Constructing The Ideal Computer Game

COMPUTE!

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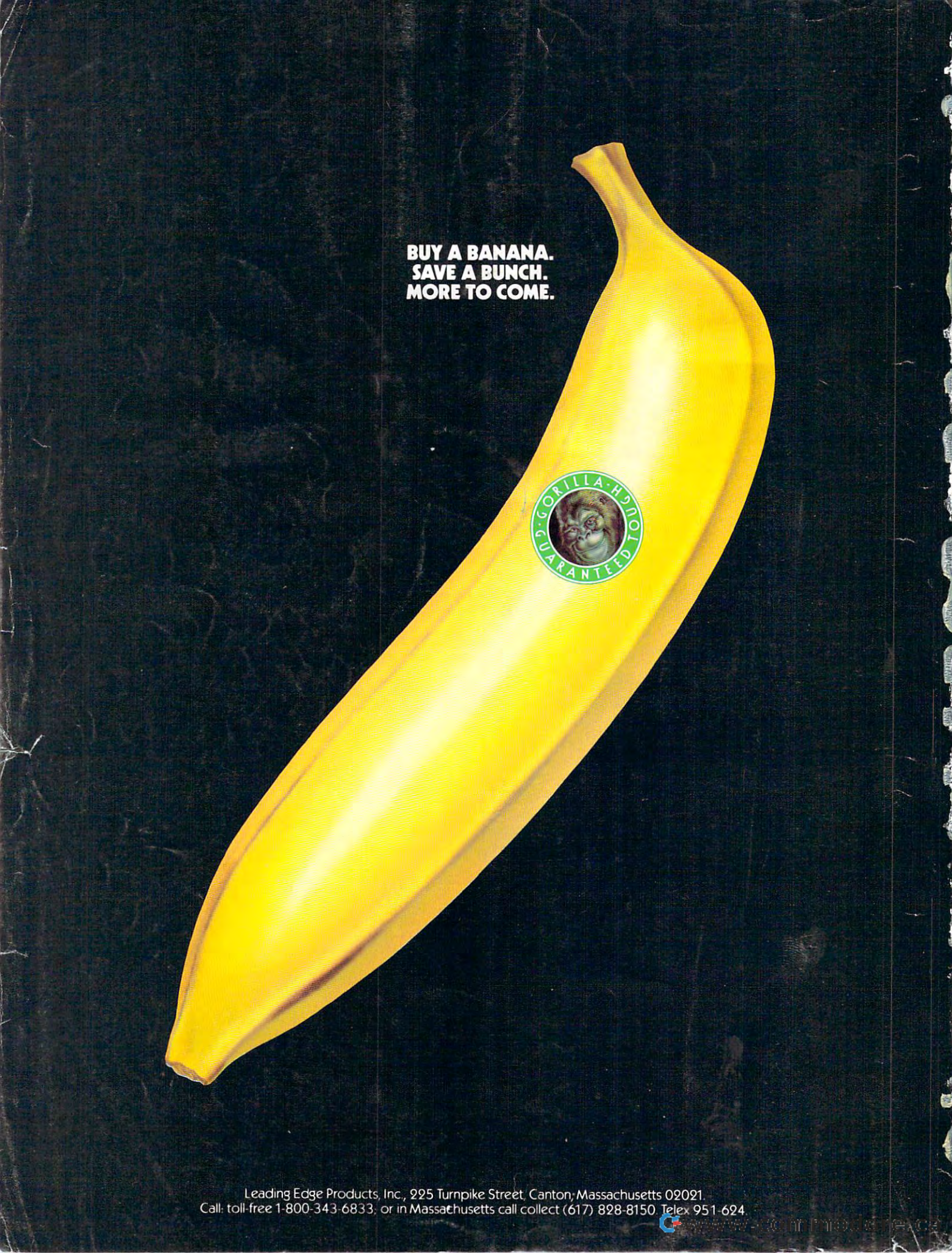

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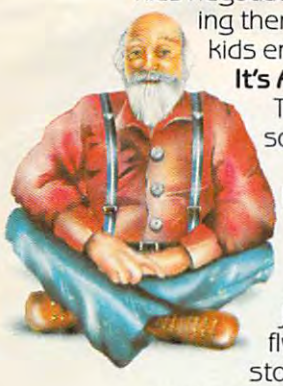

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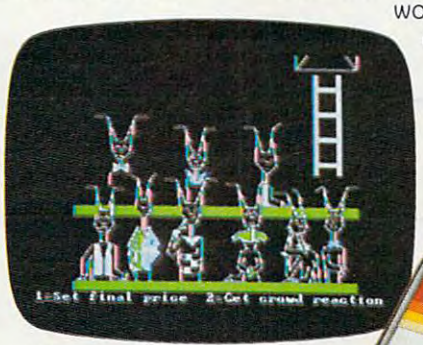

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AP Apple, **AT** Atari, **P** PET/CBM, **V** VIC-20, **O** OSI, **C** Radio Shack Color Computer, **64** Commodore 64, **T/S** Timex/Sinclair, **TI** Texas Instruments , *All or several of the above.

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EDITOR'S NOTES

The Magazine Epidemic

It's mildly distressing to observe the rash of new computer magazines in preparation or now being launched. While some appear to be the result of dedicated, sincere efforts at serving a market niche, and serving it well, many seem to be efforts to simply get something on the shelf.

It would seem that every publisher, large and small, in the country has suddenly discovered the personal computer marketplace. We welcome those of you providing genuine readership; we'll reserve comment on those of you who are slapping a computer label on inferior editorial matter as a medium for selling advertising. We're firm believers in the inherent decision-making strength of the free marketplace. Time will tell.

The New Computers

Will the surge of intelligent keyboards for game machines have a massive impact on personal computer sales? We think not. With Atari, Commodore, and TI battling it out in the price trenches, we expect to see the less than $100 market begin to expand in the features area. Principal change: more memory at less cost. And we'll just keep growing from there.

Random Bits

IBM's home computer (code name Peanut) is now rumored to appear by August. We expect this baby PC to come in as a mid-market machine with superb design, lots of support, and a slightly high price point in the $600 range. From a marketing/value added standpoint, the IBM name and reputation carries clout and has consumer impact. If and when it arrives, it will be an interesting competitor for the Commodore 64 and the soon-to-be-introduced Atari 600 and 800XL.

We hear that John Wiley, the book publishing house, is hard at work setting up a magazine staff to launch a personal computer magazine. Atari, Inc. has decided to accept advertising in their users magazine. As with Commodore publications, expect serious restraints on what type of advertising is allowed. Rumor has it that Atari won't be accepting game software advertising. We find *that* one hard to believe.

CBS is now looking for an entry into the computer magazine market. Rich Richmond, formerly Adventure International Marketing Manager, prepares to launch an Atari magazine (should we say "Another one..."?). All of this after unsuccessfully trying to raid **COMPUTE!**'s staff for several weeks.

Commodore, now in the publishing business, has become distant with **COMPUTE!** and *COMPUTE!'s Gazette* editors. We've always maintained that there's intrinsic value in independence.

Next month: The Consumer Electronics Show and a flock of exciting new products. We just returned from the National Computer Conference in Anaheim and, as far as the personal/home market goes, it simply makes us long for the arrival of CES. One point worth noting: several hundred exhibitors at this multi-million dollar show were housed in quasi-permanent, inflatable Quonset huts. Air conditioning failed and by late Monday, May 16, internal temperatures approached 115. So much for state-of-the-art technology at a state-of-the-art show.

Robert Lock

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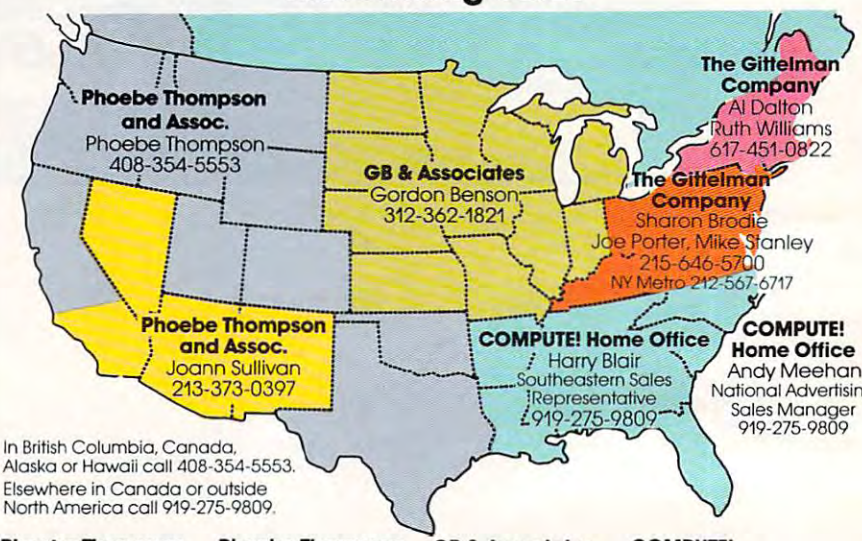

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READERS' FEEDBACK

The Editors and Readers of COMPUTE!

64 Screen Problems

I own a Commodore 64 computer. While I am quite pleased with its performance, there is a problem. Any program that uses the BASIC commands GET or INPUT causes severe interference in the form of many white (silver) horizontal lines which shoot across the color TV screen.

I also purchased some software (namely *The Word Machine* and *The Name Game*) from Commodore and these programs exhibit that same, quite annoying, problem. I might add that three friends here in Albany who also own the C-64 have the exact same problem. I have heard that Commodore replaced a video chip in the later models (of which mine is one) and that there are problems with this new chip.

My question is: will Commodore solve what may be a very large (in number of computers) problem? My warranty is close to expiration.

Donald G. Weiser

This is probably the question we're asked most about the Commodore 64. The problem that you are referring to has come to be known as "sparkle."

The problem starts with the 64's character ROM, and the sparkle is caused by the way the 64 generates its characters to put onto the screen.

However, this problem can be more than a mere inconvenience in the early machines. It can cause difficulties with some programs, especially games. When utilizing the advanced 64 Sprite features (user defined, moveable objects), the sparkles can cause the computer to register a sprite collision when none has occurred.

There are some solutions. One is to make a few hardware modifications inside the 64, but this solution is frowned upon by Commodore, and may void your warranty. Another is screen relocation. It is said that if you relocate the screen memory into another area of RAM, the sparkle will disappear.

As for the number of units plagued by this problem, Commodore's estimate is five percent. It should be noted though, that almost all of the early models had sparkle, and as of this writing the problem is apparently still not solved. As a matter of fact, **COMPUTE!** *recently purchased two 64s for testing purposes, and one has a very severe "sparkle" problem.*

In answer to your question on repairs, Commodore has no set policy in this area. For units that are under warranty, Commodore says that it will attempt to repair anything with which the customer is dissatisfied.

Concerning units out of warranty, Commodore had no comment. However, a number of computer dealers and repair centers have stated that they will install the new or updated character ROMs if they can get them from Commodore. Commodore has said that they have not yet decided whether or not they will make the new character ROMs available to the service centers.

A Timex/Sinclair Tip

I have sometimes experienced problems on my ZX81 while changing line numbers. A line 30 that I am unable to delete, for instance, might appear after a line 2000. As a solution of sorts, I came up with the following short routine (also applicable to the T/S 1000) which allows me to locate the line in memory and POKE in a valid line number. This routine gives the location in memory of a program by line number. RUN it by typing GOTO 9500 . After INPUTing a particular line number, it will tell you the length of that line and how long the program is through the end of that line. As you can see in the sample run, the portion of the program considered here is 516 bytes long (incidentally, line 1 will not work in this test).

John B. Swetland

```
1 LET TEST=9500
10 LIST
9500 PRINT"ENTER LINE NUMBER"
9502 PRINT
9503 INPUT AQ
9504 LET N=16509
9505 LET N=N+2
9506 LET N=N+(PEEK N)+(PEEK(N+1)*256)
9507 LET N=N+2
9508 IF (PEEK N*256)+(PEEK(N+1))=AQ THEN
      PRINT;"LINE ";AQ;" STARTS AT ";N
9509 IF (PEEK N*256)+(PEEK(N+1))=AQ THE
     N GOTO 9511
9510 GOTO 9505
9511 PRINT
9512 LET I=(N+50)
9513 FORR J=N TO I
9514 IF PEEK J=118 THEN PRINT"LINE ";AQ;"
       ENDS AT ";J
9515 IF PEEK J=118 THEN GOTO 9517
9516 NEXT J
9517 PRINT
```


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Right now, no one knows. This is partly because many would consider the very idea frivolous. But it's also because whoever successfully answers this question must first have answered several others.

Why do we cry? Why do we laugh, or love, or smile? What are the touchstones of our emotions?

Until now, the people who asked such questions tended not to be the same people who ran software companies. Instead, they were writers, filmmakers, painters, musicians. They were, in the traditional sense, artists.

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These are wondrous machines we have created, and in them can be seen a bit of their makers. It is as if we had invested them with the image of our minds. And through them, we are learning more and more about ourselves.

We learn, for instance, that we are more entertained by the involvement of our imaginations than by passive viewing and listening. We learn that we are better taught by experience than by memorization. And we learn that the traditional distinctions — the ones that are made between art and entertainment and education — don't always apply.

TOWARD A LANGUAGE OF DREAMS.

In short, we are finding that the computer can be more than just a processor of data.

It is a communications medium: an interactive tool that can bring people's thoughts and feelings closer together, perhaps closer than ever before. And while fifty years from now, its creation may seem no more important than the advent of motion pictures or television, there is a chance it will mean something more.

Something along the lines of a universal language of ideas and emotions. Something like a smile.

The first publications of Electronic Arts are now available. We suspect you'll be hearing a lot about them. Some of them are games like you've never seen before, that get more out of your computer than other games ever have. Others are harder to categorize — and we like that.

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SOFTWARE ARTISTS? "I'm not so sure there *are* any software artists yet," says Bill Budge. "We've got to earn that title." Pictured here are a few people who have come as close to earning it as anyone we know.

That's Mr. Budge himself, creator of PINBALL CONSTRUCTION SET, at the upper right. To his left are Anne Westfall and Jon Freeman who, along with their colleagues at Free Fall Associates, created ARCHON and MURDER ON THE ZINDERNEUF.

Left of them is Dan Bunten of Ozark Softscape, the firm that wrote M.U.L.E. To Dan's left are Mike Abbot (top) and Matt Alexander (bottom), authors of HARD HAT MACK. In the center is John Field, creator of AXIS ASSASSIN and THE LAST GLADIATOR. David Maynard, lower right, is the man responsible for WORMS?

When you see what they've accomplished, we think you'll agree with us that they can call themselves whatever they want.

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```
9518 PRINT"LINE ";AQ;" IS ";J-N;" BYTES L
     ONG"
9519 PRINT
9520 PRINT J-16509;" BYTE PROGRAM (PLUS D
     IMS)"
9600 STOP
9990 INPUT H$
9991 SAVE"TEST"
9992 GOTO 1
9509 IF (PEEK N*256)+(PEEK(N+1))=AQ THEN
     GOTO 9511
9513 FOR J=N TO I
```

Sample Run

```
ENTER LINE NUMBER
LINE 9600 STARTS AT 17020
LINE 9600 ENDS AT 17025
LINE 9600 IS 5 BYTES LONG
516 BYTE PROGRAM (PLUS DIMS)
```

Thank you for this handy tip. We can see where this program might also be useful in handling machine language routines.

VIC Memory Loss Cure

When using programmable characters, you lose some of your present memory. Is there any way to regain that memory without turning off the VIC?

Brian Gaetjens

Yes, and it can be done with a few easy POKEs. The most common way that memory is reserved for programmable characters is by POKEing locations 51 and 52 (the "pointer" for string storage in RAM), and locations 55 and 56 (the pointer for the limit, or "top," of memory). In the unexpanded VIC, the most common way to reserve character set space is to: POKE 51,0: POKE 55,0: POKE 52,28: POKE 56,28. This will reserve, or partition off, 512 bytes (enough for 64 programmable characters) at the top of BASIC RAM, leaving the programmer with 3069 bytes for BASIC programs. To reset the VIC to its original parameters, type: POKE 51,0: POKE 52,30: POKE 55,0: POKE 56,30. This will restore the VIC to its original configuration, and give you 3581 bytes for BASIC programming.

Monitor Sound

I currently have a 48K Atari 800 with a PERCOM disk drive. I would like to connect my computer to an RGB color monitor instead of a TV. But in doing so, I would lose all audio. Is there a way to have the sharpness of a color monitor and yet retain the sound capability necessary for the majority of Atari programs?

John C. Nardi

First of all, check the particular brand of color monitor you intend to buy. Some monitors do have a built-in audio capability. Other solutions would be to connect the audio output signal (pin 3 of the Atari's monitor plug) to your stereo system, or to an inexpensive, battery-powered amplifier available at most electronics supply houses.

An Atari/Commodore 64 Connection

Can an Atari 810 or other Atari disk drive be interfaced to a Commodore 64? I am thinking of buying a 64 as a second computer and would like to use my present Atari peripherals on the 64. Also, can the 64's SID sound chip be hooked up to an Atari?

David Lee

Both machines could communicate over a telephone modem hookup. Alternatively, you could hook them up directly using Commodore's RS-232 cartridge and Atari's 850 interface module (through its RS-232 port). You would likely be unsatisfied, though, at the slow rate by which data would be transferred between the two computers. Likewise, attempting to communicate to the SID chip from the Atari would be awkward. The whole would probably be less than the sum of the parts if you tried to gang these computers together and think of them as a team.

Atari and Commodore use very different peripheral buses (interface plugs). Although both have a serial bus, the 64 uses a variant of the popular RS-232C bus, while the Atari uses a complex serial standard.

VIC Disk Details

I own a Commodore VIC-20. I need a disk drive now, but I do not want to get a 1541 because I may upgrade to a PET in the future and do not want to buy a whole new drive. If I use a VIC to IEEE-488 interface to a 2031 drive, will I retain all the standard Commodore disk commands? Will I need DOS for the 2031 or the 1541? Please help.

Larry Abramowitz

You will retain all of the standard commands. One of the main reasons for the manufacturing of an IEEE-488 interface is for upgrade adaptations like the one you're contemplating. There are several such interfaces on the market now. DOS is built into both the 2031 and the 1541.

Automatic BASIC To Machine Language Converter

Is there anything on the market that will convert standard BASIC programs into machine language? I need this for my Commodore 64 and its graphics.

Ben Savage

Your question is about speed: a program written in machine language can run a thousand times faster than the same thing programmed in BASIC. Some games,

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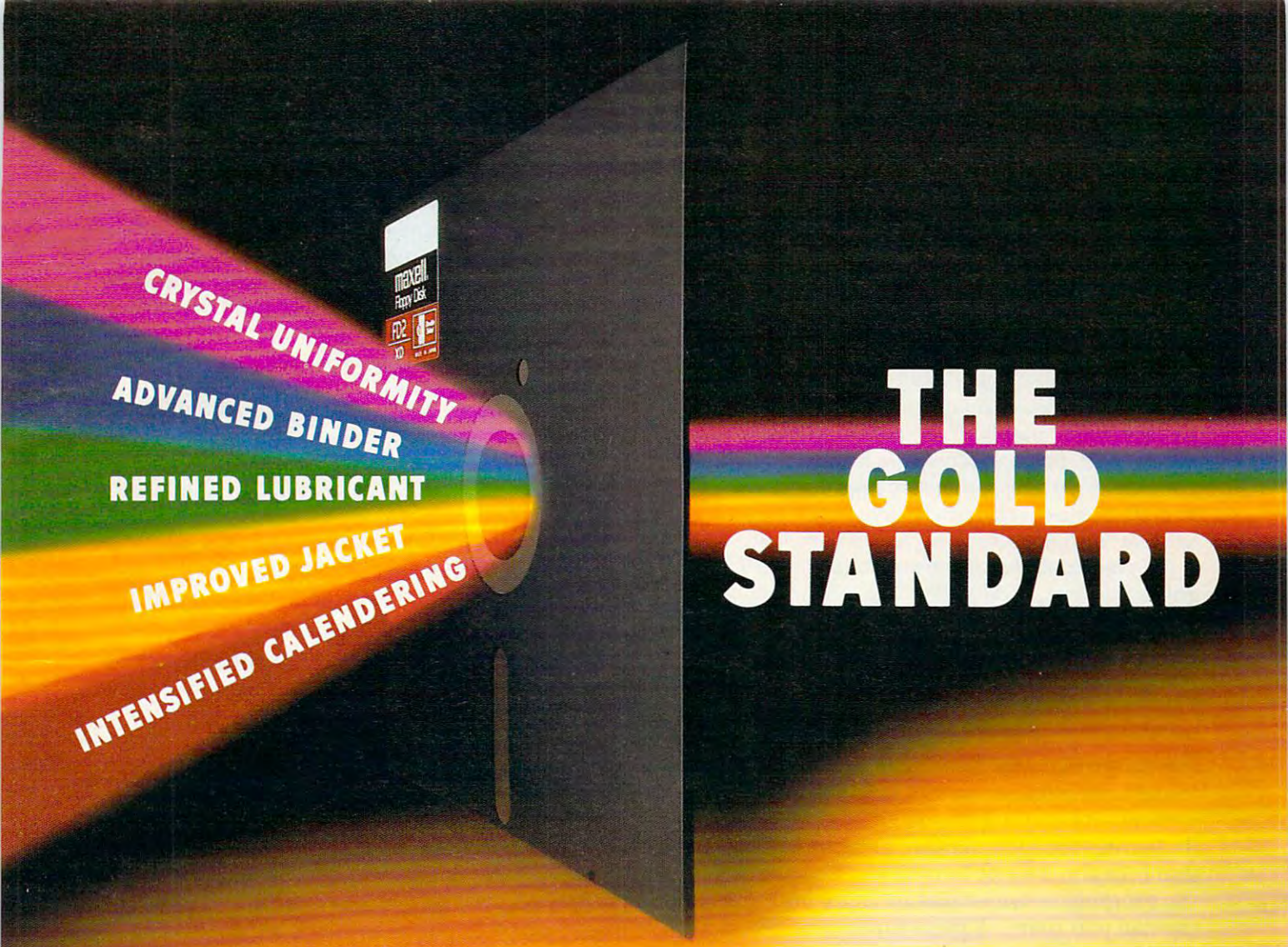

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large sorting tasks, and other kinds of computation require that the computer run at maximum velocity. That means machine language.

There are large programs called compilers *which do something similar to what you want. They take a BASIC program apart and generate a high-speed version written in "P-code," a fast-running language similar to Forth. You can expect a "compiled" BASIC program to run anywhere from 10 to 40 times faster. One minor drawback is that the compiled program will usually be somewhat larger than the original BASIC version.*

There are also "optimizing" compilers which, during the process of compilation into P-code, also rearrange the program's structure to maximize efficiency. For example, the most commonly used variables in the program might be stored in zero page (the computer's first 256 memory cells) where storage and retrieval is far faster than it would be higher up in memory.

In any case, there is no way to turn BASIC programs into true machine language. You might want to use compilers for some programs, but also learn to program in machine language for those situations when speed is of the essence. Compiler programs for various computers are advertised in **COMPUTE!**.

Retirement Planning

I read with interest the article in **COMPUTE!** on retirement planning (April 1983). It is reassuring that retirement planners are finally acknowledging that inflation may be here to stay. Unfortunately, the program assumes that inflation will stop on the day you retire. A pleasant assumption, but one that could result in a lot of retirees who may not be able to afford subscriptions to **COMPUTE!** ten years down the road.

I have found the following program extremely useful for computing with my Atari 400, how much capital I would actually need in order to retire early. The program assumes:

1. That inflation will continue at a constant rate, and your yearly expenses will increase at this rate.

2. That you wish to spend your capital after retirement.

