1 TO 4
17 READ B(K,J,I)
18 NEXT K
19 NEXT J
20 NEXT I
21 T=1
22 T2=1
23 X=20
```

Learn to write my own VIC 20 applications. With hard copy program listings that help me debug my programs.



Show off my computer graphics creations. Software includes *Kaleidoscope* and *Sketch Pad* graphics programs.

Recipe 334

CHEESE BERRY PIE

Ingredients

2 Pks (3 oz. ea.) cream  
1/3 cup powdered sugar  
1/3 cup sour cream  
2 tsp grated orange peel  
Baked 9-inch pie shell  
2 - 3 cups whole fresh  
strawberries/raspberries  
1/2 cup strawberry/rasp.  
preserves, sieved

Procedure

Soften cheese. Beat in sour cream and orange peel. in pie shell. Top with berries to glaze. Chill. If you like

Keep the family's favorite recipes on a VIC 20 cassette. Now Mom can't pretend that she lost the recipe for cheeseberry pie.



## Alphacom™

2323 South Bascom Avenue  
Campbell, CA 95008

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## Program 1: PET/CBM Version

### (40 or 80 Column Screen)

```
100 EA=33767:X1=40:A=8:A2=16:F1=15:F2=25:L
W=33569:OP=33224:WL=33374
110 A7=1000:B1=20
120 REM LINES 100,110 ARE FOR 40-COLUMN PE
T
130 REM EA=34767:X1=80:A=31:A2=39:F1=30:F2
=50:LW=34369:OP=33687:WL=33997
140 REM A7=2000:B1=0
150 REM LINES 120,130 ARE FOR 80-COLUMN PE
T
160 POKE 59468,12:PRINT CHR$(142):X=RND(-T
I)
170 PRINT "{CLEAR}"
180 FORX=1TOX1-1:POKE32768+X,ASC("*"):NEXT
X
190 FORX=1TO25:FORY=1TOX1STEPX1-2:POKE3276
8+X1*X+Y,ASC("*"):NEXTY,X
200 FORX=2TOX1-1:POKE(EA-X1+X),ASC("*"):NE
XTX
210 GOTO260
220 FORB=1TOA:PRINT "{HOME}{20 DOWN}"SPC(B)
" "A$:NEXTB:POKE LW,ASC("*")
230 FORC=1TO10:PRINT "{HOME}";
240 FORD=1TOE:PRINT "{DOWN}";:NEXTD
250 PRINTSPC(A+1)A$:PRINTSPC(A+1)" "E=E-1
:NEXTC:RETURN
260 FORF=1TO17:A=A+1:E=20
270 READA$:GOSUB220:NEXTF
280 DATA C,R,O,S,S,W,O,R,D, , ,P,U,Z,Z,L,E
290 FORX=1TO3000:NEXT
300 GOTO360
310 FORB=1TOA2-1:PRINT "{HOME}{20 DOWN}"SPC
(B)" "A$:NEXTB
320 POKE LW,ASC("*")
330 FORC=1TO13-F:PRINT "{HOME}";
340 FORD=1TOE:PRINT "{DOWN}";:NEXTD
350 PRINTSPC(A2)A$:PRINTSPC(A2)" "E=E-1:N
EXTC:POKE OP,15:RETURN
360 FORF=1TO7:E=20
370 READA$:GOSUB310:NEXTF
380 DATA P,R,O,G,R,A,M
390 FORX=1TO19:READA$
400 IFA$="0"THEN430
410 POKE WL+X,ASC(A$)-64
420 GOTO440
430 POKE WL+X,32
440 GOSUB1000:NEXT
450 FORX=1TO2000:NEXT:PRINT "{CLEAR}"
460 INPUT "{03 DOWN}HOW MANY WORDS (MAX:110
)":N
470 PRINT "{02 DOWN}HOW MANY VERTICAL WORDS
( ";F1;"-";F2;"WORKS WELL)":;INPU
T K
480 INPUT "{02 DOWN}RESULTS ON SCREEN OR PR
INTER (S OR P)":S$
490 DIM N$(N),L(N)
500 FOR X=1TON:READN$(X):L(X)=LEN(N$(X)):N
EXT:PRINT "{CLEAR}"
510 FORJ=1TO23
520 FOR I=1 TO X1-1:PRINT "{REV} {OFF}";:NE
XT I:PRINT " ";:NEXT J
530 FOR Z=1TOK:E=0:GOSUB1020:REM PUT IN V
ERTICAL WORDS
540 GOSUB 980:REM GET A RANDOM POSITION
550 FORX=0TOL(R)+1:B=PEEK(P+X1*X):C=PEEK(P
-1+X1*X):D=PEEK(P+1+X1*X)
560 IFB<>160ORC<>160ORD<>160THENX=L(R)+1:N
EXT X:GOTO 540
570 E=E+1
580 NEXTX:IFE=L(R)+1THENE=0
```