```
10 ?"ENTER CAPITAL AT RETIREMENT":
   INPUT A:?
20 ?"ENTER EXPECTED RATE OF INFLATION":
   INPUT B:?
30 ?"ENTER YEARLY ANTICIPATED RETURN
   ON INVESTMENTS AFTER TAXES AND
   INFLATION:INPUT C:?
40 ?"ENTER YEARLY EXPENSES LESS ANY
   INDEXED PENSION PLAN OR SOCIAL
   SECURITY BENEFITS":INPUT D:?
50 ?:?"YEAR";,"INCOME";,"CAPITAL"
55 Y=0
60 INC=INT(D*(1+B/100)^Y)
70 Y=Y+I
80 Z=B+C
90 A=INT(A*Z/100+A)-INC
100 ?Y,INC,A
110 IF A<0 THEN ?"CAPITAL EXHAUSTED":END
120 GO TO 60
```

Craig Cole

More Atari Automation

I'm writing in response to Joseph Wrobel's program, "Automate Your Atari" (January 1983). The following program neatly displays your disk directory (in two columns if necessary) each time you boot up your system. Just run "Automate" and enter each line below for each command. For example, command #1 would be 10 GR.0: DIM N$(17):T.60 and command #8 would be RUN without a line number. Since "Automate" counts characters, all spaces have been removed, end quotes are left off where possible, and abbreviations are used.

Rainer Forsch

```
1Ø GR.Ø:DIMN$(17):T.6Ø
2Ø POS.2,3:PRINT"FILES CONTAINED ON THIS
  DISKETTE ARE:
3Ø O.#1,6,Ø"D:*,*":PRINT
4Ø I.#1;N$:PRINTN$:T=T+1:IFT=14THENGOS.7Ø
5Ø G.4Ø
6Ø POKE82,2:PRINT:POS.2,2Ø:NEW
7Ø POS.2,4:POKE82,2Ø:PRINT:RET.
RUN
```

PET Pause

While trying out one of Commodore's Model 8032 microcomputers, I stumbled upon a key function which would be handy for program debugging. I mentioned it to one of my instructors at Wake Forest, and he suggested that I share it with your readers.

Stopping program listing or execution can be useful for finding statement errors or viewing intermediate results of a calculation. Formerly, the only way to stop a program and the screen scroll was with the RUN/STOP key. This necessitates typing in the CONT command and pressing RETURN in order to resume execution. However, if the program is stopped by means of the colon key on the top row, scrolling may be resumed merely by tapping the back-arrow key, which also serves to slow the scroll if held down.

Interestingly enough, if a pure timing loop is running, the colon key will not halt execution. However, inclusion of a PRINT statement in the loop will enable the colon/halt function.

Jonathan Kerfoot

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Computers And Society

David D. Thornburg, Associate Editor

The Fifth Generation

I can hardly resist the temptation to point out that Orwell's vision for 1984 is (thankfully) not going to come true. It is interesting to note that, as with many other futurists, Orwell overestimated the amount of social change that would occur by 1984, and seriously underestimated the amount of technological innovation that will have been developed by then. While it is true that office workers in Orwell's novel dictate their letters into a "speak write," an automated stenographer/printer, much of the remaining technology is neither advanced nor inspiring.

I was reminded of the impact of technological advances as I created the first draft of this month's column on my Brother EP-20 battery-operated electronic typewriter. This marvel of design is quite compact, fits on an airplane tray table, and is almost silent. Since it retails for about $200 and allows the user to correct up to 16 characters of text before it is printed, I would not be surprised to see this device open up whole new markets for typewriters. I never used a typewriter for rough drafts before, simply because they were too bulky. Now, this device has become my portable workstation (sadly missing the storage that would make it a terminal for my word processor), and I take it everywhere.

Is it significant that this innovation was developed by a Japanese company? As we look at the computer industry, it is clear that it is taking on a decidedly international flavor. And yet, so far, the big names in personal computers are definitely American (TI, Commodore, Atari, Apple, IBM, etc.).

KIPS Super Computer

A recently published book, *The Fifth Generation* (Addison-Wesley, $15.95), suggests that we must be much more aware of Japanese advances in computer technology if we are to survive as a technological nation. Far from being a "scare" book designed to erect protectionist trade barriers, *The Fifth Generation* is more a call to arms. Its authors are Edward Feigenbaum, a pioneer in the field of artificial intelligence, and Pamela McCorduck, a science writer who has written extensively on computers and intelligent behavior in machines. The authors say that Japan has embarked on a ten-year crash program to develop a new type of super computer – a "fifth generation" machine that is called a Knowledge Information Processing System (KIPS). The KIPS is expected to be markedly different in architecture from the computers in use today. Furthermore, it is expected that users of the KIPS will interact with it very differently from the way people use computers today.

What is a KIPS? While most of today's computers are used for data processing and, with the exception of languages like LISP and Logo, most computer languages are geared towards data processing tasks, the KIPS is an optimized blend of hardware and software, tailored to perform general symbol manipulation and symbolic inference. This shift in emphasis recognizes that most of our work is nonmathematical in nature. Much of our work involves reasoning, not calculating.

A Reasoning Machine?

Can one build a "reasoning" machine? According to Feigenbaum and McCorduck, the Japanese lack our preoccupation with this question. From their perspective, it is sufficient to note that computer systems powerful enough to be fifth generation machines will function at a level far beyond that with which we are presently familiar.

Modest projects in the development of systems that outperform human "experts" are an important result of research in artificial intelligence. For example, programs that perform certain types of medical diagnoses, analyze and propose synthetic pathways in the creation of new chemical compounds, and predict the location of geological deposits have already been implemented on existing commercial computers using languages such as LISP. Such programs must operate with both a "knowledge base" and a set of "inference procedures." To read a map, for instance, one

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must have both maps to read and a procedure for reading them.

Intuitive Solutions

The fifth generation KIPS will be built around the collection of vast amounts of data and the collection of problem-solving techniques that range from rigid deterministic methods to those that mimic the human ability to act on "hunches." You need not become embroiled in the machine intelligence controversy to appreciate that such systems have the potential to completely redefine computers, their use, and their place in society.

In order to create the KIPS, advances are required in both computer hardware and software. The computers we are familiar with operate in serial fashion. Instructions are executed one at a time. This type of computer architecture was developed by John von Neumann, and speed limitations in such computer systems are caused by the "von Neumann bottleneck" – processing instruction by instruction, byte by byte. In order to create faster computers, the fifth generation machines may favor a system using many processors in parallel.

A Billion Inferences Per Second

To appreciate the need for this approach, you should remember that the KIPS is to be used primarily for the linking of a knowledge base by symbolic representations (e.g., a *sparrow* is a *kind of bird*), or for the representation of rules (e.g., *if* the temperature is over 400 degrees, *then* the boiler must be turned down). To be used effectively, a problem-solving program must scan its library of "IFs" to find one relevant to the problem at hand. Finding this needle in the knowledge-based haystack of the size anticipated by the Japanese will require much more computational horsepower than we have seen to date. For example, today's big computers are capable of executing no more than 100,000 logical inferences per second (LIPS). (One logical inference corresponds to one IF/THEN statement.) A personal computer such as an Apple II might execute (depending on the language chosen) about 100 LIPS. The KIPS will be designed to execute up to a *billion* LIPS.

Such achievements are not the result of hardware alone. Interestingly, the language of present interest to the KIPS project leaders has already been developed by the Europeans – PROLOG.

How feasible is this project? There is much diversity of opinion on this topic, but there is consensus that, even if the project goals are not met in the allotted ten years, the interim results will most certainly change the nature of computers and computing. As Feigenbaum and McCorduck say:

Word literacy has given us power, access to an opulent, soaring world of mind – an alteration of thought processes – that is denied the illiterate. Computing literacy, even in its present form, opens still another world, one that all eventually may enter as routinely as they enter the world of letters, and it will confer perhaps even more power than the mighty pen and press have already given us. This is not idle promotion. As human muscle-power has been amplified by many special-purpose machines, so human mind-power will be amplified. The computer will change not only what we think, but how. ©

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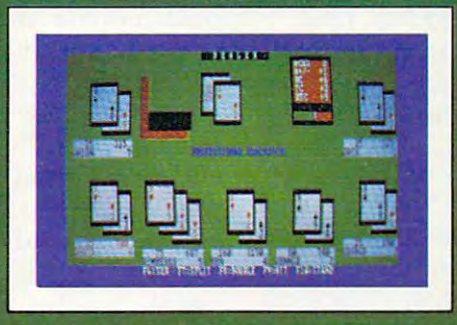

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THE BEGINNER'S PAGE

Richard Mansfield, Senior Editor

Writing A Simulation Game

There are three basic types of computer games: arcade, adventure, and simulation games. Let's briefly look at the characteristics of arcade and adventure games and then write a simulation.

Realtime Action

Arcade games feature what's called *realtime* action. Unlike chess or bridge, things happen fast. You can't sit back and plan your next move; you must react immediately to the space invaders. In other words, events take place at the same speed as they would in reality: realtime.

Arcade games also have a strong appeal to the eye and ear. There is much animation, color, and sound. In fact, your ability to respond quickly and effectively depends in part on all the clues you get from the graphics and sound effects. Strategy, while often an aspect of arcade play, is clearly secondary. These games are a new kind of athletics: the fun of man versus machine. Like auto racing, arcade games are essentially isometric exercises – you don't run around; you just stay in one place flexing and unflexing your muscles, tensing and relaxing.

Story And Strategy

Strategy, however, is more important in "adventure" games. The emphasis is on planning ahead and solving riddles. It can be like living inside an adventure novel. There is drama, characterization, and plot. You might start out, for example, in a forest with a shovel and a trusty, if enigmatic, companion parrot. As you try to figure out what to do next, the parrot keeps saying "piny dells, piny dells." After wandering aimlessly through the trees, it suddenly comes to you that the bird is saying "pine needles" and you dig through them and find a treasure map.

Your "character" will travel, meet friends and enemies, and have the opportunity to pick up or ignore potentially useful items such as food, magic wands, and medicine. It's customary that you cannot haul tons of provisions. You'd have to decide whether or not to leave the shovel in the forest. Yet you might be sorry that you'd dropped it if you're involved in a cave-in later in the game.

In any case, adventure games are fundamentally verbal. The computer displays the words:

```
YOU ARE IN A BOAT ON A LAKE. NIGHT IS
FALLING.
```

to which you can respond in any number of ways. You might type:

```
DIVE OFF BOAT.
```

and the computer would reply that you now see an underwater cave or whatever. You move through the scenes the way a character moves through a novel. There is generally no penalty if you take time to plan your next move. It's not *realtime*.

Imitations Of Life

The third category, simulation, is the least common kind of computer game. This is because to really imitate something, to *simulate* it effectively, you need lots of computer memory to hold lots of variables. However, memory has recently become far less expensive so we can expect to see increasingly effective simulation games. *Star Trek* and *Hammurabi*, both simulations, have long been popular home computer games. Although they are similar to adventure games, simulations are random. That is, there is no secret to discover, no puzzle to solve, no plot. Like real life, things happen with unpredictable, complex results.

Here's a program which simulates investing. The key to simulating is to arrange realistic *interactions* between variables. Look at line 600. If there is "international unrest," the price of gold (PGLD) goes up and the price of Bundtfund stock (PB) goes down. This relationship between gold, stock, and an international crisis is true to life. Alternatively, stock goes up and gold goes down in line 700 during a "market rally."

The game allows you to make investment decisions, and then a "month" passes during which the value of your investments will go up or down. In line 510, three variables are given ran-

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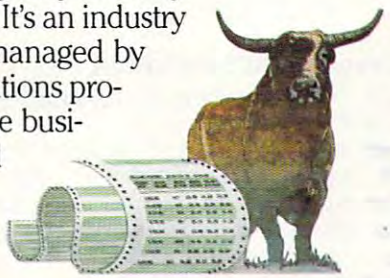

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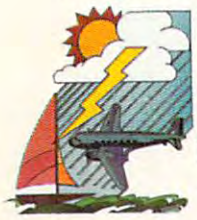

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dom values. Stock can gain or lose up to 10 points (variable X), and gold can change by $20 an ounce (Y). Variable Z will be used to simulate flipping a coin. Also notice lines 520 and 525. In 520, we determine whether or not there will be unrest. The variable CH is just a counter. Each "month," CH is raised by one. Two conditions are required for unrest to happen: in a given month, CH must be greater than 4 and it must be less than whatever X turns out to be. If both these conditions are met, CH is reset to zero and we've got international unrest. This has the effect of creating unrest roughly every four to six months. Likewise, another rhythm is set up in line 525 to cause market rallies. In both cases, however, you cannot be certain exactly when to invest in gold or in stocks.

The decision to raise or lower stock prices is made in line 530 and based on the coin toss variable, Z. Again, stocks move in opposition to gold. Prices will rise about 50 percent of the time, but you can never know what will happen in a given month.

Suggested Complications

This is the core, a rough sketch, of an investment simulation game. There is much you can do to make it a more effective simulation and thereby a more enjoyable game. The more variables in a simulation, the better. For example, add leverage and additional "incidents" which affect prices, improve the randomizing, and include other types of investments. You could even use a separate counter which, every five years, causes the X and Y variables to swing more widely to reflect recession/recovery cycles.

As you can see, a simulation should be lifelike. It has interdependent cycles and a degree of unpredictability. Its realism derives from including a sufficient number of variables. And those variables must interact in plausible ways and with just the right amount of randomness. A simulation is a little world you create. You can define cause and effect and then fine-tune the whole thing until it seems well-balanced. Adventure and arcade games are certainly enjoyable, but this investment simulation can be built up to the point where it's just as much fun as any other kind of game.

Mixing Styles

Of course, these three categories – arcade, adventure, and simulation – are somewhat arbitrary. Some of the best games contain elements of each. There are adventure games with graphics – you see the forest, the shovel, the pine needles. After you say DIVE, your character jumps into a lake and the screen transforms into an underwater scene. Likewise, arcade games can include the different "settings" so characteristic of adventure games. Popular arcade games such as *Tron* and *Donkey Kong* change the playfield as you earn more points.

There are several ways to add to the appeal of our investment simulation, beyond just making it a more complex, more accurate simulation. You could add the visuals and sound of arcade games. Try creating a tickertape across the top of the screen to show price changes and news events. Maybe add a bell sound to indicate the end of further transactions. If your computer has a voice synthesizer, news events could be announced over the "radio." And from adventure games you could borrow two elements: riddles and the necessity of planning ahead. One easy way to incorporate these two elements would be to make paying taxes a part of the game. After all, the closer it is to real life, the better the simulation.

Special Program Notes: If you have an ***Atari****, you'll need to add semicolons (;) between the variable names and the PRINT statements to make everything print on a single line. If you have a* ***TI****, put each statement on its own separate line. In other words, you cannot use colons (:). Line 10 would be CASH=100000 and you'd need to add a line: 11 PGLD=400. If you have a* ***Timex/Sinclair****, use LET whenever a variable is defined. For example, line 10 would start: 10 LET CASH=100000. If you have a* ***TRS-80 Color Computer****, add the following line: 5 RANDOMIZE.*

Investment Simulation

```
10 CASH=100000:PGLD=400
20 PB=80
30 PRINT: PRINT" BUNDTFUND IS $"PB" PER
   SHARE.YOU HAVE "B" SHARES. -- $"PB*B
40 PRINT" GOLD IS{3 SPACES}$"PGLD" PER O
   UNCE.{2 SPACES}YOU HAVE "GLD" OUNCES.
   -- $"GLD*PGLD
50 T=PB*B+GLD*PGLD
60 PRINT"{31 SPACES}TOTAL INVESTMENTS --
   $"T
70 PRINT"{31 SPACES}YOU HAVE $"CASH" TO
   SPEND."
80 PRINT"{24 SPACES}GRAND TOTAL (INVESTM
   ENTS + CASH) $"T+CASH
90 IFCK=1THEN500
100 PRINT: PRINT"1.BUY{2 SPACES}2.SELL
    {2 SPACES}3.DONE"
110 INPUTA:IFA=3THENCK=1:GOTO30
120 PRINT"WHICH?{3 SPACES}1.GOLD
    {2 SPACES}OR{2 SPACES}2.STOCK"
130 INPUTF
140 PRINT"HOW MANY (SHARES OR OUNCES)?"
150 INPUTN
160 IFF=1THEN190
170 PRICE=PB*N:IFA=1THENCASH=CASH-PRICE:
    B=B+N:GOTO210
180 CASH=CASH+PRICE:B=B-N:GOTO210
190 PRICE=PGLD*N:IFA=1THENCASH=CASH-PRIC
    E:GLD=GLD+N:GOTO210
```


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```
170 CASH=CASH+PRICE:GLD=GLD-N
400 GOTO50
500 CK=0:PRINT:PRINT" ONE MONTH LATER ..
    .":FORT=1TO700:NEXTT:PRINT
510 X=INT((RND(1)*100)/10):Y=INT((RND(1)
    *200)/10):Z=RND(1)
520 CH=CH+1:IFCH>4ANDCH<XTHENCH=0:GOTO60
525 IFCH=2GOTO700
530 IF Z>.5THENPB=PB+X:PGLD=PGLD-Y:GOTO3
540 PB=PB-X:PGLD=PGLD+Y:GOTO3
600 PRINT"INTERNATIONAL UNREST...":PGLD=
    PGLD+2*Y:PB=PB-2*X:GOTO3
700 PRINT"MARKET RALLY ...{2 SPACES}":PG
    LD=PGLD-2*Y:PB=PB+3*X:GOTO3
```


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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, **COMPUTE!** *will tackle the questions most often asked by beginners.*

Q Are there any problems I could cause while using a computer that could permanently damage it? How about any commands used in the wrong way? In other words, what are the chances that I could do real damage to the computer by not knowing how to use it right?

A There's an old saying in computing that goes something like this:

"The only way you can hurt a computer through its keyboard is to hit it with a hammer."

Of course, this isn't completely true; spilling liquids into a computer keyboard isn't too healthy for it, either. But the general thrust of that adage *is* pretty certain – aside from physical abuse, a computer can't be damaged by anything you can type on its keyboard.

There's only one rare exception we've ever heard of. A certain POKE command on one Commodore PET computer (PET/CBM's with 4.0 BASIC) can drastically speed up the process by which the computer creates the screen display. If this command is left running wild, the computer keeps speeding up until it eventually self-destructs. The chances of this POKE happening by accident are extremely remote. There are 65536 memory locations in a PET that can be POKEd, and there are 256 possible numbers that can be POKEd in each location (0 to 255). Therefore, the chances of accidentally typing in that fatal POKE command are only one in 16,777,216.

Other than this rare example, you really don't have to worry about damaging the hardware of your computer system by experimenting with commands or programs. The same pretty much holds true for the devices attached to the computer. At worst, you might cause an error which traps a device in an endless loop – for example, the disk drive might keep spinning, or the printer might keep spewing forth paper. Conceivably, if the system were left unattended, the device could eventually overheat or suffer excessive wear. But if you're there, you can always stop such "run-away" events by switching off the power. Anytime you switch off a computer or device and then switch it back on again, it resets itself.

Remember, though, we're talking about *hardware* damage. There are lots of ways you can cause permanent *software* damage. Simply typing NEW on the keyboard and pressing RETURN will wipe out any BASIC program in memory. If the program has not been saved on disk or tape, it will be lost. Likewise, certain commands can erase a program from a disk or tape, or overwrite it with something else. A wrong command, a program bug, or a typing error when entering a program listing can cause a *system crash* – your computer "locks up" (refuses to accept commands). Since the only way to recover, usually, is to switch the computer off and on again, the program in memory will be lost. But you can rest assured that the computer itself is always safe from permanent damage.

Q Can I do word processing with a tape recorder, or must I have a disk drive?

A It is quite possible to do word processing with a tape recorder.

Make sure, however, that the word processing program you buy or use is designed to work with tape. Some programs are for disk only; still others work with both.

The peripheral device which is most essential for word processing is a printer. Without a printer, you won't be able to generate a paper printout of your writing. And since the whole object of word processing is writing, a printer is indispensable. If you want to do word processing and must choose between buying a disk drive first or a printer, opt for the printer.

For casual word processing (average letter-writing, etc.) you may find that a tape recorder is a sufficient storage device. However, for more serious applications, you'll probably discover that a disk drive is necessary. Tape recorders can be reliable, but they are very slow compared to disk drives. Also, a disk drive adds flexibility to word processing. Depending on the word processing program, a disk drive can make it possible to easily store frequently used paragraphs on disk for merging with other files; to link several files together for very long documents; to merge files of names and addresses with form letters; and other advanced functions. ©

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Part I

Constructing The Ideal Computer Game

Orson Scott Card, COMPUTE! Books Editor

In this first article of a two-part series, the author examines currently available types of home computer games and suggests a new approach: a game where the player creates his or her own world. As an example, he describes the elements of a "game-building game" called "Railroader." It's something of a cross between traditional entertainment and computer programming.

Next month, the article concludes with advanced applications and specific techniques for programming Railroader on your computer.

When I first bought an Atari 400, I told my wife all kinds of stories. About how computers were the wave of the future. About how our kids had to become computer literate. About how useful the computer would be.

I didn't fool her. I didn't even fool myself. I knew I was getting the machine because of the games.

And I've done my time. My *Super Breakout* game regularly tells me "Wow!" My *Centipede* scores are respectable, and my wife and I make a great team playing *Ghost Hunter*.

But now, after a couple of years with the ultimate game machine, I've discovered a dreadful secret: true *home* computer games are rare.

Look at your games for a minute. What are they actually doing? Most of them are doing what pinball machines are designed to do – enticing you to try to beat the machine, with the odds hopelessly stacked against you. That makes sense for arcade games. They are supposed to make money, and the only way to make money is to force you to play against the clock, pumping in as many quarters per hour as possible. When the local wizards started playing 30 minutes per quarter on the Dig-Dug machine in the corner Seven-Eleven, they flipped a switch inside it and suddenly the old patterns stopped working. I stopped getting 250,000 points a game – and the company started getting a lot more quarters. That's business.

But why do home games have to play that way? The arcade games *are* fun on the home machine, at first. But they can get frustrating or boring. After a while I begin not to care anymore whether I get above 70,000 on *Centipede*. I'm never going to "win," and I don't lose a quarter when I *don't* win.

There's something worse than boredom. Something a little pernicious. Teenagers who come to my house to play my games have a great time. But when my four-year-old son and I sit down to a few games of *Salmon Run* or *Picnic Paranoia*, he almost always ends up in tears. Not because I always win – I'm a nicer father than *that* – but because the *machine* always wins. He doesn't stand a chance. He can never finish. He can never accomplish anything.

Why should all those wonderful graphics, all those fantastic imaginary worlds, be devoted to either frustrating my son or programming him until he learns how to do his part perfectly?

Because that's what all but three computer games I've tried end up doing – programming the *player*. Rewarding and punishing *me* until I learn to display the correct behaviors. What are the arcade wizards, except human beings who have learned to obey the demands of a computer program?