```
590 POKE(P),42:REM PLACE * ON EITHER SIDE ~
OF WORD
600 FOR X=1TOL(R):POKE(P+X1*X),ASC(MID$(N$
(R),X,1))-64
610 NEXT:POKE(P+X1*X),42:N$(R)="0":NEXTZ:R
EM GET ANOTHER WORD
620 Z=0
630 Z=Z+2:L=0
640 IF Z>23THEN900
650 FORX=1TON:E=0:G=0
660 IFN$(X)="0"ORL(X)+2>X1-1THENNEXTX
670 IFX>NTHEN630
680 FORY=1TOL(X)
690 B=PEEK(32768+L+Y+X1*Z)
700 C=ASC(MID$(N$(X),Y,1))-64
710 IFB=160ORB=CTHENE=E+1
720 IFB=160THENG=G+1
730 IF E=0THEN770
740 IFB=32ORB=42ORG=L(X)THENL=L+1:GOTO650
750 IF E=L(X)THEN790
760 NEXTY
770 NEXTX
780 L=L+1:GOTO650
790 B=PEEK(32768+L+L(X)+1+X1*Z)
800 IFB=42ORB=160THEN820
810 L=L+1:NEXTX:GOTO630
820 B=PEEK(32768+L+X1*Z)
830 IF B=160ORB=42THEN850
840 L=L+1:NEXTX:GOTO630
850 POKE(32768+L+X1*Z),42
860 FORL=1TOL(X):POKE(32768+L+L1+X1*Z),AS
C(MID$(N$(X),L1,1))-64
870 H=100:J=0:M=59459
880 POKEM,J:POKEM,H:POKEM,J
890 NEXTL1:POKE(32768+L+L1+X1*Z),42:N$(X)=
"0":L=L+L1:GOTO650
900 IF S$="P"THEN920
910 GOTO 1190
920 OPEN4,4
930 FORX=1TO24:B=B1:FORY=1TOX1:IFY>1THENB=
0
940 A=PEEK(32768-(X1+1)+Y+X1*X):IFA=32ORA=
42ORA=160THENA=166
950 B$=CHR$(A+64)
960 PRINT#4,SPC(B)B$;:IFY=X1THENPRINT#4
970 NEXTY,X:CLOSE4:GOTO 1190
980 U=INT(RND(1)*A7)
990 P=32768+U:RETURN
1000 FORY=1TO200:NEXT:RETURN
1010 DATAB,Y,0,W,I,L,L,I,A,M,0,L,O,E,R,C,H,
E,R
1020 R=INT(RND(1)*N)+1:IFN$(R)="0"THEN1020
1030 RETURN
1090 PRINT "{REV}DONE{OFF}-HIT {REV}C{OFF} T
O CONTINUE";
1200 GET F$:IF F$="" THEN 1200
1210 PRINT "{CLEAR}":END
1220 REM BE SURE TO INCLUDE LINES 2000-2110
```

## Program 2: vic Version

```
100 X=RND(0)
110 POKE 36879,25
120 PRINT "{CLEAR}"
130 PRINT "{03 DOWN}{RIGHT}HOW MANY WORDS"
140 INPUT " (MAX:110)";N
150 PRINT "{02 DOWN}{RIGHT}HOW MANY VERTICA
L"
160 PRINT " WORDS (10-15 WORKS"
170 INPUT " WELL)";K
180 PRINT "{02 DOWN}{RIGHT}RESULTS ON SCREE
N OR"
190 INPUT " PRINTER (S OR P)";S$
200 DIM N$(N),L(N)
```



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by SEGA®



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erful robot, armed with a lethal homing missile.

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```

210 FOR X=1TON:READN$(X):L(X)=LEN(N$(X)):N
EXT:PRINT"[CLEAR]"
220 FORI=1TO22
230 PRINT"[REV]"
":NEXT

240 FOR Z=1TOK:E=0:GOSUB710:REM PUT IN VE
RTICAL WORDS
250 GOSUB 690:REM GET A RANDOM POSITION
260 FORX=0TOL(R)+1:B=PEEK(P+22*X):C=PEEK(P
-1+22*X):D=PEEK(P+1+22*X)
270 IFB<>160ORC<>160ORD<>160THENX=L(R)+1:N
EXT X:GOTO 250
280 E=E+1
290 NEXTX:IFE=L(R)+1THENE=0
300 POKE(P),42:REM PLACE * ON EITHER SIDE ~
OF WORD
310 FOR X=1TOL(R):POKE(P+22*X),ASC(MID$(N$
(R),X,1))-64
320 NEXT:POKE(P+22*X),42:N$(R)="0":NEXTZ:R
EM GET ANOTHER WORD
330 Z=0
340 Z=Z+2:L=0
350 IF Z>22THEN590
360 FORX=1TON:E=0:G=0
370 IFN$(X)="0"ORL(X)+2>21THENNEXTX
380 IFX>NTHEN340
390 FORY=1TOL(X)
400 B=PEEK(7680+L+Y+22*Z)
410 C=ASC(MID$(N$(X),Y,1))-64
420 IFB=160ORB=CTHENE=E+1
430 IFB=160THENG=G+1
440 IF E=0THEN480
450 IFB=32ORB=42ORG=L(X)THENL=L+1:GOTO360
460 IF E=L(X)THEN500
470 NEXTY
480 NEXTX
490 L=L+1:GOTO360
500 B=PEEK(7680+L+L(X)+1+22*Z)
510 IFB=42ORB=160THEN530
520 L=L+1:NEXTX:GOTO340
530 B=PEEK(7680+L+22*Z)
540 IF B=160ORB=42THEN560
550 L=L+1:NEXTX:GOTO340
560 POKE(7680+L+22*Z),42
570 FORL1=1TOL(X):POKE(7680+L+L1+22*Z),ASC
(MID$(N$(X),L1,1))-64
580 NEXTL1:POKE(7680+L+L1+22*Z),42:N$(X)="
0":L=L+L1:GOTO360
590 IF S$="P"THEN610
600 GOTO 850
610 OPEN4,4
620 FORX=1TO23:C$="":F
ORY=1TO22:IFY>1 THEN C$=""
630 A=PEEK(7657+Y+22*X):IFA=32ORA=42ORA=16
0THENA=166
640 B$=CHR$(A+64)
650 PRINT#4,C$+B$;:IFY=22THENPRINT#4
660 NEXTY,X:CLOSE4:GOTO 850
670 GET F$:IF F$="" THEN 670
680 PRINT"[CLEAR]":END
690 U=INT(RND(1)*506)
700 P=7680+U:RETURN
710 R=INT(RND(1)*N)+1:IFN$(R)="0"THEN710
720 RETURN
850 PRINT"[REV]DONE{OFF}-HIT {REV}C{OFF} T
O CONT";
860 GET F$:IF F$="" THEN
870 PRINT"[CLEAR]":END
880 REM BE SURE TO INCLUDE LINES 2000-2110
Program 3: Atari Version
70 OPEN #1,4,0,"K:"
80 SL=PEEK(88)+256*PEEK(89):REM DETE
RMINE SCREEN MEMORY STARTING LOCA