Don't get me wrong. I still love a new arcade game. I'm in there flapping away at *Joust*, making hamburgers and McMuffins with *Burgertime*, and mastering the art of swinging on chains and ropes in *Donkey Kong Junior*. I'm as eager as anyone to find out what the next screen will look like, to find out what the programmer has created in his or her little world. But it's still the programmer's

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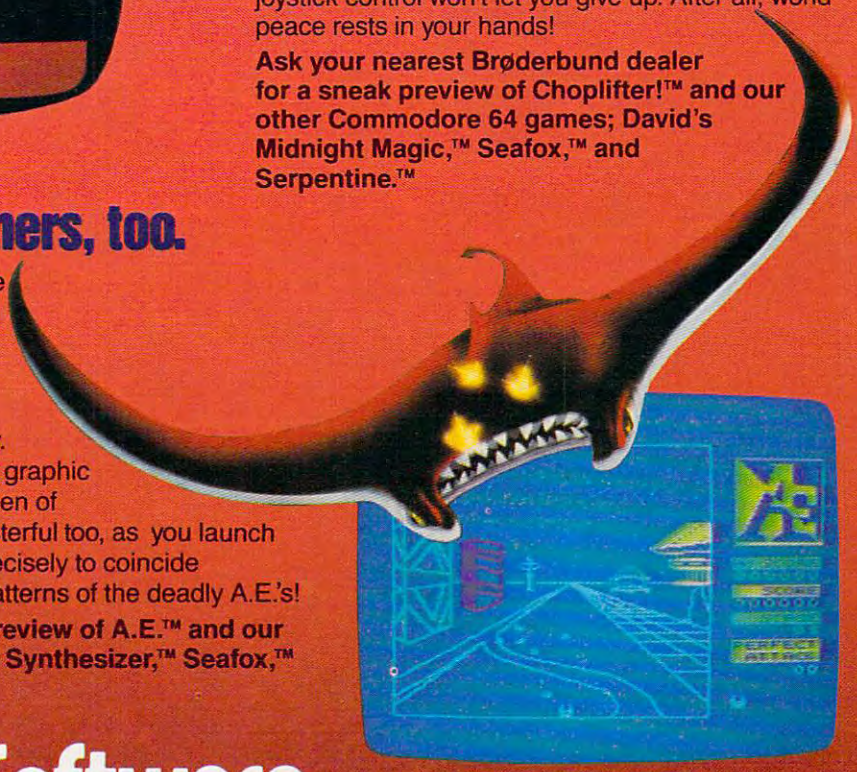

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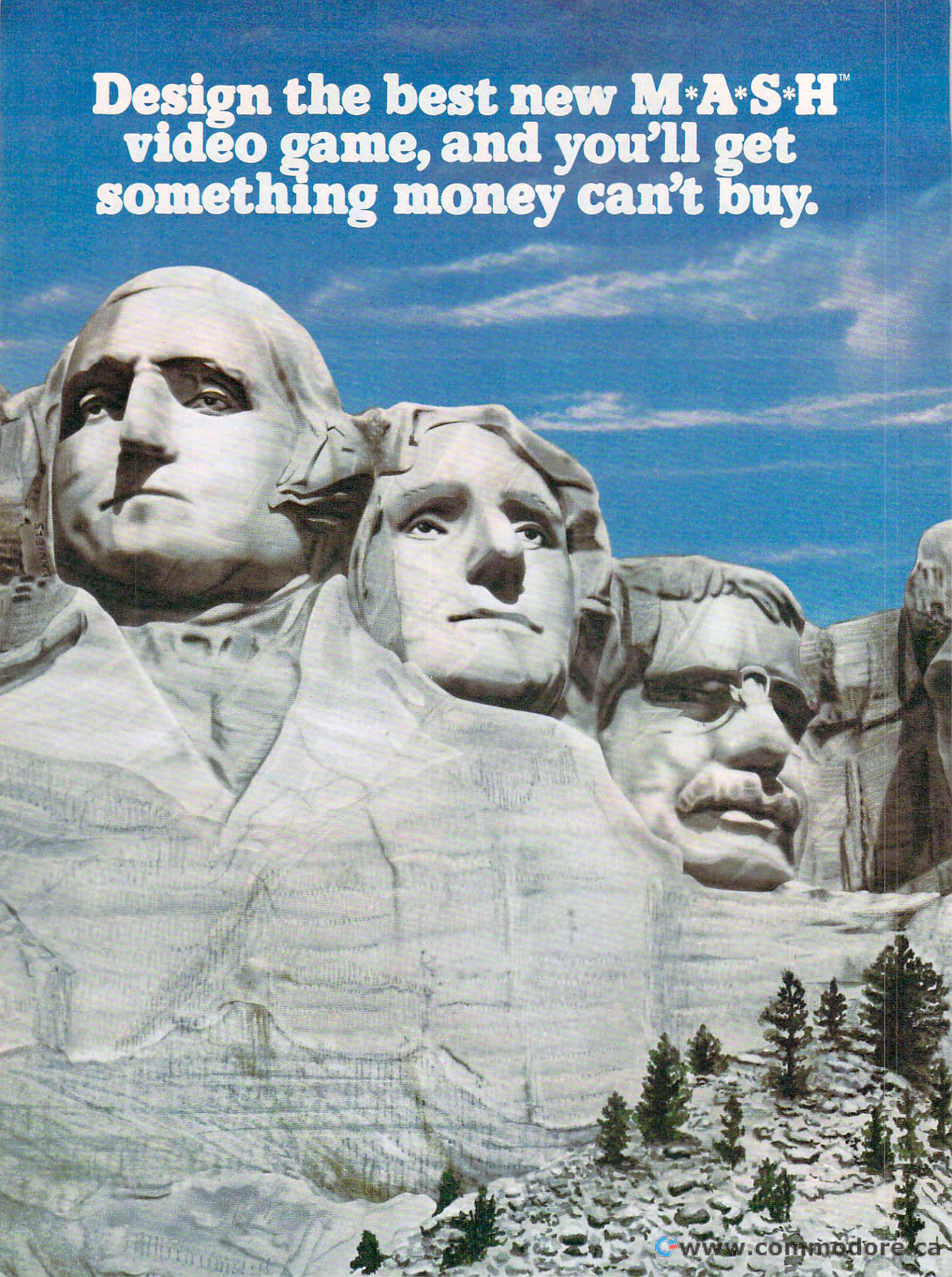

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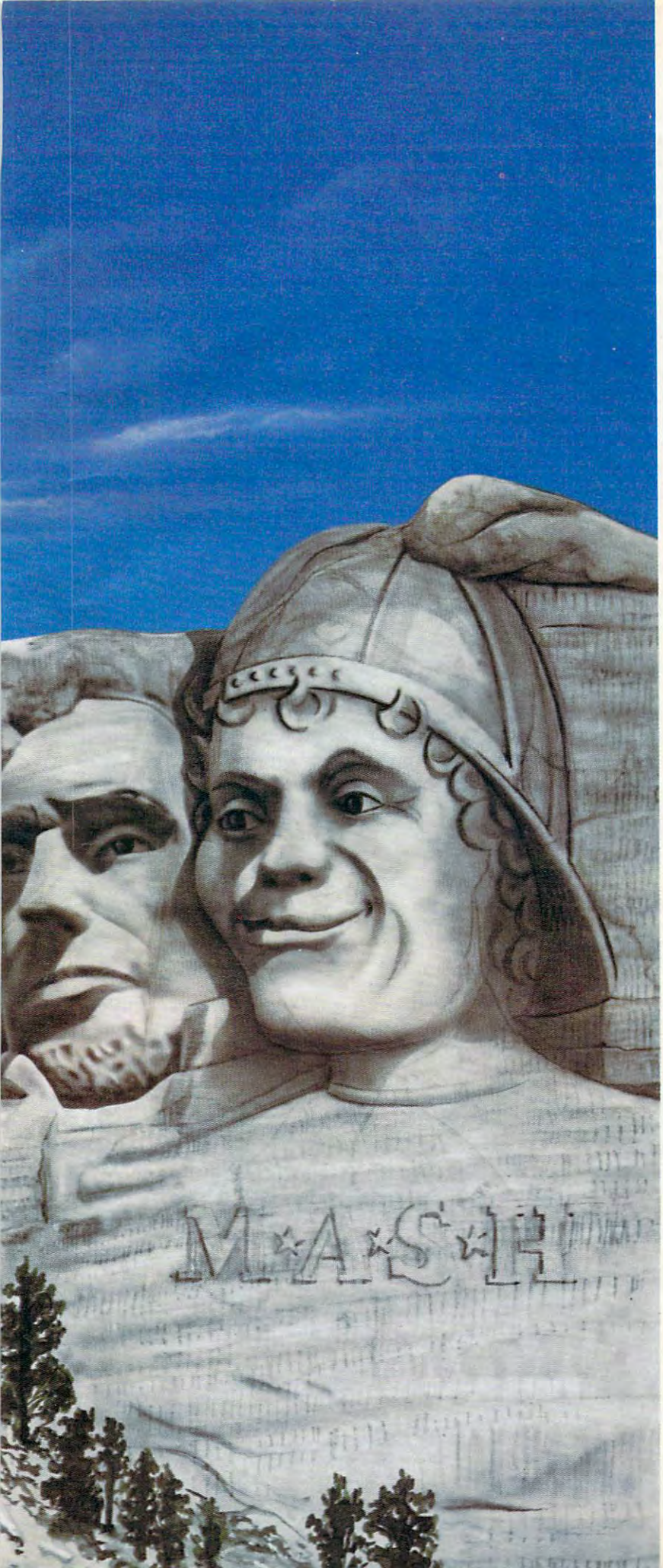

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world, not mine.

Even the adventure games, both text and graphics, usually boil down to puzzle-solving, out-guessing the programmer.

But in the home, where the family has unlimited access to the computer, there can and should be a different type of game. A different kind of play.

What Is Really Fun?

I've noticed a couple of important things in my family. First, about myself. I almost never stay up late playing computer games. But I have been known to stay up until three or four or six o'clock in the morning working on a program. You might say that, in a way, programming is much like arcading: after all, BASIC is forcing me to react in certain patterns, and I'm only just now beginning to learn when to PEEK and when to POKE. I have been trained, right?

There *is* a difference – all the difference in the world. When I program, I can save the result on something a lot more permanent than a vanity board. And I'm not just charting through someone else's program – I'm creating something that never existed before, at least not in the exact form I'm giving it. When I'm through, there's a lasting result. And I can take all the time in the world. I can take the time to do it *right*.

A second thing I've noticed is the way my children play when they *aren't* using the computer. They do like a shoot- em-up game as much as other kids. But games like that are only a minority of the things they do.

They also like solving puzzles, and spend much more time doing mazes or putting together picture puzzles than they ever spend on fast-action games.

Most of all, though, their playing time is spent making things or pretending things. They spend hours with wooden or plastic building blocks, making castles or spaceships or houses or anything they can imagine. They draw and color, write stories or act out plays, dress up in costumes or read aloud from books – whether they understand the actual words on the page or not.

In fact, they do exactly what I like to do with the computer: create their own small world that works just the way they want it to work. They don't want anyone to tell them that they can't make a castle that way, or to insist that six legs are too many for a horse. "You made your *two*s backward," we tell our son, and he looks at us impatiently and says, "Let me do it my way."

How many hundreds of dollars have we sunk into our home computer? We own it, don't we? Why, then, do we have so many programs that tell *us* what to do? Why can't my children – or my wife and I, for that matter – play games that let us tell the *computer* what to do, that let us create something that will last, that let us use the magic of the computer to make things we could never make before?

The Few Games That Work At Home

I've found three games that approach the sort of play that only the home computer can allow – games that are neither elaborate puzzles nor quarter-stealing pinballs.

Galahad and the Holy Grail. At first glance, this Atari (APX) adventure game looks pretty much like other realtime graphics adventures. Only after you've played it awhile do you begin to realize that this is the first game to give you the freedom to play your own game. True, there are fast-moving knights and spiders and a persistent, maddening moth to kill you when your reflexes are too slow, and there are puzzles to solve. But there are no win conditions. The program never congratulates you and says, "That's it, you've solved it all." It's fun simply to explore the dozens of different rooms and find out what secrets they hold. It's no coincidence that my son loves to play it, and has never found it frustrating, though it is always challenging.

Eastern Front. This APX game isn't for children, and there are definite win conditions, but it is a war game that gives you freedom to plan your own moves, to develop your own strategy, and there are hundreds and hundreds of possible ways to play, none of them "wrong." Your decisions are shaped by events, but the events do not control you any more than you control them. (*ATARI Program Exchange, 155 Moffett Park Drive, B-1, P.O. Box 427, Sunnyvale, CA 94086.*)

Facemaker. It runs slowly, but I find that my son never gets impatient with the game from Spinnaker. The choice of facial features is very limited, but the important thing is the way the program and the child interact. It allows a child whose drawings are still very primitive to make faces that actually resemble real faces, and program them to perform a series of actions. When my son plays with *Facemaker*, he is creating something, and doing things with it that could not possibly be done without the computer. (*Spinnaker, 215 1st St., Cambridge, MA 02142.*)

The Five Types

There are probably other games that make use of the special advantages of the home computer, but the point is that they are distressingly rare. Most of the games coming out today are variations on the same old themes:

- *Target Shoot.* The targets move, they dance, they are cute or they are menacing, but the game always consists of shooting them down.
- *Tag.* The same old targets, but you have to

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The game that puts space games in perspective. Zaxxon™, one of the most popular arcade games of 1982, is now available for use with your home computer system.

Zaxxon™ technology and creativity present a 3-dimensional-like playfield which sets Zaxxon™ apart from other computer games.

Zaxxon™ looks and sounds like aircraft flight, and players can soar to new levels of home computer entertainment. From the daring attack on the enemy's floating fortress and the blazing battle against the enemy's fighter fleet to the final showdown with the deadly armored robot, Zaxxon™ challenges the skill and imagination of every player at every level of skill.

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catch them instead of shooting at them.

- *Coming at You.* Tag, only they're trying to catch *you* or shoot *you*, and you spend a lot of time running and dodging.
- *Scramble.* You have to get from here to there, and there are things in the way.
- *Maze.* Like scramble, only there are several routes you can follow, and you have to figure out the best one.

Have I missed anything? Even sports simulations, like the sports that inspired them, are combinations of these elements. Football is tag plus scramble – or coming at you, depending on whether you're playing offense or defense. Hockey is target shoot plus scramble. Baseball is scramble, target shoot, and tag. Lots of fun, but all these wonderful new games are just combinations of the same old things.

New, creative game elements are getting rarer. An arcade game like *Joust*, which really does introduce a whole new way to move a player on a screen, still turns into tag-plus-scramble once you master wing-flapping. *Donkey Kong Junior* has that wonderful swinging motion and the difference between two-handed and one-handed climbing, but it's still a maze with things coming at you.

What else *is* there?

Games That Let You Create

What I want to see are games that let the player create things. BASIC and LISP and PASCAL and PILOT all fit the bill – but they also require mastering some pretty sophisticated concepts. They're fun, but they aren't exactly *play*. What I would like to see is something as simple as building with wooden blocks, while exploiting all the strengths of the home computer.

And what are those strengths?

1. *Time.* Running out of quarters doesn't mean you have to quit. Nobody's rushing you to finish. You can think, instead of letting the computer train your reflexes.

2. *Permanence.* You can save the result of what you've done, change it, re-use it, limited only by the number of cassettes or diskettes you have on hand.

3. *World creation.* You're manipulating numbers, it's true; but the result can be visible and audible, and it can move. You can create worlds the way fiction writers create them, and bring them to life as, until now, only movie-makers could.

4. *Individuality.* It's your computer. Why shouldn't the results of your play, and your children's play, be uniquely your own? Why should the only difference between you and any other player be your score?

Let's Design A Game

It's easy to talk about this kind of game. It's only a little harder to design it. So I'll give you a detailed game design that you can program. But after what I've said about individuality and creativity, there's no way I could provide you with a complete program listing. I'll just offer detailed documentation for the game, then a few hints on how to program it, and let you design the way the program works yourself. It can easily be executed in BASIC, though at some points you may be happier with machine language subroutines.

(The documentation that follows is long and detailed, but when you're designing a computer game, it's usually a good idea to figure out exactly what the player's experience of playing the game will be like. This is especially true if you aren't as conversant with your programming language as you are with English. By writing out the instructions and rules first, as I have done here, you can save yourself debugging and revising time later.)

Railroader

You are building a network of railroads. When it's all built, you control the switches and make your train run on the tracks wherever you want.

The game, though simple enough for a preschooler to master, is really an introduction to programming. Model railroaders were designing *loops* and *branches* long before electronic computers were a twinkle in Sperry-Rand's eye. If the player does not close all the loops and resolve all the branches, the program will provide a few reminders. If the player still refuses to tie up loose ends, the program will do it.

And, for those who have the most fun playing cooperatively with someone else, the program allows two players to design railroads on the same screen, and run their trains at once (with sometimes disastrous effects).

The Track-Laying Stage

"Railroader" begins by announcing its name and finding out the answers to a few questions. Do you want to lay track or run a train on an already-created track layout? Will there be one or two players? Do you want to lay track at the beginner or expert level? Do you want to save the track layout you create, and if you plan to save it in a disk file, what should the file be named?

When you have made your selections and pressed START, the screen displays a list of instructions:

> "Use joystick and joystick button to lay track units."
>
> "Type 1 to go on to the next track unit."
>
> "Type 2 to choose which railroad spur to complete."

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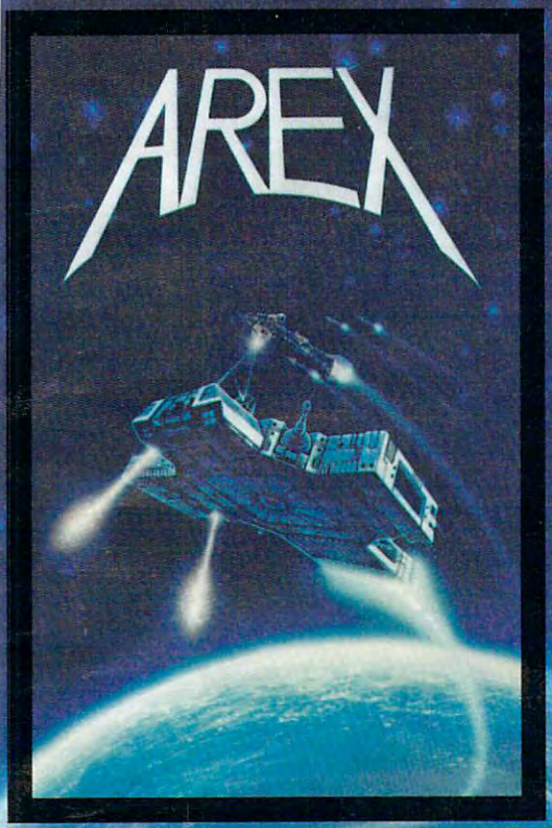

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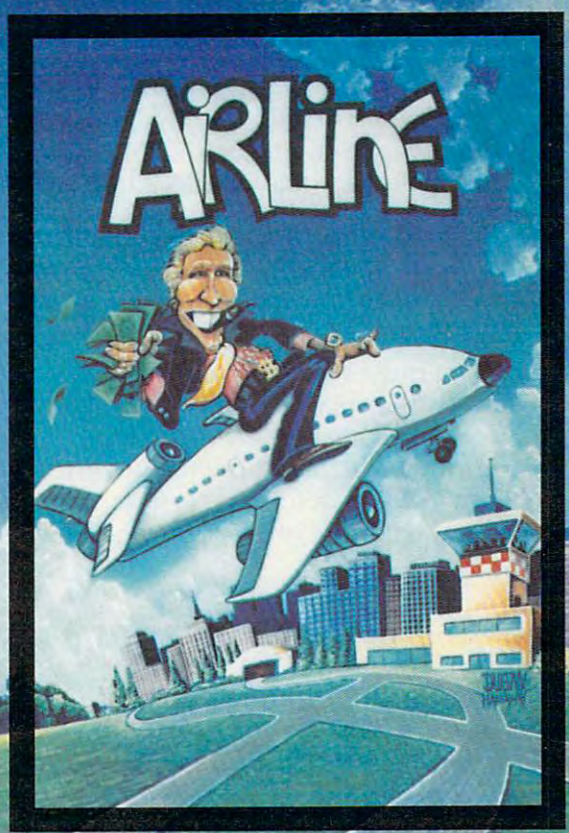

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"Type 3 when your layout is complete. At this point, if you haven't brought every spur back to the main line, Railroader will do it for you, and if you want to save the layout, Railroader will save it."

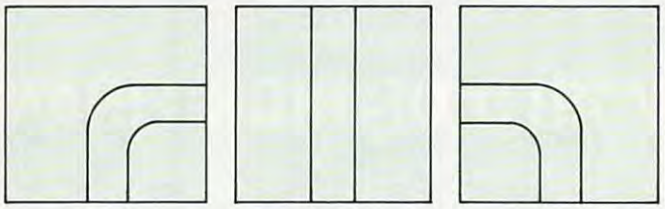
"Press any key or joystick button to begin."

When you give the signal, a light green screen appears. If there is one player, a single orange square appears about one-quarter of the way in from the left on the bottom of the screen. If there are two players, a second square appears a quarter of the way in from the right. These squares work like cursors – they mark the area where you are laying track.

Laying Simple Track Units (The Beginner Level)

To lay track, use your joystick. Push forward to make a straight vertical track unit appear in the square. Push left for a track that curves to the left, right for a track that curves to the right. If you change your mind, push a different direction, and the track unit changes. However, the first track unit always starts at the bottom center of the square.

These simple track units look like this:

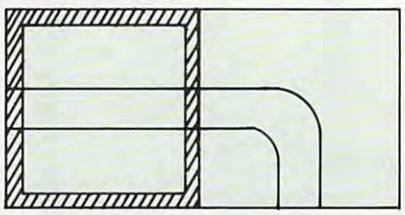


When you are satisfied with your choice, you reach over to the computer and type 1. Your square now moves to the blank area just beyond the end of the track unit you placed on the screen. If you put on a straight track, your square will appear just above it; if you curved left, your square will appear to the left.

If you are playing alone, you may immediately lay the next unit of track; if there is another player, you must wait your turn to lay track again; when the other player types 1, it will be your turn.

The next time you lay track, your new track unit will begin where the old one left off. If you curved left before, your new track unit will start in the middle of the right-hand edge of your cursor, like this:

Cursor



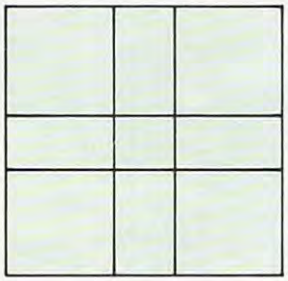
Again, to lay simple track units you have three choices. Let's say that you curved left on your first track unit. Now if you push the joystick left, a straight horizontal track unit will appear. If you pull the joystick toward you, the track will make another curve, this time downward. If you push the joystick away from you, the track unit will curve upward.

With every simple track unit you lay, the track will always begin where the last square left off, and will end up heading in one of the three valid directions you can push the joystick.

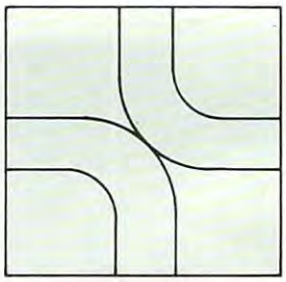
If you cause the track to end at the edge of the screen, your cursor will appear at the opposite edge. This means that track that ends on the left side of the screen is continued on the right side; track that ends at the top is continued at the bottom.

Erasing. If you want to go back and change the last track unit you completed, push the joystick in the direction of that track unit. Any track unit you laid in the new position will be erased, and your cursor will move to the former square, where you can either lay a track segment or go still farther back, erasing each track segment as you leave it behind. You may erase as many track units as you like, or stop at any point and lay a new track segment. But remember, if you are playing with another player, your turn ends when you type 1. You can erase as many units as you like, but you can lay only *one* track unit.

When Tracks Touch. At the beginner level, if you cause the track to touch an existing track segment, either your own or the other player's, Railroader will automatically create the following valid patterns:



Crossover



Curved by-pass

At the beginner level, and whenever you are touching the other player's track units, you may not cause the two tracks to join. If you are about to cross a curved track, you can choose to curve *only* in the opposite direction. If you are about to cross a straight track, you can lay only a straight track across it, not a curve that would join it. And if a new track unit would cause your track to run into the end of another player's spur, you will be allowed to lay only curved tracks that turn away from the other player's track:

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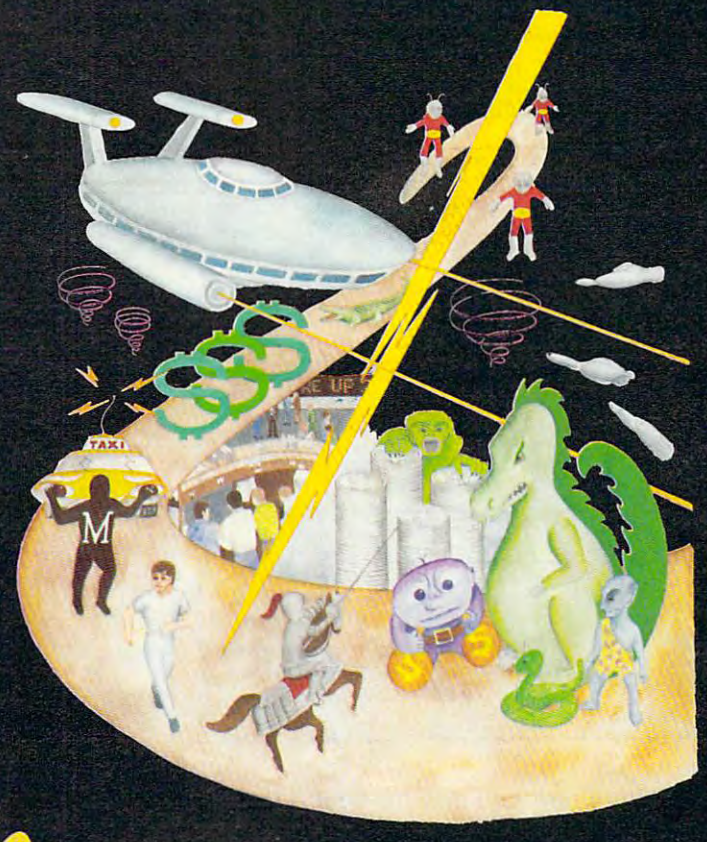

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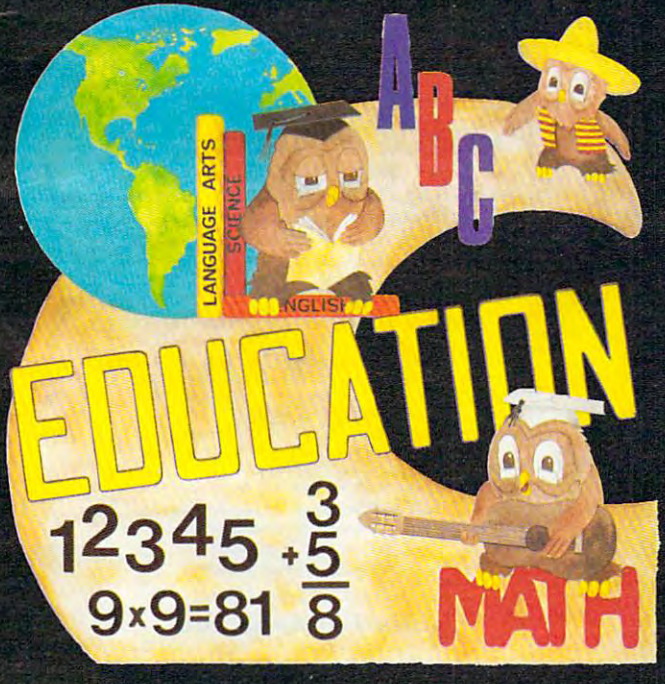

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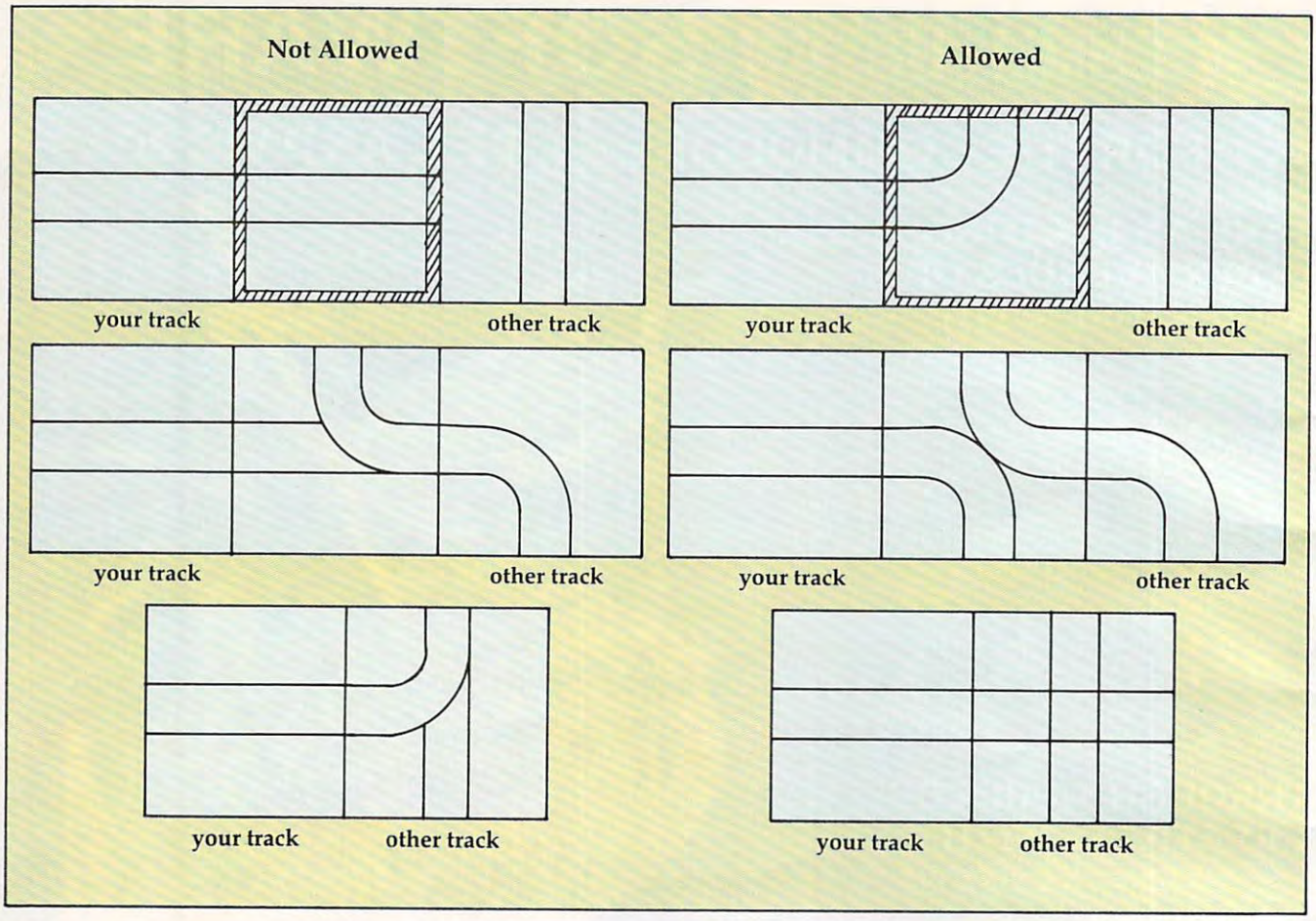

Erasing Crossovers and By-passes. If you are erasing and come to a unit where your track by-passes or crosses over another track, either your own or the other player's, Railroader will leave the other track intact, and remove only the track from the line you are erasing.

Ending the Track-laying Session. With the beginner-level game, that is the whole track-laying sequence. You just keep laying track until you match up the end of your track with the beginning at the bottom of the screen. When you are ready to quit, type 3. If you haven't linked your track with the beginning track unit, Railroader will automatically lay track from the last unit you created until it links with the first unit, so that the track always makes a closed loop.

Next month we'll go on to the Expert Level Game.

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NEW PRODUCTS AT THE COMDEX/SPRING COMPUTER SHOW

Tom R. Halfhill, Features Editor

New products displayed at the Comdex/Spring conference, held in Atlanta during late April, show a trend toward still more home computers, lower-priced home peripherals, and increasing support for the popular home computers already on the market.

This year's Comdex/Spring show was more interesting than most for home computerists. Known officially as the "National Spring Conference Exposition for Independent Sales Organizations," Comdex is primarily a show for computer dealers, manufacturers, and businessmen. Consequently, almost all the wares on display at this large show are for the more expensive personal and business systems.

At the show this year, however, there seemed to be more than the usual number of exhibitors displaying products for lower-priced home computers. Two new home computers were shown – both imports; several low-cost printers and other peripherals made impressive appearances; and software started catching up with hardware (at least a little) as new programs were introduced for all the popular home computers. Most of these products should be on the market by the time this article appears. Here's a rundown:

New Computers

It's hard to imagine how the low-end home computer market can absorb many more machines, especially with such leading contenders as Commodore, Texas Instruments, Atari, and Tandy engaged in runaway price wars. But the home market is expanding so fast that no one wants to be left out, least of all the Japanese and the British.

That's why you can expect to see more imports invading the U.S. market. The British success with the Timex/Sinclair isn't easily ignored.

The newest British entry is the Oric-1, manufactured by Oric Products International Ltd., of Berkshire, England. Reputedly the second best-selling micro in Britain and Europe (next to the Sinclair), the Oric-1 appears to be a good computer in search of a good U.S. distributor. An Oric representative said the company experimented with mail order sales, but quit in favor of setting up a more conventional distribution network. Oric hopes to have one in place by midsummer.

The standard Oric-1 includes: 16K of Random Access Memory (RAM); a 57-key keyboard, with moving keys arranged typewriter-style; full repeat on all keys; standard ASCII character set with upper/lowercase; 96 redefinable characters; 16 colors; 40-column by 28-row screen display in text mode; and a 240- by 200-pixel high-resolution graphics mode. For sound there is a three-channel sound synthesizer with a seven-octave range and programmable envelopes, similar to the Commodore 64, an internal speaker, and connections for external speakers.

A cassette interface works at 300 baud or a very fast 2400 baud, and interfaces include a built-in Centronics-standard parallel printer interface; an expansion port for RAM and Read Only Memory (ROM) cartridges; and a Red-Green-Blue (RGB) interface for high-resolution color video monitors. The built-in BASIC programming language includes such interesting commands as INK and PAPER (for color control), DOUBLE, FLASH, and INVERSE (for character control), DRAW, CIRCLE, and PLOT (for graphics), and even SOUND, MUSIC, PLAY, PING, SHOOT, EXPLODE, and ZAP (for sound control).

The Central Processing Unit (CPU) is the 6502A microprocessor, basically the same chip found in Apple, Atari, and Commodore computers. While this doesn't mean the Oric-1 is

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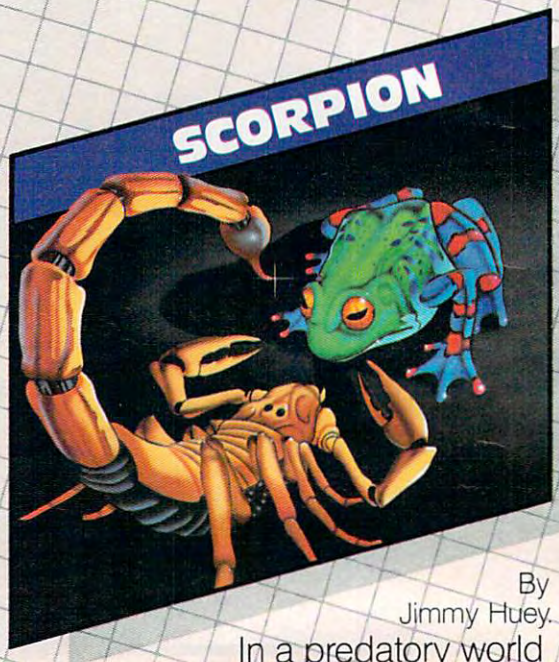

By Jimmy Huey.

In a predatory world of killer worms, dragons, stalkers, pods and fly traps, the scorpion prowls the maze in search of sustenance. Frogs and their eggs mean survival to the scorpion. But they can also mean instant death! (Suggested retail $39.95)

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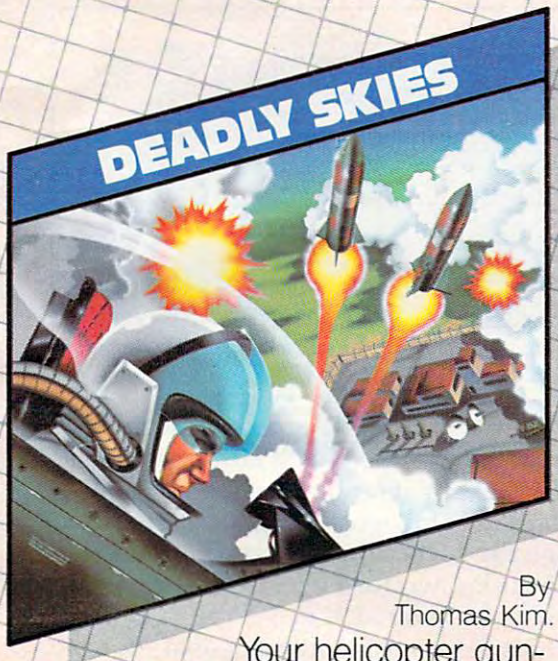
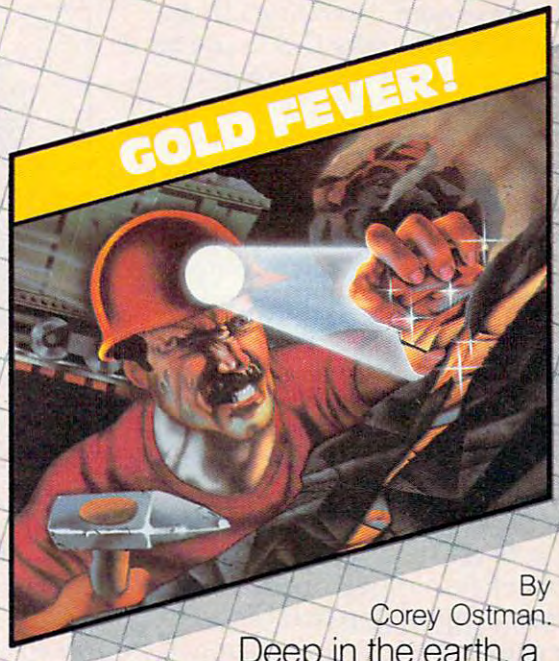


By
Thomas Kim.

Your helicopter gunship hovers over the enemy's military bases and missile emplacements. Your mission is to destroy them. But as the sky fills with smart bombs and anti-aircraft fire, there's less and less room for a wrong move! (Suggested retail $39.95)



By
Corey Ostman.

Deep in the earth, a fortune awaits. But the dark passageways are filled with peril as well as profit. Runaway boxcars. Crashing boulders. A claim jumper with murder in his eyes. Be careful. But be quick—oxygen is in short supply! (Suggested retail $39.95)

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compatible with these computers, it does mean that machine language programmers could adjust to it fairly easily.

The standard Oric-1 will sell for about $120 in U.S. funds. For about $240, there's a 64K RAM version with 16K of overlaid ROM, similar in arrangement to the Commodore 64.

Oric also makes a full line of peripherals for the Oric-1. At Comdex, Oric was showing prototypes of a microfloppy disk drive using the Hitachi 3-inch disks. The microfloppy is expected to sell for about $240.

If Oric succeeds in setting up a good U.S. distribution network, the Oric-1 could prove competitive in this country, especially if its overseas software base is also brought to America.

The Japanese Sord

Of course, the Japanese aren't standing idly by, either. Their newest export to the U.S. is the Sord M5, a $199 computer with impressive graphics and three different plug-in BASICs. The M5 is made by Sord Computer Systems, the fastest-growing microcomputer company in Japan. Founded in 1970 with $2500 by 26-year-old Takayoshi Shiina, Sord now commands about 15 percent of the Japanese business microcomputer market. Sord is exporting a line of high-end personal and business computers to the U.S., and the M5 is its first home computer.

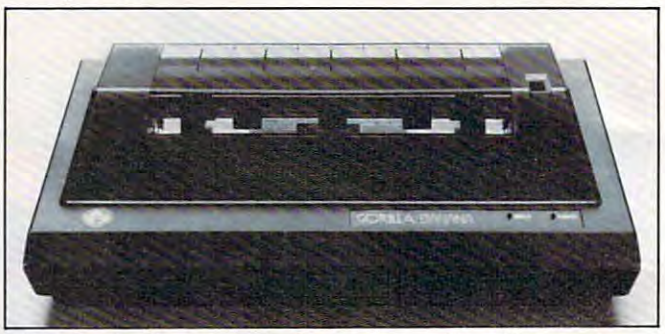
The M5 will be sold in two different configurations: the M5 Fun Computer and the M5 Multi-Computer. The basic specifications are the same: 20K of RAM expandable to 32K (although 16K is used for the screen); 8K of ROM with a machine language monitor; 16 colors; a 55-key keyboard with moving rubber keys; upper/lowercase and graphics characters; a flip-up top that conceals a cartridge slot for games, programming languages, and other plug-in "firmware"; built-in Centronics-standard parallel printer interface; cassette interface for standard tape recorders; sound generator; Z80A CPU; and a Texas Instruments video chip which allows up to 32 sprites (screen objects which can be created and animated by your own programs).

The two packages do vary, however, in terms of included accessories. The M5 can accept any of three BASIC language cartridges – BASIC-I (Introductory), BASIC-G (Graphics), and BASIC-F (Floating Point). BASIC-I is for beginners and children, BASIC-G is for general home use and graphics programming, and BASIC-F is a full-fledged floating-point BASIC for business, science, and math applications. The M5 Fun Computer comes with BASIC-I and a game cartridge. The M5 Multi-Computer comes with BASIC-G, an interesting dialect with special commands for the graphics and sprites. The Multi-Computer also has a carrying case and the FALC cartridge, a home data base program adapted from Sord's business software.

The M5 will be distributed through local dealers by Sord Computer of America, New York.

The Gorilla Banana

When personal computers cost $1000 or more, it seemed reasonable that printers sold for around $500 or $600. But now that full-featured home computers are widely available for under $100, the same printers can seem disproportionately expensive. That's why manufacturers are rushing to produce printers (and other peripherals) that are priced for the hundreds of thousands of people who are buying inexpensive mass-market computers.



The Gorilla Banana is the first in a new line of low-cost peripherals from Leading Edge.

Several new low-cost printers were seen at Comdex. Probably the one which attracted the most attention was the Gorilla Banana, the first in an upcoming line of low-cost peripherals from Leading Edge Products, Inc., of Canton, Massachusetts (best-known for Elephant Memory disks). Due this summer at $249.95, the Banana is an 80-column, tractor-feed, unidirectional, dot-matrix printer capable of 50 characters per second. It has four character sets (U.S., British, Swedish, and German), a double-width print mode, and upper/lowercase (although without true descenders). There's also a dot-addressable graphics mode with a density of 63 x 60 dots per inch.

The Banana attaches directly to any computer with a Centronics-standard parallel printer interface. Computers without a parallel port will need an interface at extra cost. An interface for Commodore 64 and VIC-20 computers will be available for $29.95, and an optional cartridge for the same price will allow the Banana to print the special Commodore graphics characters.

Another interesting 80-column dot-matrix printer is the STX-80 from Star Micronics, Inc., of Dallas, Texas. Suggested retail is $199. Although the STX-80 is a thermal printer – it uses a special print head and heat-sensitive paper to form its type instead of an inked ribbon – you wouldn't

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guess it from the printouts. The thermal paper looks and feels much like standard typing paper. Unlike most thermal paper, which is silver, this paper is white with crisp black lettering. The STX-80 is a unidirectional printer that works at 60 characters per second, has upper/lowercase with true descenders, a double-width text mode, block graphics characters, European characters, a dot-addressable graphics mode, and a Centronics parallel interface.

Star Micronics also offers a 40-column, inked ribbon, dot-matrix printer for $250. The DP-8240 prints at 50 characters per second, has friction or tractor feed, upper/lowercase without true descenders, graphics characters, scientific and European characters, and a dot-addressable graphics mode.

The lowest-priced printer exhibited was the $129.99 Impact Printer from Fidelity Electronics, Ltd., of Miami, Florida. The Impact Printer works with the VIC-20 and Commodore 64 with no additional interface. Printing at 30 characters per second, it has a 24-column line and uses standard adding machine roll paper. Other features include upper/lowercase, graphics characters, inverse characters, and dot-addressable graphics.

Custom Joysticks

Since the "feel" of a joystick is highly subjective, many independent companies are introducing "custom" joysticks for those who dislike the standard models (for an overview of custom game controllers, see "The Joy Of Joysticks," **COMPUTE!**, February 1983). A few more new joysticks surfaced at Comdex.

Suncom, Inc., of Northbrook, Illinois, makers of the Slik Stik and Starfighter joysticks for Atari-compatible computers, came out with a Starfighter model for the Apple. The Starfighter is about the same size and shape as a standard Atari joystick, but with comfortably rounded edges. Overall, it's a luxurious controller with right- and left-handed fire buttons; an alternate fire button for games that require two buttons; a centering adjustment to fine-tune the stick's neutral position to each Apple; a switch to select either a long or short throw of the stick; and a high-low sensitivity switch to further tune the stick's response. Also, Suncom guarantees the Starfighter for two years. Suggested retail is $49.95 for the Apple IIe version (a $5.95 adapter is needed for the Apple II/II+).

Suncom also introduced two new controllers for Atari-compatible machines (Atari 400/800/1200XL, Commodore 64 and VIC-20, Atari VCS 2600, Sears Telegame). The most unique is the Joy-Sensor, a stickless joystick. The Joy-Sensor is a hand-holdable box with a flat disc where the stick should be. Instead of flexing a stick, you rock the disc. It lists for $34.95.

Suncom's other new joystick is the TAC-2 (Totally Accurate Controller). This looks like an adaptation of the Starfighter, with the addition of a longer, ball-tipped stick, and both right- and left-handed fire buttons. The TAC-2 is guaranteed for two years and lists for $19.95.