```


```

TION
100 OPEN #5,9,0,"E:"
110 DIM OUTPUT$(10),A$(19)
120 POSITION 2,0:FOR I=1 TO 36:PRINT
"*";:NEXT I
140 FOR Y=1 TO 23:FOR X=2 TO 37 STEP
35:POSITION X,Y:PRINT "*";:NEXT
X:NEXT Y
160 POSITION 2,23:FOR I=1 TO 36:PRIN
T "*";:NEXT I
165 POKE 752,1
170 A=10:FOR F=1 TO 16:A=A+1:E=18:RE
AD A$
180 FOR B=3 TO A:POSITION B,19:PRINT
" ";A$:NEXT B
182 FOR C=1 TO 10:POSITION 0,0
184 FOR D=1 TO E:PRINT "<DOWN>";:NEX
T D
186 POKE 85,(A+1):PRINT A$:POKE 85,(
A+1):PRINT " ":E=E-1:NEXT C:NEXT
F
190 FOR X=1 TO 1000:NEXT X
200 A=18:FOR F=1 TO 7:E=18:READ A$:F
OR B=3 TO A-1:POSITION B,19:PRIN
T " ";A$:NEXT B
220 FOR C=1 TO 13-F:POSITION 0,0:FOR
D=1 TO E:PRINT "<DOWN>";:NEXT D
230 POKE 85,A:PRINT A$:POKE 85,A:PRI
NT " ":E=E-1:NEXT C:POKE SL+378,
47:NEXT F
240 FOR X=1 TO 19:READ A$:IF A$=""
THEN 270
250 POSITION X+8,13:PRINT A$
260 GOTO 280
270 POSITION X+8,13:PRINT " "
280 FOR Y=1 TO 100:NEXT Y:NEXT X
290 REM FOR I=1 TO 2000:NEXT I
295 GRAPHICS 0:POKE 752,0
300 POSITION 3,3:PRINT "HOW MANY WOR
DS (MAX:110)";:INPUT N
310 POSITION 3,7:PRINT "HOW MANY VER
TICAL WORDS (15-25 WORKS WELL)"
;:INPUT K
320 POSITION 3,11:PRINT "RESULTS ON
SCREEN OR PRINTER":PRINT " (S OR
P)";:INPUT OUTPUT$
325 POSITION 11,17:POKE 752,1:PRINT
"...PLEASE WAIT..."
330 DIM N$(20*(N+1)),L(N),T$(20):REM
ALLOWS WORD LENGTHS TO 20 CHARA
CTERS
340 FOR X=1 TO N:READ T$:L(X)=LEN(T$
):N$(X*20+1,X*20+L(X))=T$:NEXT X
:GRAPHICS 0
350 POKE 752,1:FOR I=0 TO 22:FOR J=0
TO 38:POSITION J,I:PRINT "■";:N
EXT J:NEXT I
360 FOR Z=1 TO K:E=0
410 R=INT(RND(0)*N)+1:IF N$(R*20+1,R
*20+1)="0" THEN 410
420 U=INT(RND(0)*960)
430 P=SL+U
440 FOR X=0 TO L(R)+1:B=PEEK(P+40*X)
:C=PEEK(P-1+40*X):D=PEEK(P+1+40*
X)
450 IF B<>128 OR C<>128 OR D<>128 TH
EN X=L(R)+1:NEXT X:GOTO 420
460 E=E+1
470 NEXT X:IF E=L(R)+1 THEN E=0
480 POKE P,10:REM PLACE * ON EITHER
SIDE OF WORD
485 T$=N$(R*20+1,R*20+L(R))
490 FOR X=1 TO L(R):POKE (P+40*X),AS

```



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```

C(T$(X,X))-32
500 NEXT X:POKE (P+40*X),10:N$(R*20+
1,R*20+1)="0":NEXT Z:REM GET AND
  THER WORD
510 Z=0
520 Z=Z+2:L=0
530 IF Z>23 THEN 800
540 FOR X=1 TO N:E=0:G=0
550 IF N$(X*20+1,X*20+1)="0" OR L+L(
X)+2>39 THEN NEXT X
560 IF X>N THEN 520
580 T$=N$(X*20+1,X*20+L(X))
590 FOR Y=1 TO L(X)
600 B=PEEK(SL+L+Y+40*X)
610 C=ASC(T$(Y,Y))-32
620 IF B=128 OR B=C THEN E=E+1
630 IF B=128 THEN G=G+1
640 IF E=0 THEN 690
650 IF B=0 OR B=10 OR G=L(X) THEN L=
L+1:GOTO 540
670 IF E=L(X) THEN 710
680 NEXT Y
690 NEXT X
700 L=L+1:GOTO 540
710 B=PEEK(SL+L+L(X)+1+40*X)
720 IF B=128 OR B=10 THEN 740
730 L=L+1:NEXT X:GOTO 520
740 B=PEEK(SL+L+40*X)
750 IF B=128 OR B=10 THEN 770
760 L=L+1:NEXT X:GOTO 520
770 POKE (SL+L+40*X),10
775 T$=N$(X*20+1,X*20+L(X))
780 FOR L1=1 TO L(X):POKE (SL+L+L1+4
0*X),ASC(T$(L1,L1))-32
790 NEXT L1:POKE (SL+L+L1+40*X),10:N
$(X*20+1,X*20+1)="0":L=L+L1:GOTO
  540
800 IF OUTPUT$="P" THEN 820
810 GOTO 1060
820 DIM L$(40):POSITION 0,0:POKE 82,
  0
830 FOR LINE=1 TO 23
840 INPUT #5,L$
850 LPRINT ",,L$
860 NEXT LINE
870 GOTO 1060
880 DATA C,R,O,S,S,W,O,R,D, ,P,U,Z,Z
  ,L,E
890 DATA P,R,O,G,R,A,M
900 DATA B,Y,0,W,I,L,L,I,A,M,0,L,O,E
  ,R,C,H,E,R
1060 PRINT "{4 SPACES}DONE-HIT 'C' T
  O CONTINUE":
1070 GET #1,D:GRAPHICS 0:END
1080 REM BE SURE TO INCLUDE LINES 20
  00-2110

```

## Program 4: TI-99/4A Version

```

100 GOTO 230
110 REM HORIZONTAL PRINTER
120 FOR I=1 TO LEN(H$)
130 LETTER=ASC(SEG$(H$,I,1))
140 CALL HCHAR(ROW,COL+I,LETTER)
150 NEXT I
160 RETURN
170 REM VERTICAL PRINTER
180 FOR I=1 TO LEN(V$)
190 LETTER=ASC(SEG$(V$,I,1))
200 CALL VCHAR(ROW+I,COL,LETTER)
210 NEXT I
220 RETURN
230 RANDOMIZE
240 CALL CLEAR

```

```

250 FOR I=2 TO 23 STEP 21
260 CALL HCHAR(I,2,42,30)
270 NEXT I
280 FOR I=2 TO 31 STEP 29
290 CALL VCHAR(2,I,42,21)
300 NEXT I
310 H$="CROSSWORD PUZZLE"
320 ROW=10
330 COL=8
340 GOSUB 120
350 V$="PROGRAM"
360 ROW=7
370 COL=15
380 GOSUB 180
390 H$="by WILLIAM LOERCHER"
400 ROW=14
410 COL=5
420 GOSUB 120
430 FOR DELAY=1 TO 750
440 NEXT DELAY
450 CALL CLEAR
460 INPUT "HOW MANY WORDS (MAX:110)
  ?":N
470 PRINT
480 PRINT
490 PRINT "HOW MANY VERTICAL WORDS"
500 INPUT "(15-20 WORKS WELL)?:K
510 PRINT
520 PRINT
530 PRINT "RESULTS ON SCREEN OR PRI
  NTER"
540 INPUT "(S OR P)?:S$
550 DIM N$(110),L(110)
560 FOR X=1 TO N
570 READ N$(X)
580 L(X)=LEN(N$(X))
590 NEXT X
600 CALL CLEAR
610 CALL COLOR(1,1,16)
620 REM PUT IN EDGE CHAR
630 CALL VCHAR(1,32,31,24)
640 CALL HCHAR(24,1,31,31)
650 FOR Z=1 TO K
660 E=0
670 R=INT(RND*N)+1
680 IF N$(R)="0" THEN 670
690 ROW=INT(RND*23)+1
700 COL=INT(RND*29)+3
710 FLAG=0
720 FOR X=0 TO L(R)+1
730 IF ROW+X>23 THEN 670
740 CALL GCHAR(ROW+X,COL,B)
750 CALL GCHAR(ROW+X,COL-1,C)
760 CALL GCHAR(ROW+X,COL+1,D)
770 IF (B=32)*(C=32)*(D=32) THEN 810
780 FLAG=1
790 X=L(R)+1
800 GOTO 820
810 E=E+1
820 NEXT X
830 IF FLAG=1 THEN 690
840 IF E<>L(R)+1 THEN 860
850 E=0
860 CALL HCHAR(ROW,COL,42)
870 FOR X=1 TO L(R)
880 CALL HCHAR(ROW+X,COL,ASC(SEG$(N
  $(R),X,1)))
890 NEXT X
900 CALL HCHAR(ROW+X,COL,42)
910 N$(R)="0"
920 NEXT Z
930 Z=0
940 Z=Z+2

```



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```

950 M=1
960 IF Z>23 THEN 1370
970 FOR X=1 TO N
980 E=0
990 G=0
1000 IF (N$(X)="0")+((M+L(X)+2)>31)
    THEN 1260
1010 FOR Y=1 TO L(X)
1020 CALL GCHAR(Z,M+Y,B)
1030 C=ASC(SEG$(N$(X),Y,1))
1040 IF (B<>32)*(B<>C) THEN 1060
1050 E=E+1
1060 IF B<>32 THEN 1080
1070 G=G+1
1080 IF E=0 THEN 1140
1090 IF (B<>31)*(B<>42)*(G<>L(X)) TH
    EN 1120
1100 M=M+1
1110 GOTO 970
1120 IF E=L(X) THEN 1190
1130 NEXT Y
1140 LOC=2
1150 GOTO 1260
1160 LOC=0
1170 M=M+1
1180 GOTO 970
1190 CALL GCHAR(Z,M+L(X)+1,B)
1200 IF (B=42)+(B=32) THEN 1230
1210 M=M+1
1220 GOTO 1260
1230 CALL GCHAR(Z,M,B)
1240 IF (B=32)+(B=42) THEN 1290
1250 M=M+1
1260 NEXT X
1270 IF LOC=2 THEN 1160
1280 GOTO 940
1290 CALL HCHAR(Z,M,42)
1300 FOR L1=1 TO L(X)
1310 CALL HCHAR(Z,M+L1,ASC(SEG$(N$(
    X),L1,1)))
1320 NEXT L1
1330 CALL HCHAR(Z,M+L1,42)
1340 N$(X)="0"
1350 M=M+L1
1360 GOTO 970
1370 IF S$="P" THEN 1460
1380 H$="DONE-HIT c TO CONTINUE"
1390 ROW=24
1400 COL=4
1410 GOSUB 120
1420 CALL KEY(3,F,ST)
1430 IF ST=0 THEN 1420
1440 CALL CLEAR
1450 END
1460 OPEN #1:"RS232"
1470 FOR ROW=1 TO 23
1480 FOR COL=2 TO 31
1490 CALL GCHAR(ROW,COL,X)
1500 PRINT #1:CHR$(X);
1510 NEXT COL
1520 PRINT #1:CHR$(13)
1530 NEXT ROW
1540 CLOSE #1
1550 GOTO 1380
1560 REM BE SURE TO INCLUDE LINES 20
    00-2110

```

## Program 5: Apple Version

```

100 TEXT : HOME
110 HTAB 2: FOR X = 1 TO 38: PRINT "*"
    ;: NEXT X
120 VTAB 1: FOR Y = 2 TO 23: FOR X = 2
    TO 39 STEP 37: VTAB Y: HTAB X: PRINT