For users of Texas Instruments computers, Suncom introduced a $12.95 adapter so that Atari-style joysticks will work on the TI-99/4A, and a $13.95 dual cassette recorder adapter.

Since the "feel" of a joystick is highly subjective, many independent companies are introducing "custom" joysticks for those who dislike the standard models.

Two new joysticks were also introduced by the Kraft Systems Company of Vista, California. The Kraft Joystick is a lightweight Atari-compatible controller with an unusually short, flexible stick designed for fingertip action. It includes an extra-long eight-foot cord, a one-year warranty, and retails for $16.95. Another joystick, the Switch-Hitter, has two fire buttons for use by right- or left-handed players. Otherwise identical to the Kraft Joystick, it retails for $19.95.

Accessories And Peripherals

Numerous other add-ons were introduced at Comdex/Spring, too. Here are some which deserve special note:

- A low-cost modem for the Apple. The $119 Networker modem, by Zoom Telephonics, of Boston, Massachusetts, plugs into a single expansion slot and requires no other connections or external power source. It's a 300-baud direct-connect modem that hooks up to any modular phone jack. It has an originate/answer switch, a carrier detection LED, and is compatible with any standard telecommunications software. For $169, the Networker comes with *Netmaster*, a terminal program with upload/download, and a 40K text buffer (on a 64K system).
- Plug-in boards for Commodore and Texas Instruments computers. Microtek, Inc., of San Diego, California, introduced a $299 64K memory board for the TI-99/4A which fits into the expansion box. A 32K board also is planned. For the VIC-20, Microtek introduced VIGOR (VIC's Grand

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BASE PRICE	$299	$1,540	$899	$595	$399	$299
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	NO	NO	NO	NO
GENERATED GRAPHICS (FROM KEYBOARD)	YES	NO	YES	YES	NO	NO
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	280 x 160	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 IO	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
** 128K user addressable plus 16K graphic support
*** Apple II can accept modified 40 or 80 column CP/M
**** Commodore 64 accepts 40 column CP/M

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Old RAM-cage). This is a $39.95, three-slot expansion board. For both the VIC and Commodore 64, there's the CC-2064, a $70 interface cable which allows the computers to drive parallel printers.

• New disk drive for Atari. The Rana 1000 Atari-compatible disk drive, by Rana Systems, of Carson, California, also was shown at the West Coast Computer Faire in San Francisco a few weeks before Comdex/Spring. Due on the market this summer, the Rana 1000 is switchable single/double density and will retail for $449 ($49 extra for the double-density Disk Operating System).

The Rana 1000 disk drive for Atari offers single and double density for $449.

It has some unique features not found on other drives: a write-protect button, a unit ID button (which tells you the drive's position in the daisy chain if you have several), an error button (which returns an error code), and a button which lets you know which track the head is reading or writing. What's more, the drive runs very quietly and is only about a third the size of a standard Atari drive.

• Network systems for Atari. These systems look like they'd be ideal for classrooms, computer camps, and even users groups. With the Quick Share, you can hook up to four Atari computers to a single disk drive, 850 Interface Module, and printer. The Quick Share continuously scans the four computers for input/output commands and lets them access the devices on a first-come, first-served basis. Four blinking LEDs let users know when the devices are busy. It costs $595 and is available from Wolsten's Computer Devices, Inc., of East Orange, New Jersey. The company also introduced a similar, but larger system primarily for classroom use. Called the Network 216 and Monitor 16, it allows up to 16 Ataris to connect to a single drive and printer. In addition, the master station hooks up to a TV so the operator can see what's happening on any one of the 16 computer monitors. A headset with a microphone plugs into the station so the operator can converse privately with any of the 16 students (the operator's voice comes through the TV speaker). This looks like a great way for teachers to make sure their students aren't playing *Centipedes* on the sly. It will sell for $1995, cables extra.

• Supermother for VIC-20. What's a Supermother? It appears to be the largest expansion board available for the VIC. This huge board has eight switch-selectable slots for memory and program cartridges, a system reset button, a pause button that freezes games or other programs, and a switch that lets you back up cartridges on tape or disk. It retails for $149.95, from Compuscope, Inc., of Tillamook, Oregon.

Educational Software

Now that more schools are acquiring computers for their students, and more parents are buying home computers for their children, the demand for good educational software is becoming almost unquenchable. Fortunately, some companies with background in other educational fields are starting to get involved in software.

Among these is Scholastic, Inc., of Englewood Cliffs, New Jersey. Remember the *Weekly Reader*? Scholastic is now introducing Wizware, a line of programs for Apple, VIC-20, Atari, and Texas Instruments computers. The first samples are entertaining and colorful and make good use of each computer's special features. Among the interesting programs at the show were *Turtle Tracks*, which uses turtle graphics to teach programming by creating drawings and songs; *The Square Pairs*, a memory game; and *Your Computer*, a how-to introduction to computers with a robot narrator.

Another line of educational software was displayed by Edu-Ware Services, Inc., of Agoura Hills, California. Most were for the Apple, with a few for the Atari. Ranging from preschool to college level, the programs cover basic math, algebra, spelling, reading, perception, and SAT/PSAT preparation. One of the most interesting packages was *Hands On BASIC Programming*, an introduction to Applesoft BASIC with additional instruction on more advanced BASICs. It includes a 185-page manual and two disks of sample programs.

Microfloppy Update

More shots were fired during the show in the continuing microfloppy wars (see "Mass Memory Now And In The Future," **COMPUTE!**, March 1983). Since nobody has agreed yet whether to adopt the 3-inch, 3¼-inch, or 3½- inch standard, everyone seems to be going their own way.

Thus Verbatim Corp. of Sunnyvale, California, widely known for its larger diskettes, unveiled a prototype of a 3½-inch microfloppy disk. The 3½-inch size is backed by Sony, and Verbatim's microfloppy will be manufactured under license from Sony. However, Verbatim is varying a bit even from Sony's standard in order to conform with recommendations of the Microfloppy In-

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Adding a printer to your computer makes sense. But deciding which printer to add can be tricky. Do you settle for a printer with limited functions and an inexpensive price tag or buy a more versatile printer that costs more than your computer? Neither choice makes sense.

Here's a refreshing option—the new, compact STX-80 printer from Star Micronics. It's the under $200 printer that's whisper-quiet, prints 60 cps and is ready to run with most popular personal computers.

The STX-80 has deluxe features you would expect in higher priced models. It prints a full 80 columns of crisp, attractive characters with true descenders, foreign language characters and special symbols. It offers both finely detailed dot-addressable graphics and block graphics.

And, of course, the STX-80 comes with Star Micronics' 180 day warranty (90 days on the print element).

The STX-80 thermal printer from Star Micronics. It combines high performance with a very low price. So now, there is nothing in the way of owning a quality printer.

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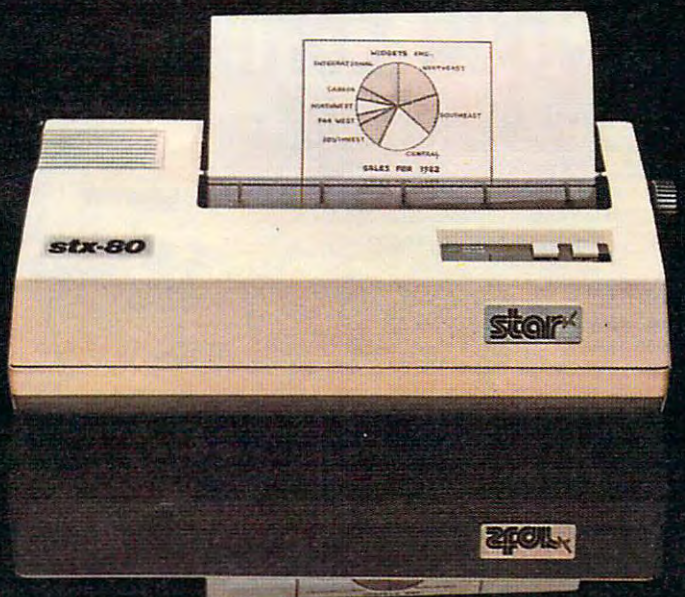

The new STX-80 printer for only $199.*

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dustry Committee. Verbatim's microfloppy will have 80 tracks instead of 70, an automatic shutter which covers the head window when the disk is removed from a drive, and a thinner magnetic coating.

Meanwhile, across the convention hall, another company was introducing a 3¼-inch microfloppy drive while distributing photocopies of news articles about a rejection of the 3½-inch size. The 3¼-inch drive, hooked up to a Radio Shack TRS-80 Color Computer, was exhibited by Tabor Corp., of Westford, Massachusetts. It's based on the Dysan 3¼-inch microfloppy, a challenger to Sony's 3½-inch disk. Instead of selling directly to the public, Tabor plans to supply the drive to other companies for private labeling. The photocopied article was from *Computer Systems News*, reporting on the recent vote by the American National Standards Institute not to adopt a working paper submitted by Verbatim and Shugart pushing the 3½-inch size.

The decision was far from final, however, and all three sizes are still very much alive. And just to make things more interesting, IBM recently unveiled a 4-inch microfloppy disk drive. It appears it will be quite a while before the various factions within the microcomputer industry agree on how much to shrink disks. ©

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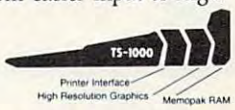

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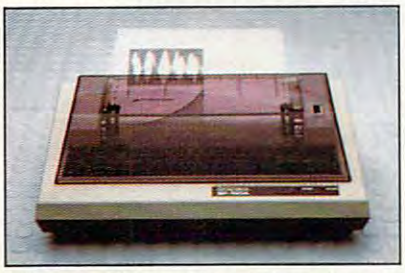

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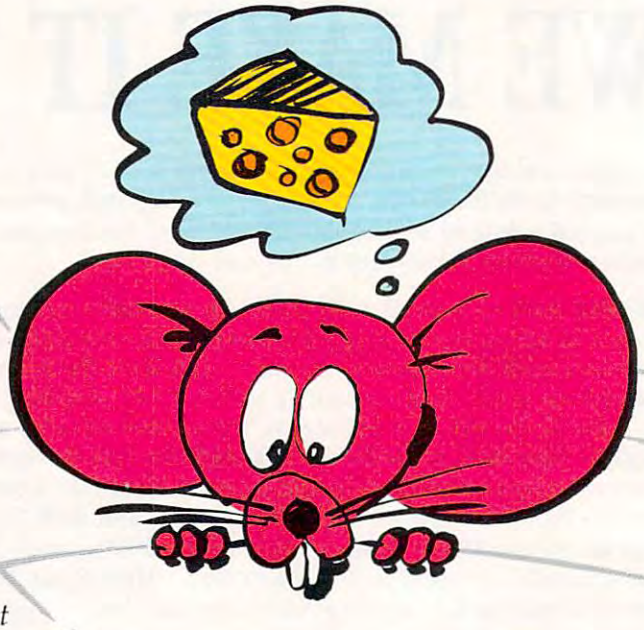
RATS!

Mike Steed



Harry Blair

This impressive game makes you feel that you are inside *a maze, not just seeing it from above. Three dimensional views appear as hallways, doors, and corners as you struggle to find the way out. It's for Upgrade or 4.0 BASIC PETs and Commodore 64.*

You must find your way through a maze displayed from a rat's eye view. After you have solved the maze, the program displays the top view and traces your steps.

First, you are asked what maze size you want, up to 15 by 15 (you may wish to change the DIM statement in line 49 – add two to the largest dimension you want – and line 43). Line 45 checks to see if the machine code has been POKEd in, so you have to wait for that only the first time.

The space bar is used to move forward, and the "J" and "L" keys are used to turn left and right, respectively (turning doesn't change your location; it just gives you the view in another direction). The "M" key will display the top view of the maze, mark your position, and tell you in which direction you are headed.

There are four machine language routines in RATS! (they will all work as is with Upgrade or 4.0 ROMs). LINE, as its name implies, draws a line; this routine is similar to Applesoft's HPLOT TO or Atari BASIC's DRAWTO command. PLOT sets the "hi-res cursor" to the position from which the next line is to be drawn, and plots that point on the screen.

INIT removes everything that is not a letter or number from the screen (thus the quarter-square graphics are erased, but not the "MOVE XX" at the bottom of the screen), and sets all the variables used by the other routines (locations 826-837) to zero.

SCR either loads or saves something to or from the screen. This routine is used to save the screen to memory after the top view of the maze has been displayed the first time, and from then on is used to display the maze almost instantly, so you have to wait only once.

Readers who want a copy of the program (PET version only) without having to type it in may send a blank tape or 8050 disk, an SASE mailer, and $3 to: *Mike Steed*

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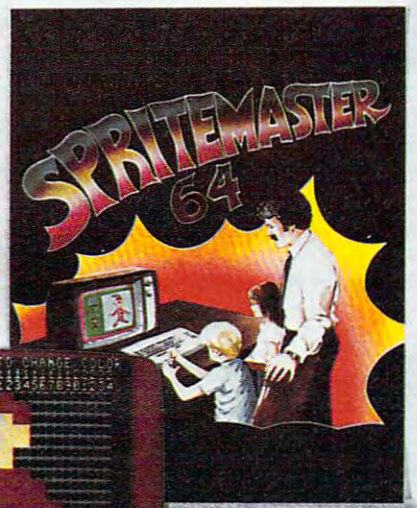

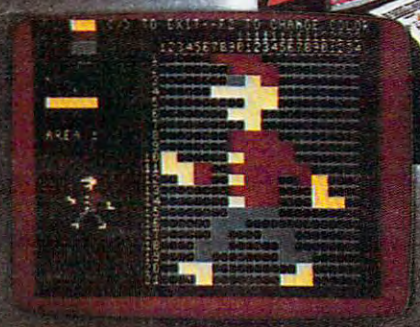

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Program 1: RATS! PET Version

```
3 POKE 59468,12:PRINT CHR$(142):GOTO 38
4 REM DRAW 3-D VIEW
5 N=2:A=H:B=V:FF=2↑(F-1):SYS IN
6 Z=M%(A,B)*FF:IF ((Z/16) AND 1)=1 THEN ~
   RL=-1:GOSUB 25:GOTO 8
7 W=M%(A+S,B-R)*FF:IF ((W/128) AND 1)=1 ~
   THEN RL=-1:GOSUB 21
8 IF ((Z/64) AND 1)=1 THEN RL=1:GOSUB 25
   :GOTO 10
9 W=M%(A-S,B+R)*FF:IF ((W/128) AND 1)=1 ~
   THEN RL=1:GOSUB 21
10 IF ((Z/128) AND 1)=1 THEN 14
11 N=N+1:IF N>8 THEN 15
12 A=A+R:B=B+S:IF B<2 THEN 15
13 GOTO 6
14 GOSUB 17
15 RETURN
16 REM DRAW CENTER BACK
17 POKE HX,VX+DX(N):POKE HY,YU(N):SYS PL:
   POKE HY,YD(N):SYS LI
18 POKE HX,VX-DX(N):SYS LI:POKE HY,YU(N):
   SYS LI:POKE HX,VX+DX(N):SYS LI
19 RETURN
20 REM DRAW BACK SIDE
21 POKE HX,VX+RL*DX(N-1):POKE HY,YU(N):SY
   S PL:POKE HX,VX+RL*DX(N):SYS LI
22 POKE HY,YD(N):SYS LI:POKE HX,VX+RL*DX(
   N-1):SYS LI
23 RETURN
24 REM DRAW RIGHT OR LEFT SIDE
25 POKE HX,VX+RL*DX(N-1):POKE HY,YU(N-1):
   SYS PL:POKE HX,VX+RL*DX(N)
26 POKE HY,YU(N):SYS LI:POKE HY,YD(N):SYS
    LI:POKE HX,VX+RL*DX(N-1)
27 POKE HY,YD(N-1):SYS LI:POKE HY,YU(N-1)
   :IF N>2 THEN SYS LI
28 RETURN
29 REM GET KEYBOARD CHARACTER
30 GET A$:IF A$="" THEN 30
31 RETURN
32 REM ERROR SOUND
33 POKE 59467,16:POKE 59466,51:POKE 59464
   ,80
34 FOR L=1 TO 50:NEXT
35 POKE 59467,0:POKE 59466,0:POKE 59464,0

36 RETURN
37 REM INITIALIZE
38 HX=828:HY=829:LINE=12288:PLOT=12665:IN
   IT=12685:SCR=12725
39 FL=12726:FH=12730:TL=12734:TH=12738
40 PRINT "{CLEAR}{05 DOWN}{17 RIGHT}RATS!

41 PRINT "{02 DOWN}{03 RIGHT}SOLVE A MAZE
    FROM A RAT'S EYE VIEW
42 INPUT "{03 DOWN}{07 RIGHT}MAZE SIZE (H
   ,V)   3,3{05 LEFT}";H,V
43 IF H<3 OR H>15 OR V<3 OR V>15 THEN 40
44 PRINT "{CLEAR}{DOWN}PLEASE WAIT...
45 IF PEEK(LI)=32 AND PEEK(LI+1)=33 AND P
   EEK(LI+2)=48 THEN 48
46 CK=0:FOR L=12288 TO 12761:READ A:POKE ~
   L,A:CK=CK+A:NEXT
47 IF CK<>45230 THEN PRINT "{DOWN}ERROR I
   N DATA STATEMENTS":STOP
48 N=H*V-1:H=H+1:V=V+1:D=1
49 DIM M%(17,17),WALK(100),CUT(5),DX(8),Y
   U(8),YD(8)
50 FOR J=1 TO V+1:M%(1,J)=4:M%(H+1,J)=1:N
   EXT
51 MX=79:MY=49:VX=39:VY=24:X=VX
52 FOR J=1 TO 8:DX(J)=X:YU(J)=INT(VY-X*VY
   /VX):YD(J)=INT(VY+X*(MY-VY)/VX)
53 X=INT(X*7/10):NEXT
54 FOR I=2 TO H:M%(I,V+1)=8:M%(I,1)=2:FOR
    J=2 TO V:M%(I,J)=15:NEXT:NEXT
55 R=INT(H/2)+1:S=INT(V/2)+1:M%(R,S)=15
56 PRINT "{CLEAR}{DOWN}GENERATING MAZE...
   ";:GOSUB 33
57 REM GENERATE RANDOM MAZE (ALGORITHM FR
   OM ROGERS AND STRASSBERGER)
58 FOR IWALK=1 TO N
59 I=Z
60 IF M%(R-1,S)>14 THEN I=I+1:CUT(I)=1
61 IF M%(R,S-1)>14 THEN I=I+1:CUT(I)=2
62 IF M%(R+1,S)>14 THEN I=I+1:CUT(I)=3
63 IF M%(R,S+1)>14 THEN I=I+1:CUT(I)=4
64 IF I=0 THEN 75
65 IF I<>1 THEN I=INT(RND(1)*I)+1
66 ON CUT(I) GOTO 67,69,71,73
67 M%(R,S)=M%(R,S)-(M%(R,S) AND 1):R=R-1
68 M%(R,S)=M%(R,S)-((M%(R,S)/4) AND 1)*4:
   GOTO 86
69 M%(R,S)=M%(R,S)-((M%(R,S)/8) AND 1)*8:
   S=S-1
70 M%(R,S)=M%(R,S)-((M%(R,S)/2) AND 1)*2:
   GOTO 86
71 M%(R,S)=M%(R,S)-((M%(R,S)/4) AND 1)*4:
   R=R+1
72 M%(R,S)=M%(R,S)-(M%(R,S) AND 1):GOTO 8
   6
73 M%(R,S)=M%(R,S)-((M%(R,S)/2) AND 1)*2:
   S=S+1
74 M%(R,S)=M%(R,S)-((M%(R,S)/8) AND 1)*8:
   GOTO 86
75 IF D=-1 THEN 79
76 IF R<>H THEN 83
77 IF S<>V THEN 82
78 R=2:S=2:GOTO 84
79 IF R<>2 THEN 83
80 IF S<>V THEN 82
81 R=H:S=2:GOTO 84
82 S=S+1:D=-D:GOTO 84
83 R=R+D
84 IF M%(R,S)=15 THEN 75
85 GOTO 59
86 NEXT IWALK
87 MH=H:MV=V:I=INT(RND(1)*(MH-1))+2
88 M%(I,1)=0:M%(I,2)=M%(I,2)-((M%(I,2)/8)
    AND 1)*8
89 H=INT(RND(1)*(MH-1))+2:H1=H:V1=V
90 PRINT "{CLEAR}{DOWN}MAZE COMPLETED.":G
   OSUB 33:GOTO 105
91 REM DISPLAY TOP VIEW OF MAZE
92 HZ=INT(79/MH):VZ=INT(49/MV)
93 SYS IN:POKE 216,24:PRINT TAB(25);"{UP}
           {HOME}";
94 POKE HX,1+HZ:POKE HY,1+VZ:SYS PL:POKE
   HY,MV*VZ+1:SYS LI
95 FOR J=1 TO MV:FOR I=2 TO MH:N=M%(I,J):
   X=I*HZ+1:Y=J*VZ+1
96 IF ((N/2) AND 1)=1 THEN POKE HX,X:POKE
    HY,Y:SYS PL:POKE HX,X-HZ:SYS LI
97 IF ((N/4) AND 1)=1 THEN POKE HX,X:POKE
    HY,Y:SYS PL:POKE HY,Y-VZ:SYS LI
98 NEXT:NEXT
99 RETURN
100 REM MARK PLAYER'S POSITION
101 X=H*HZ-1:Y=V*VZ-1:POKE HX,X+1:POKE HY,
   Y+1:SYS PL
```


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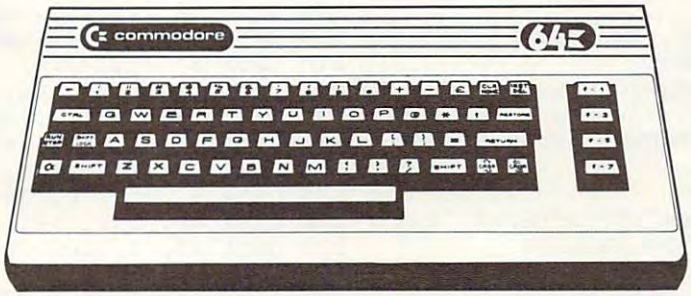