```

```

    "*" ;: NEXT X,Y
130 HTAB 2: VTAB 24: FOR I = 1 TO 38:PRINT
    "*" ;: NEXT I
140 A = 11: FOR F = 1 TO 16: A = A + 1: E
    = 18: READ A$
150 FOR B = 3 TO A: VTAB 19: HTAB B:PRINT
    " A$ : NEXT B
160 FOR C = 1 TO 10: HTAB 1
170 FOR D = 1 TO E: VTAB D + 1: NEXT D

180 HTAB A + 1: PRINT A$: HTAB A + 1: PRINT
    " : E = E - 1: NEXT C: NEXT F
190 FOR X = 1 TO 2000: NEXT
200 A = 19: FOR F = 1 TO 7: E = 18: READ
    A$: FOR B = 3 TO A - 1: VTAB 19: HTAB
    B: PRINT " A$ : NEXT B
210 VTAB 19: PRINT " *"
220 FOR C = 1 TO 13 - F: HTAB 1: FOR D
    = 1 TO E: VTAB D + 1: NEXT D
230 HTAB A: PRINT A$: HTAB A: PRINT "
    " : E = E - 1: NEXT C: POKE 1210,143
    : NEXT F
240 FOR X = 1 TO 19: READ A$: IF A$ =
    "0" THEN 270
250 VTAB 14: HTAB X + 9: PRINT A$
260 GOTO 280
270 VTAB 14: HTAB X + 9: PRINT " "
280 FOR Y = 1 TO 200: NEXT Y: NEXT X
290 FOR I = 1 TO 2000: NEXT : HOME
300 VTAB 4: INPUT "HOW MANY WORDS (MAX
    : 110)?" ; N
310 VTAB 7: INPUT "HOW MANY VERTICAL W
    ORDS (15-25 WORKS WELL)?" ; K
320 VTAB 10: INPUT "RESULTS ON SCREEN
    OR PRINTER (S OR P)?" ; S$
330 DIM N$(N),L(N)
340 FOR X = 1 TO N: READ N$(X): L(X) =
    LEN (N$(X)): NEXT X: HOME
350 INVERSE : FOR I = 1 TO 23: FOR J =
    1 TO 39: HTAB J: VTAB I: PRINT " "
    ;: NEXT J: NEXT I: NORMAL
360 DIM XL%(23): FOR I = 0 TO 7
370 XL%(I) = 1024 + 128 * I
380 XL%(I + 8) = 1064 + 128 * I
390 XL%(I + 16) = 1104 + 128 * I: NEXT I
400 FOR Z = 1 TO K: E = 0
410 R = INT ( RND (1) * N) + 1: IF N$(
    R) = "0" THEN 410
420 ROW = INT ( RND (1) * 23): COL = INT
    ( RND (1) * 40)
430 P = XL%(ROW) + COL
440 FOR X = 0 TO L(R) + 1: B = PEEK (X
    L%(ROW + X) + COL): C = PEEK (XL%(
    ROW + X) + COL - 1): D = PEEK (XL%(
    ROW + X) + COL + 1)
450 IF B < > 32 OR C < > 32 OR D < >
    32 THEN X = L(R) + 1: NEXT X: GOTO
    420
460 E = E + 1
470 NEXT X: IF E = L(R) + 1 THEN E = 0

480 POKE P,170: REM PLACE * ON EITHER
    SIDE OF WORD .
490 FOR X = 1 TO L(R): POKE (XL%(ROW +
    X) + COL), ASC ( MID$( N$(R),X,1))
    + 64
500 NEXT : POKE (XL%(ROW + X) + COL),1
    70: N$(R) = "0": NEXT Z: REM GET A
    NOTHER WORD
510 Z = 0
520 Z = Z + 2: L = 0
530 IF Z > 23 THEN 770
540 FOR X = 1 TO N: E = 0: G = 0

```



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```

550 IF N$(X) = "0" OR L + L(X) + 2 > 3
    9 THEN NEXT X
560 IF X > N THEN 520
570 FOR Y = 1 TO L(X)
580 B = PEEK (XL%(Z) + L + Y)
590 C = ASC ( MID$ (N$(X),Y,1)) + 64
600 IF B = 32 OR B = C THEN E = E + 1
610 IF B = 32 THEN G = G + 1
620 IF E = 0 THEN 660
630 IF B = 160 OR B = 170 OR G = L(X) THEN
    L = L + 1: GOTO 540
640 IF E = L(X) THEN 680
650 NEXT Y
660 NEXT X
670 L = L + 1: GOTO 540
680 B = PEEK (XL%(Z) + L + L(X) + 1)
690 IF B = 170 OR B = 32 THEN 710
700 L = L + 1: NEXT X: GOTO 520
710 B = PEEK (XL%(Z) + L)
720 IF B = 32 OR B = 170 THEN 740
730 L = L + 1: NEXT X: GOTO 520
740 POKE (XL%(Z) + L), 170
750 FOR L1 = 1 TO L(X): POKE (XL%(Z) +
    L + L1), ASC ( MID$ (N$(X),L1,1)) +
    64
760 NEXT L1: POKE (XL%(Z) + L + L1), 17
    0:N$(X) = "0":L = L + L1: GOTO 540

770 IF S$ = "P" THEN 790
780 GOTO 1030
790 PR# 1: PRINT CHR$ (9)"255N"
800 FOR X = 0 TO 23: B = 20: FOR Y = 0 TO
    39: IF Y > 0 THEN B = 0
810 A = PEEK (XL%(X) + Y): IF A = 160 OR
    A = 170 OR A = 32 THEN A = 237
820 B$ = CHR$ (A - 64)
830 PRINT SPC( B)B$; IF Y = 39 THEN
    PRINT
840 NEXT Y: NEXT X: PR# 0: PRINT : GOTO
    1030
850 DATA C,R,O,S,S,W,O,R,D, ,P,U,Z,Z,
    L,E
860 DATA P,R,O,G,R,A,M
870 DATA B,Y,O,W,I,L,L,I,A,M,O,L,O,E,
    R,C,H,E,R
1030 PRINT "      DONE-HIT 'C' TO CO
    NTINUE";
1040 GET F$: HOME : END
1050 REM BE SURE TO INCLUDE LINES 200
    0-2110

```

### Program 6: DATA Statements To Be Added To Each Version

```

2000 REM NUMBER OF WORDS = 110
2010 DATA ASSENT,ASTERISK,BAG,BITE,BOOT,BUF
    FER,BULK,CELL,CEMENT,CLAIM
2020 DATA CAT,PERSON,CHAIR,CAN,PAPER,NUMBER
    ,OWL,PLATE,CIRCLE,PENCIL,LIGHT
2030 DATA VICTORY,LETTER,DOORWAY,SAIL,LOVE,
    MOTHER,SON,DAUGHTER,CAR,HAPPY,WIN
    G
2040 DATA TOMORROW,TRUCK,BUSY,FEELINGS,SUN
    S,BRIGHT,SUMMER,PAINT,MOVIE,CHES
    S
2050 DATA TENNIS,NET,BALL,RACKET,COURT,PLAY
    ER,OFFICIAL,BOOTH,SCORE,POINT,THE
2060 DATA PINS,RACK,NEEDLES,CHAIR,STOOL,CEI
    LING,SOUND,PROFESSOR,TEACHER,SCHO
    OL
2070 DATA COMPUTE,KEYBOARD,BYTE,BIT,STOP,GO

```

```

,END,MICROCOMPUTER,SOLUTION,FINE
2080 DATA ROOM,SAD,JOY,PEACE,BOATING,RIVER,
    LAKE,SWIMMING,BOARD,GRASS,TOIL,TR
    EE
2090 DATA EGG,EXHALE,GLORY,ILLUSIVE,IMMORAL
    ,DESK,LET,LEVEL,MYSTERY,MYSELF,RU
    N
2100 DATA NAIL,TWO,MUTE,OFF,OFFER,PALM,PANE
    L,PENNY,CENT,DOLLAR,POLL,POLICE,H
    ELP
2110 DATA RENDER

```

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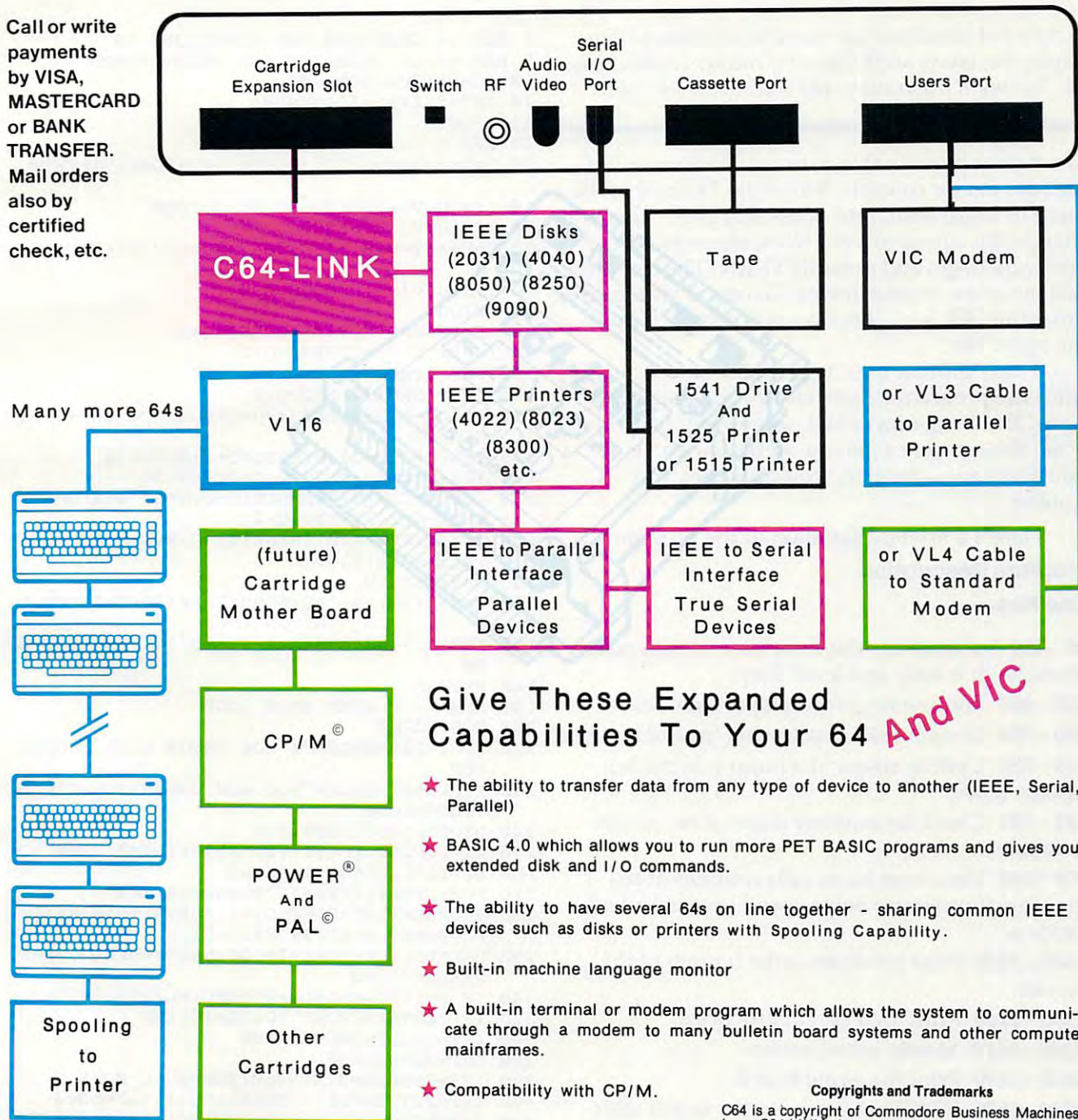
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Lester W. Cain

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The computer logic is not tournament quality, since the program checks moves only one level deep. The King moves lack somewhat, but, otherwise, the computer plays a pretty fair game. If you don't pay attention, you could get into trouble.

Here's a brief explanation of the program.

## Program Description

### Line Nos.

- 30 - 160 Subroutines the computer uses to scan its move. It is only one level deep.
- 200 - 480 Routine to get the player's move.
- 490 - 504 Error checks disallowing invalid moves.
- 509 - 580 Update arrays; if a jump was made, update score.
- 581 - 585 Check for another move; if so, go get next move.
- 700 - 880 Main scan loop; calls routines at beginning of program; helps speed up computer process.
- 1800 - 1820 Print prompts at the bottom of the screen.
- 1900 - 2160 Print logo and instructions.
- 2300 - 2470 Mostly initialization.
- 2600 - 2690 Print the game board.
- 2700 - 2850 POKE new array to the board after every move.
- 2870 - 3000 Update the scores.