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```
102 POKE HX,X-HZ+2:POKE HY,Y-VZ+2:SYS LI:P
    OKE HY,Y+2:SYS PL
103 POKE HX,X+2:POKE HY,Y-VZ+2:SYS LI
104 RETURN
105 FOR X=1 TO MH:FOR Y=1 TO MV:M%(X,Y)=M%
    (X,Y)+M%(X,Y)*16:NEXT:NEXT
106 REM PLAY
107 F=INT(RND(1)*4)+1:ON F GOTO 108,109,11
    0,111
108 R=0:S=-1:GOTO 112
109 R=+1:S=0:GOTO 112
110 R=0:S=+1:GOTO 112
111 R=-1:S=0
112 PRINT "{CLEAR}{DOWN}PRESS {REV}J{OFF}
    TO TURN LEFT
113 PRINT "{DOWN}PRESS {REV}L{OFF} TO TURN
     RIGHT
114 PRINT "{DOWN}PRESS {REV}SPACE{OFF} TO
    GO FORWARD
115 PRINT "{DOWN}PRESS {REV}M{OFF} TO DISP
    LAY TOP VIEW OF MAZE
116 PRINT "{03 DOWN}{REV} PRESS ANY KEY TO
     CONTINUE "
117 GOSUB 30:PRINT "{CLEAR}";:GOSUB 5
118 REM GET KEYSTROKE
119 GOSUB 30
120 ON -(A$="J")-2*(A$="L")-3*(A$=" ")-4*(
    A$="M") GOTO 122,124,131,136
121 GOSUB 33:GOTO 112
122 F=F-1:IF F<1 THEN F=4
123 GOTO 125
124 F=F+1:IF F>4 THEN F=1
125 ON F GOTO 126,127,128,129
126 R=0:S=-1:GOTO 130
127 R=+1:S=0:GOTO 130
128 R=0:S=+1:GOTO 130
129 R=-1:S=0
130 GOTO 135
131 Z=M%(H,V):T=Z*2^(F-1):T=(T/128) AND 1:
    IF T=1 THEN GOSUB 33:GOTO 119
132 NM=NM+1:POKE 216,24:PRINT TAB(25);"{UP
    UP}MOVE";NM;"{HOME}";
133 IF NM<100 THEN WALK(NM)=F
134 H=H+R:V=V+S:IF V<2 THEN 147
135 GOSUB 5:GOTO 119
136 IF NOT MS THEN 138
137 POKE FL,218:POKE FH,49:POKE TL,0:POKE
    TH,128:SYS SC:GOTO 139
138 GOSUB 92:POKE FL,0:POKE FH,128:POKE TL
    ,218:POKE TH,49:SYS SC:MS=-1
139 GOSUB 101:PRINT "{HOME}YOU ARE FACING
    ";: ON F GOTO 140,141,142,143
140 PRINT "NORTH";:GOTO 144
141 PRINT "EAST";:GOTO 144
142 PRINT "SOUTH";:GOTO 144
143 PRINT "WEST";
144 PRINT ".  PRESS ANY KEY TO":PRINT "CON
    TINUE":GOSUB 30
145 PRINT "{HOME}
                ":PRINT "        "
146 GOSUB 5:GOTO 119
147 GOSUB 33:V=V1:H=H1:IF MS THEN POKE FL,
    218:POKE FH,49:POKE TL,0:POKE TH,
    128
148 IF MS THEN SYS SC:GOTO 150
149 GOSUB 92
150 GOSUB 101
151 PRINT "{HOME}{DOWN}CONGRATULATIONS-YOU
    'RE OUT IN";NM;"STEP!{LEFT}{INST}
    S"
152 REM DRAW PATH WALKED
153 POKE HX,H*HZ-HZ/2+1:POKE HY,V*VZ-VZ/2+
    1:SYS PL
154 FOR N=1 TO NM:IF N>100 THEN 158
155 F=WALK(N):V=V+(F=1)-(F=3):H=H+(F=4)-(F
    =2)
156 POKE HX,H*HZ-HZ/2+1:POKE HY,V*VZ-VZ/2+
    1:SYS LI
157 NEXT
158 PRINT:END
159 DATA 32, 33, 48, 173, 58, 3, 133
160 DATA 0, 173, 59, 3, 133, 1, 32
161 DATA 0, 49, 173, 62, 3, 205, 63
162 DATA 3, 16, 8, 240, 6, 32, 173
163 DATA 48, 76, 3, 48, 96, 169, 128
164 DATA 24, 109, 60, 3, 56, 237, 58
165 DATA 3, 141, 63, 3, 169, 128, 24
166 DATA 109, 61, 3, 56, 237, 59, 3
167 DATA 141, 64, 3, 162, 128, 142
168 DATA 66, 3, 142, 69, 3, 232, 142
169 DATA 67, 3, 142, 68, 3, 173, 63
170 DATA 3, 201, 128, 176, 11, 169
171 DATA 127, 141, 68, 3, 169, 0, 56
172 DATA 237, 63, 3, 41, 127, 141
173 DATA 63, 3, 173, 64, 3, 201, 128
174 DATA 176, 11, 169, 127, 141, 67
175 DATA 3, 169, 0, 56, 237, 64, 3
176 DATA 41, 127, 141, 64, 3, 173
177 DATA 63, 3, 205, 64, 3, 176, 32
178 DATA 174, 63, 3, 172, 64, 3, 142
179 DATA 64, 3, 140, 63, 3, 173, 68
180 DATA 3, 141, 66, 3, 173, 67, 3
181 DATA 141, 69, 3, 169, 128, 141
182 DATA 67, 3, 141, 68, 3, 173, 63
183 DATA 3, 74, 141, 65, 3, 169, 0
184 DATA 141, 62, 3, 96, 173, 68, 3
185 DATA 56, 233, 128, 24, 109, 58
186 DATA 3, 141, 58, 3, 173, 69, 3
187 DATA 56, 233, 128, 24, 109, 59
188 DATA 3, 141, 59, 3, 173, 65, 3
189 DATA 24, 109, 64, 3, 141, 65, 3
190 DATA 238, 62, 3, 173, 65, 3, 205
191 DATA 63, 3, 48, 35, 240, 33, 56
192 DATA 237, 63, 3, 141, 65, 3, 173
193 DATA 66, 3, 56, 233, 128, 24, 109
194 DATA 58, 3, 141, 58, 3, 173, 67
195 DATA 3, 56, 233, 128, 24, 109
196 DATA 59, 3, 141, 59, 3, 96, 169
197 DATA 0, 133, 148, 169, 32, 133
198 DATA 2, 165, 0, 201, 80, 176, 56
199 DATA 165, 1, 201, 50, 176, 50
200 DATA 234, 234, 234, 234, 70, 0
201 DATA 38, 148, 106, 38, 148, 133
202 DATA 1, 10, 10, 101, 1, 10, 10
203 DATA 38, 2, 10, 38, 2, 234, 234
204 DATA 234, 133, 1, 166, 148, 189
205 DATA 99, 49, 133, 148, 164, 0
206 DATA 177, 1, 162, 15, 221, 103
207 DATA 49, 240, 4, 202, 16, 248
208 DATA 96, 173, 156, 3, 240, 6, 138
209 DATA 5, 148, 170, 208, 8, 138
210 DATA 73, 255, 5, 148, 73, 255
211 DATA 170, 189, 103, 49, 164, 0
212 DATA 145, 1, 96, 1, 1, 2, 4, 8
213 DATA 32, 126, 123, 97, 124, 226
214 DATA 255, 236, 108, 127, 98, 252
215 DATA 225, 251, 254, 160, 234, 0
216 DATA 173, 60, 3, 141, 58, 3, 133
217 DATA 0, 173, 61, 3, 141, 59, 3
218 DATA 133, 1, 32, 0, 49, 96, 162
219 DATA 128, 160, 0, 134, 34, 132
220 DATA 33, 177, 33, 41, 127, 201
```


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```
221 DATA 64, 48, 2, 169, 32, 145, 33
222 DATA 200, 208, 241, 232, 224, 132
223 DATA 208, 232, 169, 0, 170, 157
224 DATA 58, 3, 232, 224, 12, 208
225 DATA 248, 96, 169, 218, 133, 31
226 DATA 169, 49, 133, 32, 169, 0
227 DATA 133, 33, 169, 128, 133, 34
228 DATA 162, 4, 160, 0, 177, 31, 145
229 DATA 33, 136, 208, 249, 230, 32
230 DATA 230, 34, 202, 48, 2, 208
231 DATA 240, 96
```

Program 2:

RATS! 64 Version — Setup Program

Run this program before RUNning RATS! on the 64.

```
100 POKE16384,0:POKE16385,0
110 POKE56578,PEEK(56578)OR3
120 POKE56576,(PEEK(56576)AND252)OR1
130 POKE53272,4:POKE648,128
140 POKE53280,12:POKE53281,12
145 POKE641,0:POKE642,64
150 POKE43,1:POKE44,64:POKE55,0:POKE56,1
    28:POKE646,1:PRINT"{CLR}"
```

Program 3:

RATS! 64 Version — Adjustments To Program 1

Replace these lines in Program 1 if you are using the 64.

```
3 :PRINT CHR$(142):GX=49152:GOTO 38
46 CK=0:FOR L=12288 TO 12761:READ A:POKE
    L,A:CK=CK+A:NEXT:FORK=GXTOGX+23:READ
   GX
47 POKEK,GX:NEXT:IF CK<>50144 THEN PRINT
    "{DOWN}ERROR IN DATA STATEMENTS":STO
   P
56 PRINT "{CLR}{DOWN}GENERATING MAZE..."
   ;:GOSUB 2000
90 PRINT "{CLR}{DOWN}MAZE COMPLETED.":GO
   SUB 2000:GOTO 105
93 SYS IN:POKE 214,24:PRINT TAB(25);"
   {UP}{9 SPACES}{HOME}";
117 GOSUB 30:PRINT "{CLR}";:SYS49152:GOS
    UB 5
121 GOSUB2000:GOTO112
131 Z=M%(H,V):T=Z*2↑(F-1):T=(T/128) AND
    1:IF T=1 THEN GOSUB 2000:GOTO 119
132 NM=NM+1:POKE 214,24:PRINT TAB(25);"
    {UP}MOVE";NM;"{HOME}";
147 GOSUB2000:V=V1:H=H1:IF MS THEN POKE
    FL,218:POKE FH,49:POKE TL,0:POKE TH,
    128
```

Program 4:

Add these lines to Program 1 if you are using the 64.

```
2000 S0=54272:FORE=S0TOS0+28:POKEE,0:NEX
     T
2010 POKE54296, 15 :POKE54277, 51 :POKE5
     4278, 211
2020 POKE 54276, 33 :POKE 54273, 63 :POK
     E54272, 75
2030 FORT=1TO 200 :NEXT:POKE54276, 32:FO
     RT=1TO 100 :NEXT
2040 FORE=S0TOS0+28:POKEE,0:NEXT
2050 RETURN
```

Remove lines 32, 33, 34, 35, and 36 if you are using the 64.

RATS! For 64

Gregg Peele,
Programming Assistant

The Commodore 64 version of "RATS!" utilizes the same machine language program that was used in the PET version. The program was changed significantly in only two ways. First, zero-page locations were altered because there is limited zero page space on the 64. Second, a routine to fill screen with color has been added to make the maze visible on the newer 64s. (Color RAM must be POKEd on newer 64s, or values POKEd to the screen are invisible.)

Whenever you run the 64 version, you must prepare the 64 by running Program 2 first. Program 2 sets screen memory at 32768 ($8000) and places BASIC at 16384 ($4000); this emulates the PET screen and provides a safe place for both BASIC and the machine language program. Since the screen normally resides at 1024 ($0400), be careful not to hit the RUN/STOP and RESTORE keys simultaneously while you are within the program. If you do this, then the 64 will "forget" where your BASIC program resides, and you will lose your program.

To transform Program 1 (the PET version) into a 64 version, type in Program 1 as is except replace, add, and delete lines as instructed below. Also, *all* DATA statement lines are different (see Program 5).

Program 5:

Use none *of the DATA statements from Program 1. Instead, use these for the 64.*

```
160 DATA 32, 33, 48, 173, 58, 3, 133, 2
170 DATA 173, 59, 3, 133, 195, 32, 0, 49
180 DATA 173, 62, 3, 205, 63, 3, 16, 8
190 DATA 240, 6, 32, 173, 48, 76, 3, 48
200 DATA 96, 169, 128, 24, 109, 60, 3, 56
210 DATA 237, 58, 3, 141, 63, 3, 169, 128
220 DATA 24, 109, 61, 3, 56, 237, 59, 3
230 DATA 141, 64, 3, 162, 128, 142, 66, 3
240 DATA 142, 69, 3, 232, 142, 67, 3, 142
250 DATA 68, 3, 173, 63, 3, 201, 128, 176
260 DATA 11, 169, 127, 141, 68, 3, 169, 0
270 DATA 56, 237, 63, 3, 41, 127, 141, 63
280 DATA 3, 173, 64, 3, 201, 128, 176, 11
290 DATA 169, 127, 141, 67, 3, 169, 0, 56
300 DATA 237, 64, 3, 41, 127, 141, 64, 3
310 DATA 173, 63, 3, 205, 64, 3, 176, 32
320 DATA 174, 63, 3, 172, 64, 3, 142, 64
330 DATA 3, 140, 63, 3, 173, 68, 3, 141
340 DATA 66, 3, 173, 67, 3, 141, 69, 3
350 DATA 169, 128, 141, 67, 3, 141, 68, 3
360 DATA 173, 63, 3, 74, 141, 65, 3, 169
370 DATA 0, 141, 62, 3, 96, 173, 68, 3
380 DATA 56, 233, 128, 24, 109, 58, 3, 1
    41
390 DATA 58, 3, 173, 69, 3, 56, 233, 128
400 DATA 24, 109, 59, 3, 141, 59, 3, 173
410 DATA 65, 3, 24, 109, 64, 3, 141, 65
```


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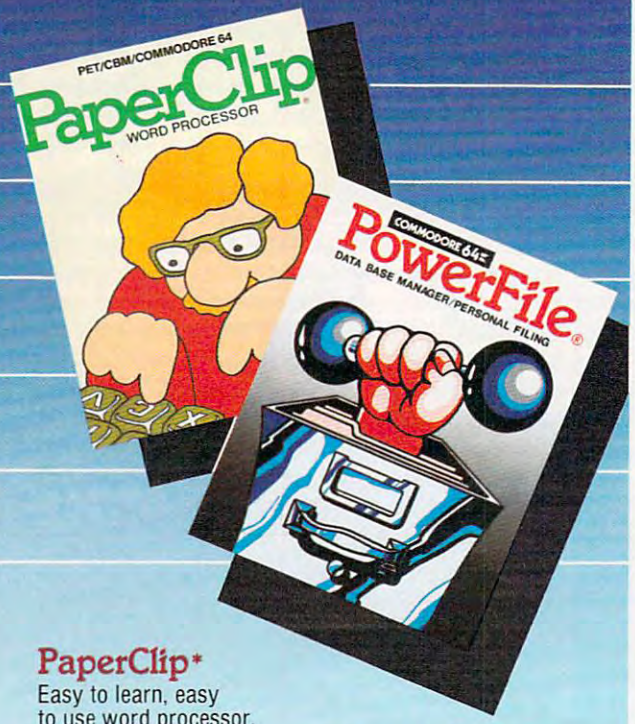