```

1 REM -- CHECKERS FOR COMMODORE 64
5 REM -- GO INIALIZE AND PRINT BOARD
10 GOSUB1900:GOTO200
20 GETA$:IFA$=""THEN20
22 RETURN
29 REM -- COMPUTERS SCAN
30 U=X+A:V=Y+B:IFU<0ORU>7ORV<0ORV>7THEN80

40 IFS(U,V)=0THENGOSUB90:GOTO80
50 IFS(U,V)<0THEN80
60 U=U+A:V=V+B::IFU<0ORV<0ORU>7ORV>7THEN8
  0
70 IFS(U,V)=0THENGOSUB90
80 RETURN
90 IFV=0ANDS(X,Y)=-1THENQ=Q+2
95 IFABS(Y-V)=2THENQ=Q+5
100 IFY=7THENQ=Q-2
105 IFY=0ORU=7THENQ=Q+1
110 FORC=-1TOSTEP2:IFU+C<0ORU+C>7ORV+G<0T
  HEN130
115 IFS(U+C,V+G)<0THENQ=Q+1:GOTO130
120 IFU-C<0ORU-C>7ORV-G>7THEN130
125 IFS(U+C,V+G)>0AND(S(U-C,V-G)=0OR(U-C=X
  ANDV-G=Y))THENQ=Q-2
130 NEXTC:IFQ>R(0)THENR(0)=Q:R(1)=X:R(2)=Y
  :R(3)=U:R(4)=V
135 Q=0:RETURN
150 U=X+A:V=Y+B:IFU<0ORU>7ORV<0ORV>7THEN16
  0
155 IFS(U,V)=0ANDS(X+A/2,Y+B/2)>0THENGOSUB
  90
160 RETURN
199 REM -- PLAYER MAIN LOOP
200 GOSUB2700
220 IFCL=12THEND$="I WON TOUGH LUCK":GOTO1
  600
230 IFPL=12THEND$="YOU WON CONGRATULATIONS
  ":GOTO1600
240 D$=T$:GOSUB1800:Z=0
250 F1=1:F2=2:LO=SU+(22*CD)+1:L1=0:U1=0
260 L2=L1-1:U2=U1-1:KI=63
270 F=0:GETF$:IFF$<>""THENF=ASC(F$)
280 PE=PEEK(LO):POKELO,KI:FORT=1TO50:NEXT:
  PC=PEEK(LO+DI):POKELO+DI,1
290 POKELO,160:FORT=1TO50:NEXT:POKELO,PE:P
  OKELO+DI,PC
300 IF F=157THENIFL1>0THENL1=L1-1:LO=LO-3
320 IFF=19THENPRINT"{CLEAR}":END
340 IFF=13ORF=141THEN490
360 IFF=32THEN690
370 IFF=20ANDZ=0THEN250:REM NULL MOVE
400 IFF=29THENIFL1<7THENL1=L1+1:LO=LO+3
420 IFF=145THENIFU1<7THENU1=U1+1:LO=LO+3*C
  D
460 IFF=17THENIFU1>0THENU1=U1-1:LO=LO+3*CD
  
```



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" :MT\$="MY TURN":AM\$="ANOTHER MOVE

```

2450 C6$="C-64":SR$="{28 RIGHT}"
2460 POKE53281,15:PRINTCHR$(142)
2470 G=-1:R(0)=-99
2600 PRINT"{CLEAR}";:RT$="{03 RIGHT}":R$=CHR$(28)+"":B$=CHR$(144)+"":
2610 FORI=1TO4:FORJ=1TO3:PRINTRT$;
2620 FORL=1TO4:PRINT"{REV}";R$;B$;:NEXT:PRINT"{OFF}":NEXT
2630 FORK=1TO3:PRINTRT$;
2640 FORL=1TO4:PRINT"{REV}";B$;R$;:NEXT:PRINT
2650 NEXTK,I:PRINT"{BLK}";
2660 PRINT"{HOME}{02 DOWN}";SR$;C6$;"":PL$=SU+3*CD+27:J=SU+3*CD+32
2680 POKEI,Z2:POKEI+DI,RC:POKEJ,Z1:POKEJ+DI,BC
2690 RETURN
2699 REM UPDATE BOARD
2700 D1=SU+CD+1:FORJ=7TO0STEP-1:FORI=0TO7
2710 IFS(I,J)=0THENPOKEI,160:POKEI+DI,0:GOTO2850
2720 IFS(I,J)=1THENPOKEI,Z1:POKEI+DI,RC:GOTO2850
2730 IFS(I,J)=-1THENPOKEI,Z2:POKEI+DI,BC:GOTO2850
2740 IFS(I,J)=2THENPOKEI,Z3:POKEI+DI,RC:GOTO2850
2750 IFS(I,J)=-2THENPOKEI,Z4:POKEI+DI,BC:GOTO2850
2850 D1=D1+3:NEXT:D1=D1+96:NEXT
2860 REM -- UPDATE SCORE
2870 PRINT"{HOME}{05 DOWN}";SR$;C1;"":PL
3000 RETURN
  
```

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# Programming Multicolor Characters On The VIC

Bill McDannell

*If you know how to create standard programmable characters, you can create four-color characters and multicolor graphics. Here's how to select colors for the screen, border, character, and auxiliary colors. For the unexpanded VIC.*

In order to understand the creation of multicolor characters on the VIC-20, you must first have a working knowledge of standard programmable characters. You can easily pick this information up from the *Programmer's Reference Manual*, or from some excellent articles in past issues of **COMPUTE!**.

For standard programmable characters, drawing is done using an eight by eight grid. Each point on the grid represents one bit, which is turned either on or off by designating a value of one or zero for the bit.

You can use as many as four colors in one character when using multicolor graphics. Since you must designate one of four color choices, rather than simply on or off, you cannot program each individual bit. However, if adjacent bits are combined to produce a piece of information, you have four choices:

1. Both bits off (00)
2. First bit off, second on (01)
3. First bit on, second off (10)
4. Both bits on (11)

You now have the four possibilities necessary to designate four colors, but you have them at the sacrifice of horizontal resolution. Since it takes two bits to specify a color, you will be able to specify only four individual blocks of color across one horizontal line of your character (as opposed to the eight blocks available with a standard character). You still have eight vertical rows available.

## Available Colors

Each possible two-bit value corresponds to a specific selectable color.

00 = screen color  
01 = border color  
10 = character color  
11 = auxiliary color

For border and character colors, you have the choice of the eight standard VIC colors. For screen and auxiliary colors, you can choose from the 16 colors depicted in the screen and border color chart in the back of your owner's manual. More about selecting individual colors later.

First, let's see how we designate our four initial choices. The figure shows the same programmable character in both standard and multicolor mode. Notice that the numerical value of each horizontal byte is the same. The DATA statements you use to create each character are identical. The difference is that in the multicolor mode, each pair of bits is combined and read as one nybble to identify the appropriate color group.

## Getting Into Multicolor

Accessing multicolor mode and setting the desired character color are done simultaneously. For standard characters, you POKE the appropriate screen location to the desired color using the numbers zero (black) through seven (yellow). To go into multicolor mode, you simply add eight to the desired color value. This both selects your character color and sets that particular character to multicolor mode. For example, POKEing screen location 38400 to a value of 15 would both change the character color in the upper left corner of the screen to yellow, and turn on the multicolor mode in that space.

Setting border and screen colors is done the same as always: by POKEing 36879 to the desired value from the color chart in your user's manual (POKE 36879,9 will give you a black screen and a white border).

The choice of auxiliary color is made, believe it or not, in the same memory location you use to control volume, with a POKE to location 36878.



There are 256 possible values for this POKE location (0-255), and each of the consecutive 16 values corresponds to one of the 16 available colors, in descending order, from the chart.

In other words, any value between zero and 15 POKEd into location 36878 will produce an auxiliary color of black. Values 16 through 31 will produce white, and so forth. This creates a slight problem when we're writing a program where we want to control both volume and multicolor graphics. We can solve it with this formula:

$$\text{POKE } 36878, A * 15 + V$$

A is the number of the desired color (0 is black, 1 is white, etc.), and V is the desired volume.

That's what you need to know to create multicolor graphics. The rest of the operation is identical to creating standard graphics.

These two programs illustrate how to use multicolor characters. The first program creates a four-color spaceship and moves it down the screen. The spaceship is drawn using two separate characters and POKEing them side by side.

The second program is a coloring game my children seem to love. It allows you to choose the colors in which the character will be drawn. I created the character using a grid that is five characters wide and five deep, and which yields a 20 x 40 area of programmable blocks. The screen and border colors are set to black and white by the program. You select the auxiliary color and three different areas of character color. Because character color blocks are set individually, a multicolor figure consisting of more than one character can be programmed to more than four colors. In this case, I could have selected up to 28 different colors for the figure. Six were sufficient.

### Program 1: Four-Color Spaceship

```
10 PRINT "{CLEAR}"
100 POKE36869,255
105 POKE36879,61
110 FORI=7168TO7679:POKEI,PEEK(I+25600):NEXT
130 FORI=7176TO7191
150 READA:POKEI,A:NEXT
154 X=7690:C=30720
155 POKEX,1:POKEX+C,10:POKEX+1,2:POKEX+C+1,10
156 FORT=1TO80:NEXT:POKEX,32:POKEX+1,32
157 X=X+22:IFX>8185THEN154
158 GOTO155
160 DATA8,2,5,23,85,93,85,40,32,128,80,212,85,117,85,40
```

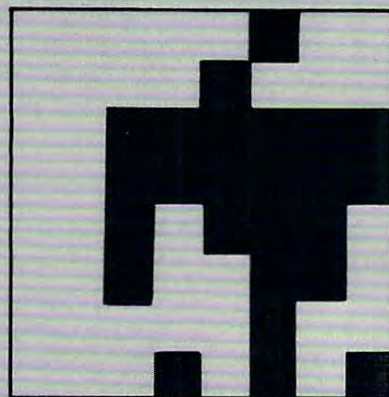
### Program 2: Coloring Game

```
10 PRINT "{CLEAR}"
20 PRINT "{10 DOWN} JUST A MINUTE..."
110 FORI=7168TO7679:POKEI,PEEK(I+25600):NEXT
120 FORI=7176TO7375
130 READA:POKEI,A:NEXT
139 POKEX+89,10:POKEX+89+C,10
140 DATA48,252,239,235,235,235,232,232,235
```

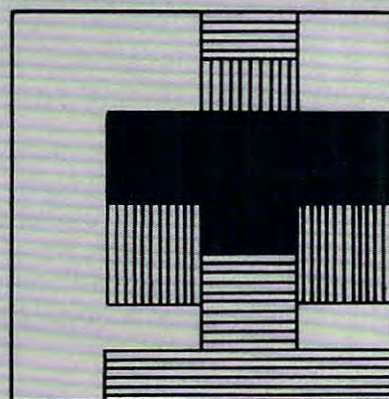
#### Draw

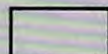
128	64	32	16	8	4	2	1	
0	0	0	0	0	1	0	0	=4
0	0	0	0	1	0	0	0	=8
0	0	1	1	1	1	1	1	=63
0	0	1	1	1	1	1	1	=63
0	0	1	0	1	1	1	0	=46
0	0	1	0	0	1	1	0	=38
0	0	0	0	0	1	0	0	=4
0	0	0	1	0	1	0	1	=21


#### Standard





#### Multicolor



 = screen color

 = border color

 = character color

 = auxiliary color

Same programmable character in both standard and multicolor mode.