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```
420 DATA 3, 238, 62, 3, 173, 65, 3, 205
430 DATA 63, 3, 48, 35, 240, 33, 56, 237
440 DATA 63, 3, 141, 65, 3, 173, 66, 3
450 DATA 56, 233, 128, 24, 109, 58, 3, 1
    41
460 DATA 58, 3, 173, 67, 3, 56, 233, 128
470 DATA 24, 109, 59, 3, 141, 59, 3, 96
480 DATA 169, 0, 133, 168, 169, 32, 133,
     196
490 DATA 165, 2, 201, 80, 176, 56, 165,
    195
500 DATA 201, 50, 176, 50, 234, 234, 234
    , 234
510 DATA 70, 2, 38, 168, 106, 38, 168, 1
    33
520 DATA 195, 10, 10, 101, 195, 10, 10,
    38
530 DATA 196, 10, 38, 196, 234, 234, 234
    , 133
540 DATA 195, 166, 168, 189, 99, 49, 133
    , 168
550 DATA 164, 2, 177, 195, 162, 15, 221,
     103
560 DATA 49, 240, 4, 202, 16, 248, 96, 1
    73
570 DATA 98, 49, 240, 6, 138, 5, 168, 17
    0
580 DATA 208, 8, 138, 73, 255, 5, 168, 7
    3
590 DATA 255, 170, 189, 103, 49, 164, 2,
     145
600 DATA 195, 96, 1, 1, 2, 4, 8, 32
610 DATA 126, 123, 97, 124, 226, 255, 23
    6, 108
620 DATA 127, 98, 252, 225, 251, 254, 16
    0, 234
630 DATA 0, 173, 60, 3, 141, 58, 3, 133
640 DATA 2, 173, 61, 3, 141, 59, 3, 133
650 DATA 195, 32, 0, 49, 96, 162, 128, 1
    60
660 DATA 0, 134, 254, 132, 253, 177, 253
    , 41
670 DATA 127, 201, 64, 48, 2, 169, 32, 1
    45
680 DATA 253, 200, 208, 241, 232, 224, 1
    32, 208
690 DATA 232, 169, 0, 170, 157, 58, 3, 2
    32
700 DATA 224, 12, 208, 248, 96, 169, 218
    , 133
710 DATA 251, 169, 49, 133, 252, 169, 0,
     133
720 DATA 253, 169, 128, 133, 254, 162, 4
    , 160
730 DATA 0, 177, 251, 145, 253, 136, 208
    , 249
740 DATA 230, 252, 230, 254, 202, 48, 2,
     208
750 DATA 240, 96
1000 DATA 162, 0, 169, 1, 157, 0, 216, 1
     57
1010 DATA 0, 217, 157, 0, 218, 157, 0, 2
     19
1020 DATA 232, 208, 241, 96, 234, 234, 2
     34, 0
```

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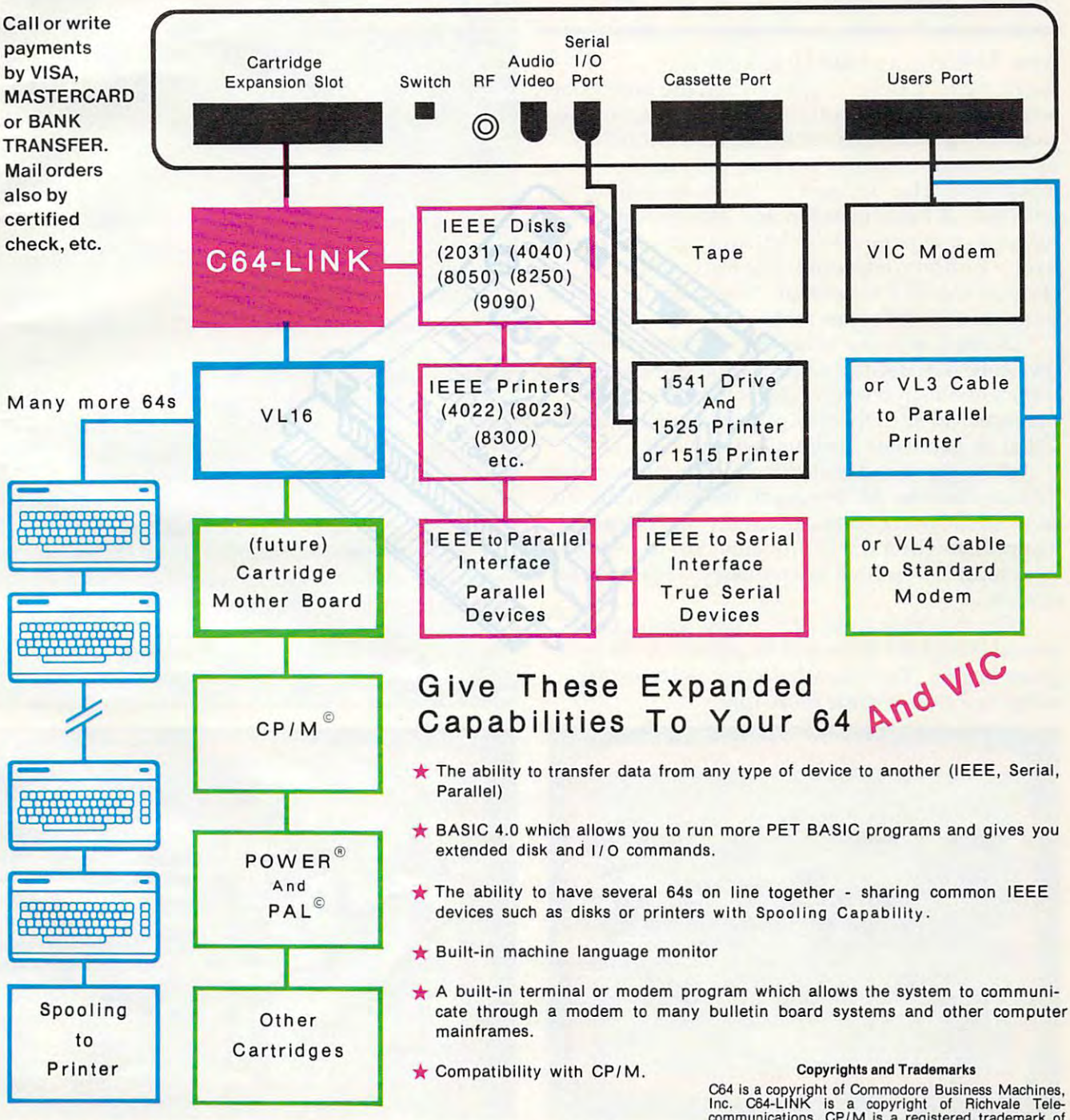

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GOBLIN

Dan Goff

In "Goblin" (for the unexpanded VIC, 64, Atari, TI, and Apple) custom characters are used to create a simple yet entertaining game. The object is to capture the scowling creatures with your goblin while avoiding the many block-shaped obstacles that lie in your path.

After obstacles and sad faces have been positioned, "Goblin" begins when the main character appears at the bottom of the screen. As the game progresses, the goblin moves continually upward and the player controls only its horizontal movement. The "O" and "P" keys, in conjunction with the GET command in line 260, enable the player to move the goblin left and right, respectively. Children especially like the cumulative effect of the GET statement; they make rapid key punches and then wait for the delayed effects.

As each sad face is captured by the goblin, the score is updated and printed at the upper left. If the goblin successfully clears the screen of all the faces, an entirely new playfield will be provided. A game lasts as long as you wish.

A single round ends when the goblin crashes into an obstacle. At this point, the remaining sad faces smile, and you are asked if you wish to play again. If you don't, it is probably best to respond by typing "N" so that full memory is restored to the VIC.

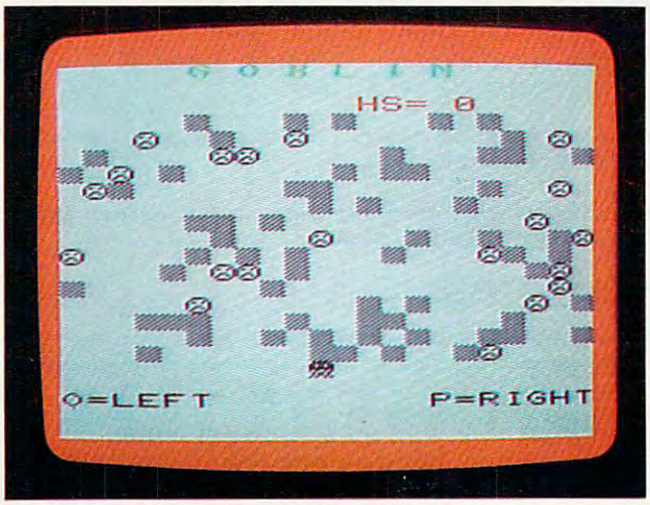
On the other hand, if you play again, your previous highest score will be posted as the new game begins. The incentive to exceed a record score makes any game more fun.

64, AtARI, TI-99/4A And Apple Version Notes

The 64, Atari, TI-99/4A, and Apple versions of Goblin are almost identical to the VIC version. Minor differences do exist, however, in the Atari and Apple versions.

The Atari version uses the "+" and "*" keys to control left and right movement of the goblin. The Apple uses the left and right arrow keys.

The Apple version requires that you have a disk drive with the DOS Tool Kit disk in the drive when the program is run. This version defines certain characters using the program "Animatrix" from this disk. As Goblin is run, these custom characters are placed in memory as shapes and are later drawn on the high-resolution graphics screen. When the game begins, they are simultaneously POKEd into the areas of memory associated with the text and the high-resolution graphics screens. So, although you see these redefined characters on the high-resolution page, collision detection is actually carried out by PEEKing text screen memory.



Chasing goblins on the VIC-20 version of Goblin.

Goblin on the Commodore 64.

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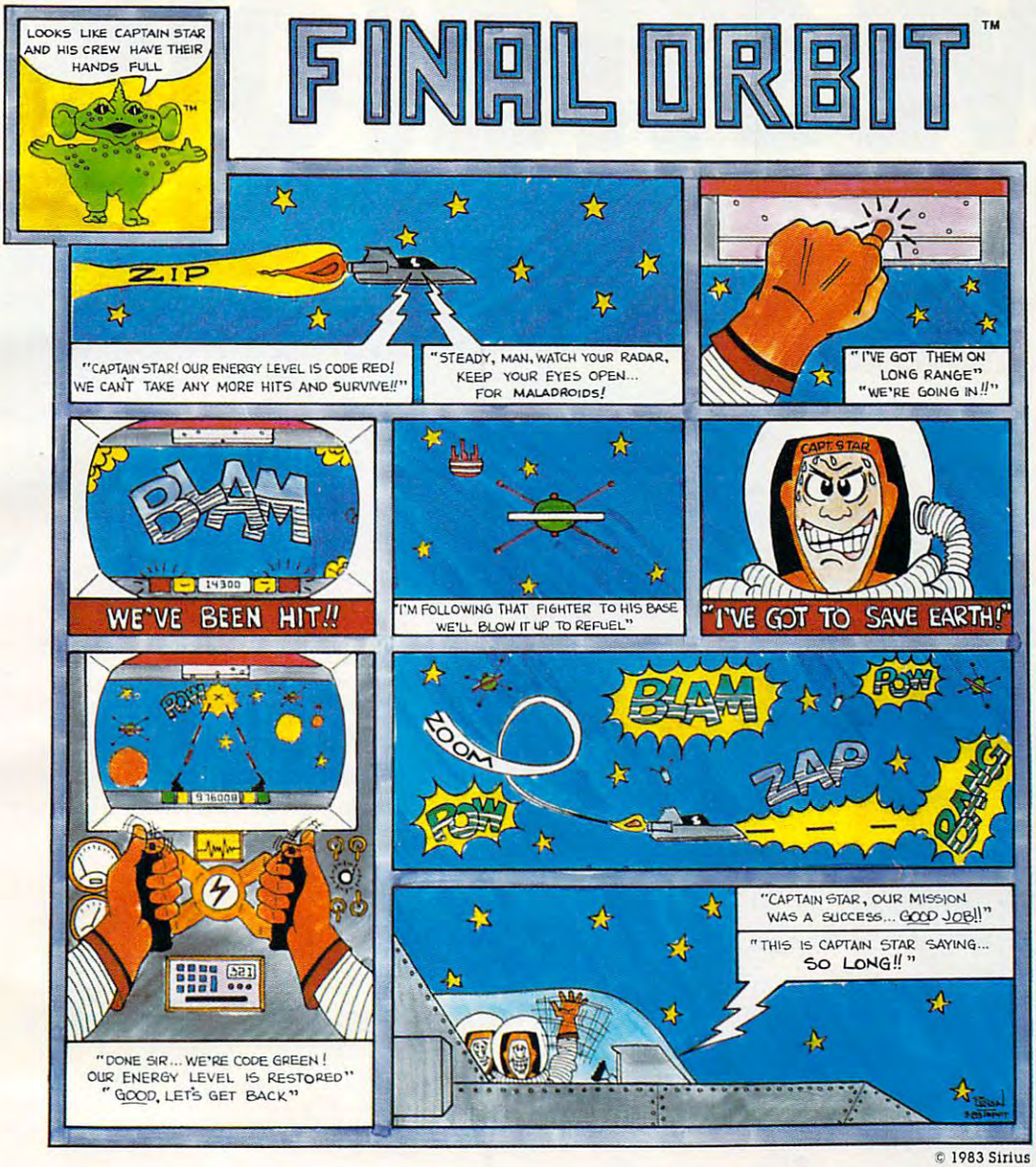

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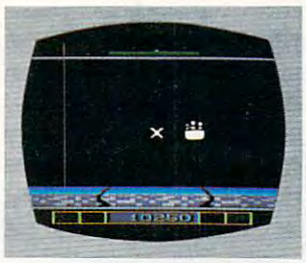

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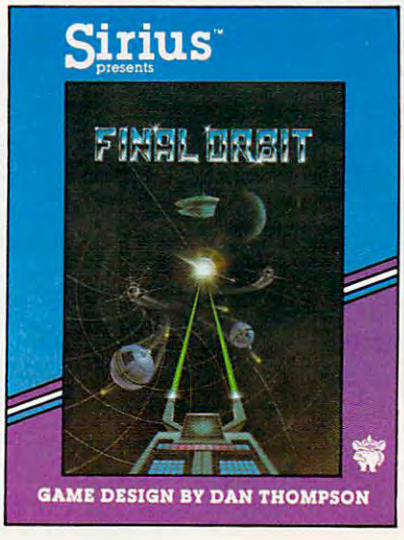

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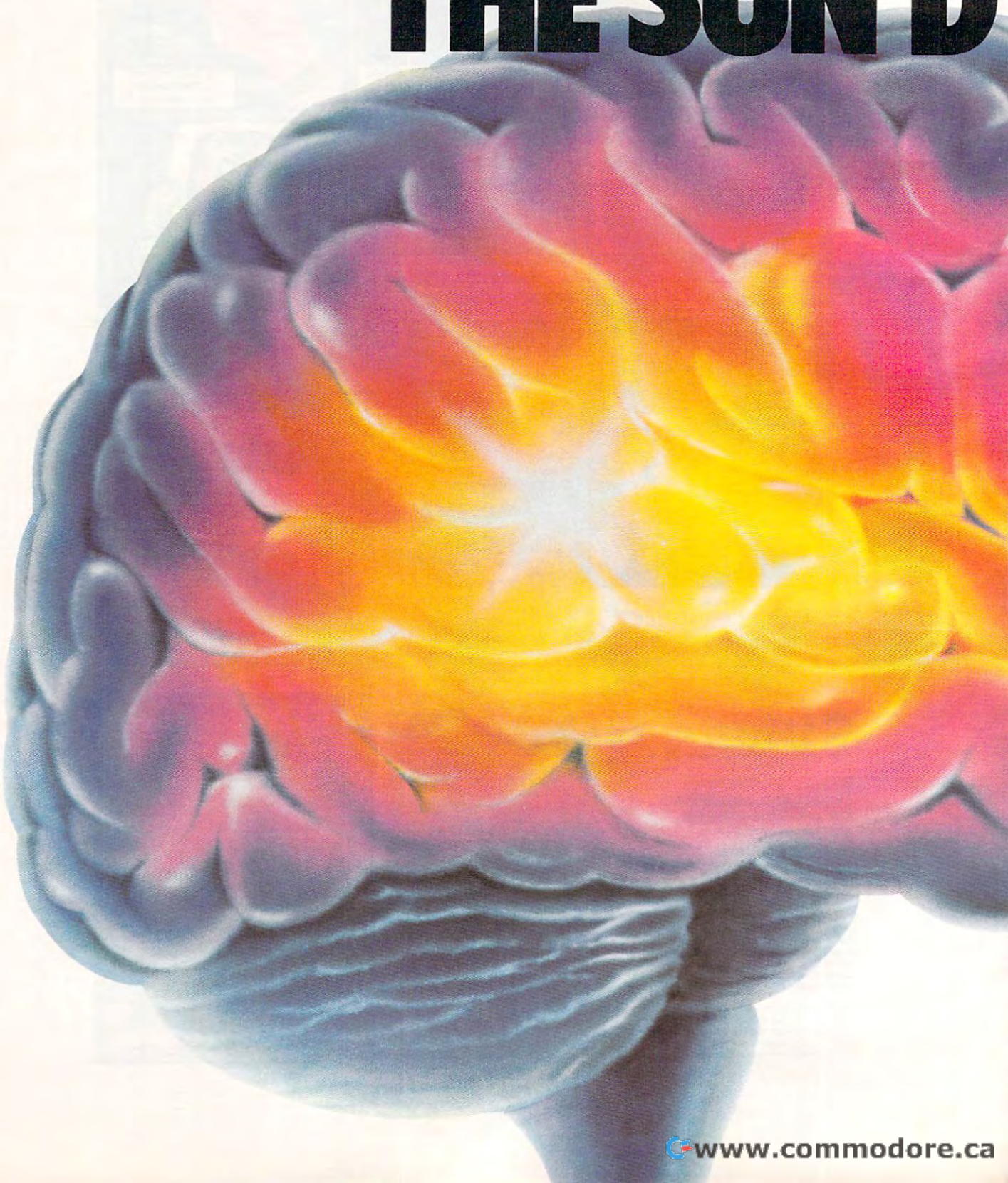

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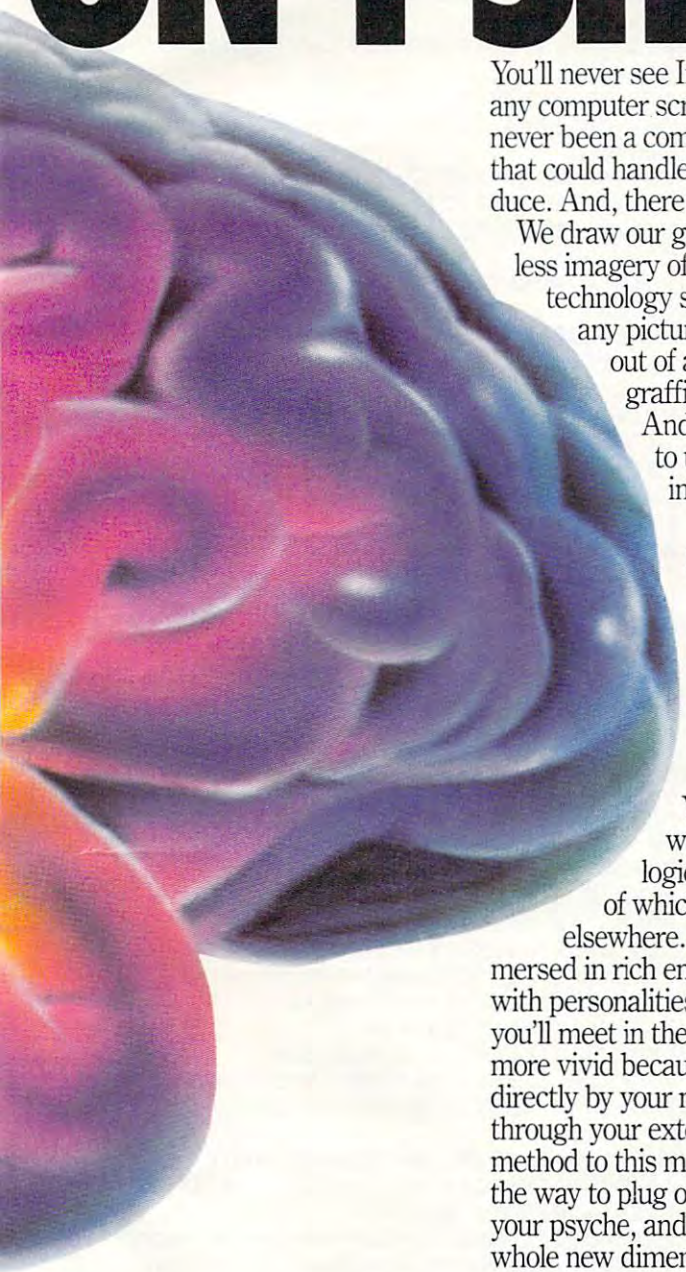

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BEGINNING PROGRAMMERS

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Program 1: Goblin – VIC Version

```
100 PRINT"{CLR}":POKE 52,28:POKE 56,28:C
    LR:POKE 36869,255:POKE 36879,26
110 IFS>HSTHENHS=S
115 RESTORE:B=230:Z=8152:Z1=Z+30720:W=0:
    S=J:G=0
120 FOR X=1TO32:READ A:POKEX+7167,A:NEXT
    :FORX=1TO8:READA:POKEX+7423,A:NEXT
130 PRINT"{CLR}{RVS}{GRN}{5 RIGHT}G O B
    L I N"
140 PRINT"{HOME}{RED}{2 DOWN}"SPC(12)"
    {RVS}HS="HS:PRINT"{HOME}{RVS}{BLK}
    {20 DOWN}O=LEFT{9 RIGHT}P=RIGHT"
150 FOR I=1 TO 65
160 X=INT(RND(1)*330)+7746
170 IFPEEK(X)=BTHEN 160
180 POKEX,B:POKEX+30720,0:NEXTI
190 FORI=1TO20
200 X=INT(RND(1)*330)+7746
210 IF PEEK(X)=BORPEEK(X)=1ORPEEK(X)=3TH
    EN 200
220 IFPEEK(X+21)=BANDPEEK(X+22)=BANDPEEK
    (X+23)=BTHENPOKEX,3:POKEX+30720,0:G=
    G+1:GOTO240
230 POKEX,1:POKEX+30720,0
240 NEXT I
250 POKEZ,32:Z=Z-22:Z1=Z1-22:IF Z<7746 T
    HEN Z=Z+374:Z1=Z1+374
260 GET A$:IFA$="O"THENZ=Z-1:Z1=Z1-1
270 IFA$="P"THENZ=Z+1:Z1=Z1+1
280 IFPEEK(Z)=B THEN 410
290 IFPEEK(Z)=1 THEN GOSUB 330
300 POKEZ,0:POKEZ1,0:FORT=1TO220:NEXT
310 IFW=20-G THEN J=S:GOSUB350:GOTO110
320 GOTO 250
330 W=W+1:S=S+25:PRINT"{HOME}{BLU}
    {2 DOWN}{RVS}"S:POKE36878,15
340 FORT=235TO250:POKE36876,T:NEXT:POKE3
    6876,0:RETURN
350 PRINT"{HOME}{RED}{16 DOWN}{RVS}*****
    *ALL RIGHT!******"
355 FORI=1TO10:GETA$:NEXTI:REM COLLECT G
    ARBAGE
360 FORI=1TO25
370 X=INT(RND(1)*15)+233
380 POKE36878,15:POKE36875,X
390 FORT=1TO30:NEXTT:NEXTI
400 POKE36878,0:POKE36875,0:RETURN
410 POKE36877,200:FORV=15TO0STEP-1:POKE3
    6878,V:NEXT:POKE36877,0:POKEZ,2
420 FORX=7746TO8075:IF PEEK(X)<>1THEN NE
    XTX
430 IFPEEK(X)=1THEN POKEX,3:NEXTX
440 J=0
445 FORI=1TO10:GET C$:NEXTI
450 PRINT"{HOME}{BLU}{18 DOWN}{RIGHT}
    {RVS}PLAY AGAIN? (Y/N)"
465 GET C$:IF C$="" THEN 465
470 IFC$="Y"THEN 110
490 POKE 36869,240:POKE36879,27:POKE52,3
    0:POKE56,30:PRINT"{CLR}SEE YA!"
500 DATA126,219,219,255,165,90,90,165,60
    ,66,165,129,153,165,66,60
510 DATA 170,85,170,85,126,219,255,189,6
    0,66,165,129,165,153,66,60
520 DATA 0,0,0,0,0,0,0,0
```

Program 2: Goblin – 64 Version

```
80 POKE 53280,2:POKE 53281,1
90 PRINT"{CLR}{7 DOWN}{4 RIGHT}PLEASE WA
   IT...DEFINING CHARACTERS";
100 POKE 52,48:POKE 56,48:CLR:POKE56334,
    PEEK(56334)AND254
105 POKE1,PEEK(1)AND251
108 FORN=0TO2047:POKEN+12288,PEEK(N+5324
    8):NEXTN
109 FOR N=0 TO 7:POKEN+12320,PEEK(N+5406
    4):NEXT N
110 IFS>HSTHENHS=S
112 RESTORE:B=4:Z=1964:Z1=Z+54272:W=0:S=
    J:G=0
115 VS=54296:AD=54277:SR=54278:WF=54276:
    LB=54272:HB=54273
120 FOR X=0TO31:READ A:POKEX+12288,A:NEX
    T
123 POKE 1,PEEK(1)OR4:POKE56334,PEEK(563
    34)OR1
125 POKE 53272,(PEEK(53272)AND240)+12
130 PRINT"{CLR}{GRN}{14 RIGHT}{RVS}G O B
     L I N"
140 PRINT"{HOME}{RED}{2 DOWN}{RVS}"SPC(1
    7)"HS="HS
145 PRINT"{HOME}{BLK}{22 DOWN}{RVS}O=LEF
    T";SPC(27);"P=RIGHT"
150 FOR I=1 TO 118
160 X=INT(RND(1)*680)+1144
170 IFPEEK(X)=BTHEN 160
180 POKEX,B:POKEX+54272,0:NEXTI
190 FORI=1TO36
195 G1=0
200 X=INT(RND(1)*680)+1144
210 IF PEEK(X)=BORPEEK(X)=1ORPEEK(X)=3TH
    EN 200
220 IFPEEK(X+39)=BANDPEEK(X+40)=BANDPEEK
    (X+41)=BTHENPOKEX,3:POKEX+54272,0:G1
    =1
225 IF G1=1 THEN G=G+1:GOTO 240
230 POKEX,1:POKEX+54272,0
240 NEXT I
250 POKEZ,32:Z=Z-40:Z1=Z1-40:IF Z<1144 T
    HEN Z=Z+760:Z1=Z1+760
260 GET A$:IFA$="O"THENZ=Z-1:Z1=Z1-1
270 IFA$="P"THENZ=Z+1:Z1=Z1+1
280 IFPEEK(Z)=B THEN 410
290 IFPEEK(Z)=1 THEN GOSUB 330
300 POKEZ,0:POKEZ1,0:FORT=1TO220:NEXT
310 IFW=36-G THEN J=S:GOSUB350:GOTO110
320 GOTO 250
330 W=W+1:S=S+25:PRINT"{HOME}{BLU}
    {2 DOWN}"S:POKE VS,15:POKE AD,30:POK
    E SR,200:POKE WF,17
340 POKEHB,7:POKELB,12:FORT=1TO90:NEXTT
    :POKEVS,0:POKEHB,0:POKELB,0:RETURN
350 PRINT"{HOME}{RED}{18 DOWN}{8 RIGHT}
    {RVS}******ALL RIGHT!******"
355 FORI=1TO10:GETC$:NEXTI:REM COLLECT G
    ARBAGE
360 POKE VS,15:POKE AD,30:POKE SR,200:PO
    KE WF,17:FOR I=1 TO 17
370 H=INT(RND(0)*10)+21:L=INT(RND(0)*45)
    +210:POKE HB,H:POKE LB,L
380 FOR T=1 TO 80:NEXT T:NEXTI:POKE VS,0
    :POKE HB,0:POKE LB,0
```


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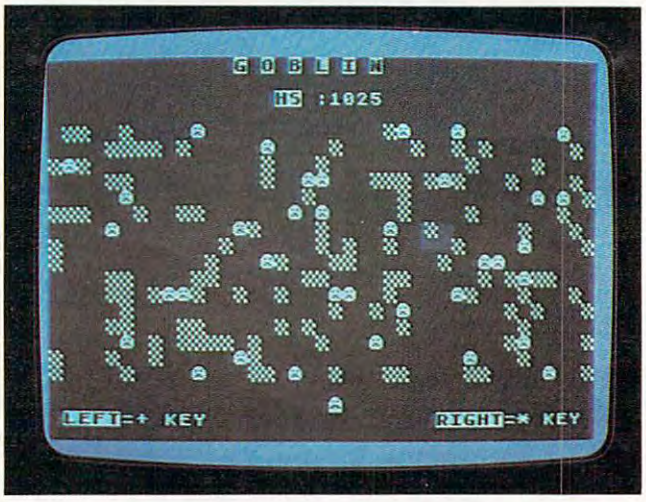
```
400 RETURN
410 POKEZ,2:POKEVS,15:POKEAD,30:POKESR,2
    00:POKEWF,129:POKE HB,2:POKE LB,125
415 FOR I=1 TO 400:NEXT I:POKE VS,15:POK
    E HB,0:POKE LB,0
420 FORX=1144TO1823:IF PEEK(X)<>1THEN NE
    XTX
430 IFPEEK(X)=1THEN POKEX,3:NEXTX
440 J=0
445 FORI=1TO10:GET C$:NEXTI
450 PRINT"{HOME}{BLU}{20 DOWN}{RVS}PLAY
    AGAIN? (Y/N)":POKE 646,14
465 GET C$:IF C$="" THEN 465
470 IFC$="Y"THEN 110
490 POKE53272,21:POKE53280,14:POKE53281,
    6:POKE 52,50:POKE56,50:PRINT"{CLR}SE
    E YA!"
500 DATA126,219,219,255,165,90,90,165,60
    ,66,165,129,153,165,66,60
510 DATA 170,85,170,85,126,219,255,189,6
    0,66,165,129,165,153,66,60
520 DATA 0,0,0,0,0,0,0,0
```

Program 3: Goblin – Atari Version

```
90 SCREEN=PEEK(88)+256*PEEK(89):DIM
   A$(3):OPEN #1,4,0,"K:"
100 GRAPHICS 1+16:POSITION 1,10:? #6
    ;"...PLEASE WAIT..."
105 GOSUB 2000
107 IF S>HS THEN HS=S
108 S=J1:W=0:Z=SCREEN+900:G=0
110 GRAPHICS 0:POKE 752,1:SETCOLOR 4
    ,6,6:SETCOLOR 2,10,1:POSITION 13
    ,0:PRINT "G O B L I N"
115 POKE 756,CHSET/256
120 POSITION 16,2:? "HS :";HS:POSITI
    ON 1,22:? "LEFT=+ KEY":POSITION
    28,22:? "RIGHT=* KEY";
150 FOR I=1 TO 120
160 X=SCREEN+INT(RND(0)*640)+160
170 IF PEEK(X)=7 THEN 160
180 POKE X,7:NEXT I
190 FOR I=1 TO 36
200 X=SCREEN+INT(RND(0)*640)+160
210 IF PEEK(X)=7 OR PEEK(X)=1 OR PEE
    K(X)=32 THEN 200
220 IF PEEK(X+39)=7 AND PEEK(X+40)=7
     AND PEEK(X+41)=7 THEN POKE X,1:
    G=G+1:GOTO 240
230 POKE X,32
240 NEXT I
245 SOUND 1,50,10,12:FOR I=1 TO 50:N
    EXT I:SOUND 1,0,0,0:FOR I=1 TO 2
    00:NEXT I
250 POKE Z,0:Z=Z-40:IF Z<SCREEN+120
    THEN Z=Z+760
260 A=PEEK(764):POKE 764,255:IF A=7
    THEN Z=Z+1
270 IF A=6 THEN Z=Z-1
280 IF PEEK(Z)=7 THEN 410
290 IF PEEK(Z)=32 THEN GOSUB 330
300 POKE Z,5:FOR T=1 TO 100:NEXT T
310 IF W=36-G THEN J1=S:GOSUB 350:GO
    TO 107
320 GOTO 250
330 W=W+1:S=S+25:POSITION 3,2:? S
340 SOUND 2,20,14,12:FOR I=1 TO 20:S
    OUND 2,0,0,0
345 RETURN
350 FOR I=SCREEN+360 TO SCREEN+480:P
    OKE I,0:NEXT I:POSITION 10,10:?
    "**** ALL RIGHT ***"
355 J1=S
360 FOR X=1 TO 20:SOUND 1,30-X,10,12
    :FOR I=1 TO 40:NEXT I:NEXT X:SOU
    ND 1,0,0,0
400 RETURN
410 POKE Z,6
415 FOR V=12 TO 0 STEP -1:SOUND 1,40
    ,2,V:SOUND 2,70,12,V:SETCOLOR 4,
    V,6:FOR I=1 TO 40:NEXT I:NEXT V
418 SETCOLOR 4,6,6:SOUND 1,0,0,0:SOU
    ND 2,0,0,0
420 FOR X=SCREEN+160 TO SCREEN+800:I
    F PEEK(X)<>32 THEN NEXT X
430 IF PEEK(X)=32 THEN POKE X,1:NEXT
     X
440 J1=0
450 POKE 764,255:POSITION 10,21:? "P
    lay Again (Y/N)?";:GET #1,A
460 IF A=ASC("Y") THEN 107
470 GRAPHICS 1+16:POSITION 3,10:? #6
    ;"...SEE YA...":FOR I=1 TO 800:N
    EXT I:END
2000 CHSET=(PEEK(106)-8)*256:FOR I=0
      TO 1023:POKE CHSET+I,PEEK(5734
    4+I):NEXT I
2001 RESTORE 2005
2002 READ A:IF A=-1 THEN RETURN
2003 FOR J=0 TO 7:READ B:POKE CHSET+
    A*8+J,B:NEXT J
2004 GOTO 2002
2005 DATA 1,60,126,219,255,189,195,1
    26,60
2006 DATA 5,60,126,219,255,195,153,2
    55,255
2007 DATA 6,204,204,51,51,204,126,21
    9,255
2008 DATA 7,204,204,51,51,204,204,51
    ,51
2009 DATA 32,60,126,219,255,231,219,
    126,0
2010 DATA -1
```



Atari version of Goblin.

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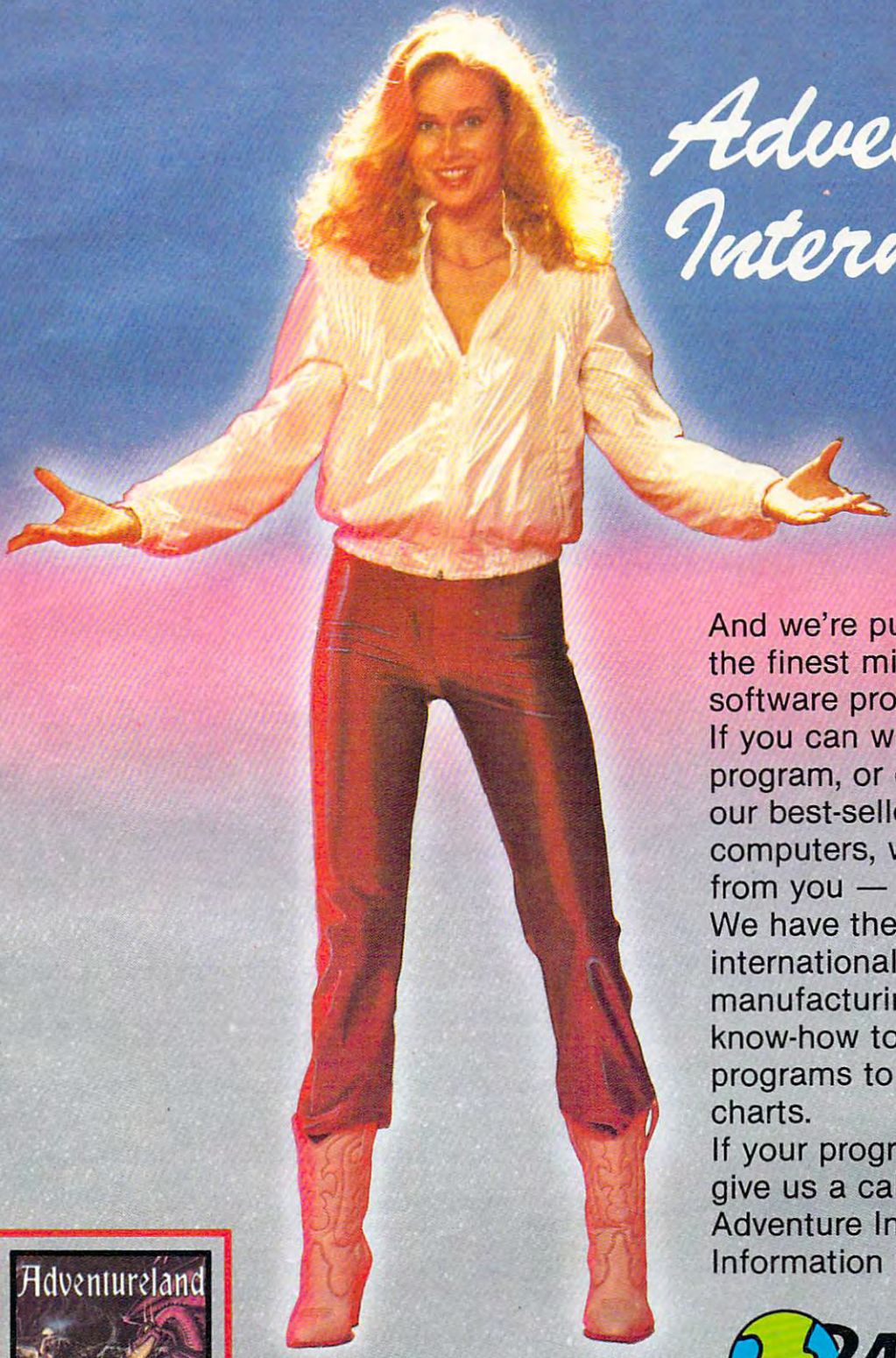

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Program 4: Goblin – TI-99/4A Version

```
100 RANDOMIZE
110 GOTO 170
120 FOR I=1 TO LEN(H$)
130 R=ASC(SEG$(H$,I,1))
140 CALL HCHAR(ROW,XCOL+I,R)
150 NEXT I
160 RETURN
170 A=96
180 B=97
190 C=104
200 D=105
210 Z=24
220 COL=16
230 W=0
240 G=0
250 S=J
260 CALL CLEAR
270 IF S>HS THEN 290
280 GOTO 300
290 HS=S
300 GOSUB 1270
310 CALL SCREEN(16)
320 PRINT "{8 SPACES}G O B L I N"
330 PRINT
340 PRINT "{10 SPACES}HS : "
350 FOR I=1 TO 19
360 PRINT
370 NEXT I
380 PRINT "O=LEFT{14 SPACES}P=RIGHT"
    ;
390 ROW=4
400 XCOL=17
410 H$=STR$(HS)
420 GOSUB 120
430 FOR I=1 TO 80
440 X=INT(RND*30)+2
450 Y=INT(RND*16)+6
460 CALL GCHAR(Y,X,L)
470 IF L=B THEN 440
480 CALL HCHAR(Y,X,B)
490 NEXT I
500 FOR I=1 TO 27
510 X=INT(RND*30)+2
520 Y=INT(RND*16)+6
530 CALL GCHAR(Y,X,L)
540 IF (L=B)+(L=C)+(L=D)THEN 510
550 CALL GCHAR(Y+1,X-1,L)
560 CALL GCHAR(Y+1,X,M)
570 CALL GCHAR(Y+1,X+1,N)
580 IF (L<>B)+(M<>B)+(N<>B)THEN 620
590 CALL HCHAR(Y,X,D)
600 G=G+1
610 GOTO 630
620 CALL HCHAR(Y,X,C)
630 NEXT I
640 CALL SOUND(100,500,6)
650 CALL HCHAR(Z,COL,32)
660 IF L<>C THEN 680
670 CALL SOUND(10,880,4)
680 Z=Z-1
690 IF Z>4 THEN 710
700 Z=23
710 CALL KEY(0,L,ST)
720 IF (L<>79)*(L<>80)THEN 770
730 IF L<>79 THEN 760
740 COL=COL-SGN(COL-2)
750 GOTO 770
760 COL=COL+SGN(30-COL)
770 CALL GCHAR(Z,COL,L)
780 IF L=B THEN 1060
790 IF L=C THEN 850
800 CALL HCHAR(Z,COL,A)
810 FOR I=1 TO 25
820 NEXT I
830 IF W=27-G THEN 920
840 GOTO 650
850 W=W+1
860 S=S+25
870 H$=STR$(S)
880 ROW=4
890 XCOL=3
900 GOSUB 120
910 GOTO 800
920 J=S
930 CALL HCHAR(10,1,32,31)
940 GOSUB 120
950 H$="**** ALL RIGHT! ****"
960 XCOL=6
970 ROW=10
980 GOSUB 120
990 FOR I=1 TO 15
1000 X=INT(RND*100)+300
1010 CALL SOUND(75,X,8)
1020 NEXT I
1030 FOR I=1 TO 100
1040 NEXT I
1050 GOTO 210
1060 REM WHOOPS! ...YOU CRASHED...
1070 CALL HCHAR(Z,COL,98)
1080 FOR I=3 TO 30 STEP 3
1090 CALL SOUND(50,-7,I)
1100 NEXT I
1110 CALL CHAR(104,"3C42A581A599423
     C")
1120 J=0
1130 HS=S
1140 H$="PLAY AGAIN (Y / N)?"
1150 ROW=22
1160 XCOL=2
1170 GOSUB 120
1180 CALL KEY(0,L,ST)
1190 IF ST=0 THEN 1180
1200 H$=CHR$(L)
1210 IF H$="Y" THEN 1250
1220 CALL CLEAR
1230 PRINT "SEE YA!"
1240 END
1250 CALL CHAR(104,"3C3CA58199A5423
     C")
1260 GOTO 210
1270 REM DEFINE CUSTOM CHARS
1280 REM CHAR 96 - GOBLIN
1290 CALL CHAR(96,"7EDBDBFFA55A5AA5
     ")
1300 REM CHAR 97 - BARRIER
1310 CALL CHAR(97,"CCCC3333CCCC3333
     ")
1320 REM CHAR 98 - CRUNCHED GOBLIN
1330 CALL CHAR(98,"CCCC33337EDBFFBD
     ")
1340 REM CHAR - 104 - FROWN
1350 CALL CHAR(104,"3C3CA58199A5423
     C")
1360 REM CHAR - 105 - SMILE
1370 CALL CHAR(105,"3C42A581A599423
     C")
1380 CALL COLOR(10,7,1)
1390 FOR I=5 TO 8
1400 CALL COLOR(I,16,14)
1410 NEXT I
1420 RETURN
```


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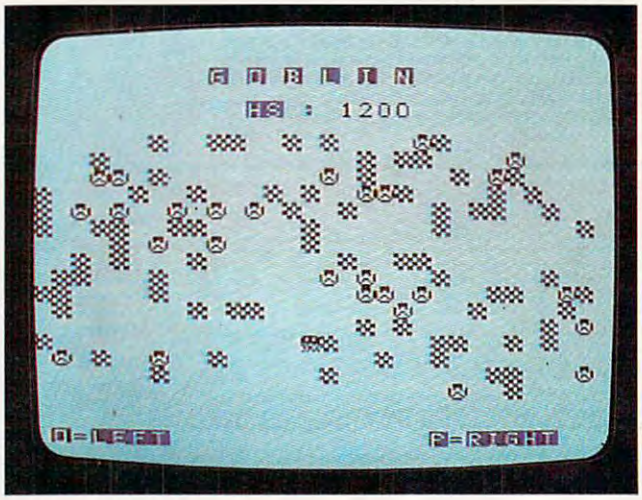
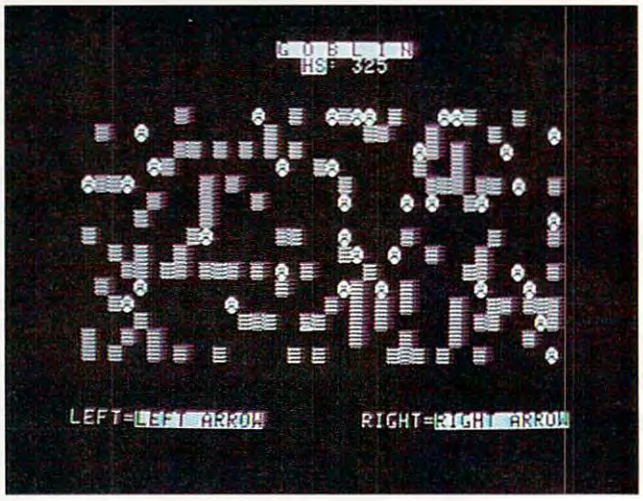


Goblin, TI-99/4A version.



The Apple version of Goblin.

Program 5: Goblin – Apple Version

```
10  REM *THIS PROGRAM REQUIRES A DISK D
    RIVE
20  REM  AND THE APPLE 'DOS TOOL KIT PR
    OGRAMMING
30  REM  UTILITIES DISK' TO RUN.
40  REM *PLACE THE ABOVE UTILITY DISK I
    N YOUR
50  REM  DRIVE BEFORE RUNNING THIS PROG
    RAM.
55  GOSUB 1000
60  DIM XL%(23): FOR I = 0 TO 7:XL%(I) =
     1024 + 128 * I:XL%(I + 8) = 1064 +
    128 * I:XL%(I + 16) = 1104 + 128 *
    I: NEXT I
85  HOME : HGR : POKE  - 16302,0: IF S >
    HS THEN HS = S
90 ZROW = 23:ZCOL = 19:W = 0:S = J1:G =
    0
100  VTAB 1: HTAB 17: PRINT  CHR$ (1);"
    O"; CHR$ (9);"G O B L I N";
110  VTAB 2: HTAB 19: PRINT "HS"; CHR$
    (14);": ";HS: VTAB 23: PRINT "LEFT
    ="; CHR$ (9);"LEFT ARROW"; CHR$ (1
    4);
120  HTAB 24: PRINT "RIGHT="; CHR$ (9);
    "RIGHT ARROW"; CHR$ (14);
125  PRINT  CHR$ (1);"1";
130  FOR I = 1 TO 120
135 ROW =  INT ( RND (1) * 15) + 5:COL =
     INT ( RND (1) * 38) + 2
140 X = XL%(ROW) + COL: IF  PEEK (X) =
    164 THEN 135
145  VTAB ROW: HTAB COL: PRINT  CHR$ (1
    64);: NEXT I
150  FOR I = 1 TO 36
160 ROW =  INT ( RND (1) * 15) + 5:COL =
     INT ( RND (1) * 38) + 2:X = XL%(R
    OW - 1) + COL - 1
170  IF  PEEK (X) = 164 OR  PEEK (X) =
    161 OR  PEEK (X) = 163 THEN 160
180  IF  PEEK (XL%(ROW) + COL - 2) = 16
    4 AND  PEEK (XL%(ROW) + COL - 1) =
    164 AND  PEEK (XL%(ROW) + COL) = 1
    64 THEN  HTAB COL: VTAB ROW: PRINT
     CHR$ (161);:G = G + 1: GOTO 200
190  HTAB COL: VTAB ROW: PRINT  CHR$ (163);
200  NEXT I
240  POKE 768,5: POKE 769,180: CALL 770
250 Z = XL%(ZROW) + ZCOL: HTAB ZCOL: VTAB
    ZROW: PRINT  CHR$ (167);:ZROW = ZR
    OW - 1: IF ZROW < 3 THEN ZROW = 21
260 A =  PEEK ( - 16384): POKE  - 16368
    ,0: IF A = 136 THEN ZCOL = ZCOL -
    1: IF ZCOL < 1 THEN ZCOL = 39
270  IF A = 149 THEN ZCOL = ZCOL + 1: IF
    ZCOL > 39 THEN ZCOL = 2
280  IF  PEEK (XL%(ZROW - 1) + ZCOL - 1
    ) = 164 THEN 410
290  IF  PEEK (XL%(ZROW - 1) + ZCOL - 1
    ) = 163 THEN  GOSUB 330
300  HTAB ZCOL: VTAB ZROW: PRINT  CHR$
    (165);: FOR T = 1 TO 100: NEXT T
310  IF W = 36 - G THEN J = S: GOSUB 35
    0: GOTO 85
320  GOTO 250
330 W = W + 1:S = S + 25: VTAB 2: HTAB
    3: PRINT  CHR$ (1);"O";S; CHR$ (14
    ); CHR$ (1);"1";
340  POKE 768,2: POKE 769,230: CALL 770
345  RETURN
350  FOR J = 10 TO 12: VTAB J: FOR I =
    0 TO 39: HTAB I: PRINT  CHR$ (167)
    ;: NEXT I: NEXT J: VTAB 17: HTAB 1
    0: PRINT  CHR$ (1);"O";"****** ALL
     RIGHT! ******"; CHR$ (1);"1";
360  FOR I = 1 TO 10
370  POKE 768, INT ( RND (1) * 3) + 1: POKE
    769, INT ( RND (1) * 15) + 130: CALL
    770
380  NEXT I
385 J1 = S
390  FOR J = 1 TO 500: NEXT J
400  RETURN
410  HTAB ZCOL: VTAB ZROW: PRINT  CHR$
    (166);:C = 0
415 X =  PEEK ( - 16336):C = C + 1: IF
    C < 15 THEN 415
420  FOR ROW = 0 TO 23: FOR COL = 1 TO
    38:X = XL%(ROW) + COL: IF  PEEK (X
    ) <  > 163 THEN  NEXT COL: NEXT ROW
430  IF  PEEK (X) = 163 THEN  VTAB ROW +
    1: HTAB COL + 1: PRINT  CHR$ (161)
    ;: NEXT COL: NEXT ROW
440 J1 = 0: VTAB 21: HTAB 13: PRINT  CHR$
    (1);"O";"PLAY AGAIN ("; CHR$ (9);"
```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```
    Y"; CHR$ (14);"/"; CHR$ (9);"N"; CHR$
    (14);") ?";
450 POKE  - 16368,0: GET C$: IF C$ = "
    Y" THEN 85
460 TEXT : HOME : VTAB 4: HTAB 2: PRINT
    "SEE YA!...HIT RESET...": FOR I =
    1 TO 1000: NEXT I: END
1000  REM  INIT SUBROUTINE
1020 ADRS = 0
1030  PRINT  CHR$ (4);"BLOAD RBOOT"
1040  CALL 520
1050 ADRS =  USR (0),"HRCG"
1051  IF ADRS < 0 THEN ADRS = ADRS + 65536
1060 CS = ADRS - 768
1061 CH =  INT (CS / 256):CL = CS - CH *256
1062  POKE ADRS + 7,CL: POKE ADRS + 8,CH
1070  HIMEM: CS
1080  READ A: IF A =  - 1 THEN 1100
1090  FOR J = 0 TO 7: READ B: POKE CS +
    A * 8 + J,B: NEXT : GOTO 1080
1100  CALL ADRS + 3
1110  PRINT  CHR$ (16)
1150  REM  SOUND ROUTINE
1160  FOR I = 770 TO 795: READ M: POKE
    I,M: NEXT
1170  RETURN
1500  DATA  1,28,62,127,107,127,93,34,28
1510  DATA  3,28,62,107,127,99,93,62,28
1520  DATA  4,85,42,85,42,85,42,85,42
1530  DATA  5,28,62,107,127,107,85,127,119
1540  DATA  6,85,42,85,42,85,62,107,127
1545  DATA  7,0,0,0,0,0,0,0,0
1550  DATA  -1
1560  DATA  172,1,3,174,1,3,169,4,32,16
    8,252,173,48,192,232,208,253,136,2
    08,239,206,0,3,208,231,96
```

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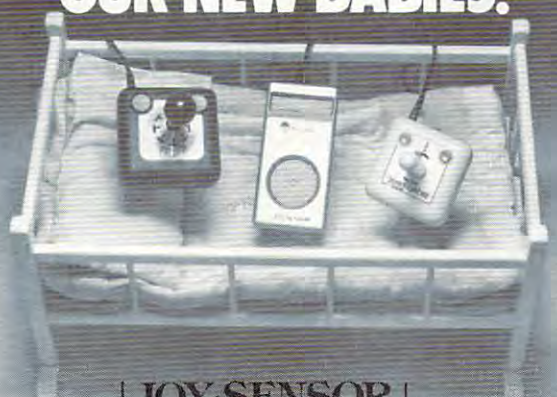

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SpeedSki

Dub Scroggin

SpeedSki takes VIC BASIC to its limits. Like most good action games, SpeedSki is easy to learn and hard to master. What's equally impressive, the program runs extremely fast, and creates an excellent, realistic physical challenge. It sounds and feels like skiing – complete with jumps, trees, fences, and an ever-changing pathway.

Also, if you're interested in programming games in VIC BASIC, the author provides a complete explanation of how the program works. He discusses the techniques which permit such amazing execution speed.

With five skill levels, for one to four players, on any unexpanded VIC. The world's champion SpeedSkier (the author himself) has managed to achieve a score of 168 during a five-run series. Do better than that and you'll be the new record holder.

"SpeedSki" is a fast, action VIC-20 game that fits in standard memory and makes full use of the VIC's color and sound capabilities. It is controlled from the keyboard and provides up to five rounds of play for one to four players, allowing each to select from any of five skill levels.

The game was designed around one central concept – speed. Every effort, short of machine language, has been used to make the game run as fast as possible without sacrificing too much realism. The result is an exciting game requiring concentration and practice. It's easy to learn the basics at skill level one, then step gradually up to level five, but mastery will take a lot of practice.

Avoid The Hazards

The object is to steer a skier through 10 gates, while avoiding the hazards posed by trees and fences. The optional jumps will improve your time. The best possible time, about 29 seconds, can be achieved at skill level five by avoiding every hazard, hitting every gate, and taking every jump. But getting this best time is not easy, even for an expert. I've played the game several hundred times and have made a perfect score only a handful of times. And I'm the greatest SpeedSki player in the world. The fact that as I write this there are only three players in the world could have something to do with this, of course. The other two are my daughter, who is second best in the world, and a friend's son, who has played only once. My best score for a five-run series is 168. Beat that score and you'll be the world's champion SpeedSki player.

You should take the jumps whenever you can – they not only move you ahead, they also take you over trees you might otherwise hit, and increase your speed. Every time you hit a tree, you move up one line on the screen (to a limit of ten), and you have more time to react to the slope coming up from the bottom. You are also a little farther from the finish line. Whenever you hit a jump, you move down a line (to a limit of three below the center), so you are closer to the finish line, but you must also react faster.

There are a number of REMarks in the program listing as an aid to understanding, but I recommend they not be typed in because of the memory they consume.

Defining Characters

Line 10 prints the title, and line 20 sets the memory limits that are necessary in a program employing user-defined characters. Moving the end of memory indicators hides a section of memory from BASIC, so this section can be used for storing the user-defined character values.

Try this: print FRE(X) and hit RETURN. Then type POKE 56,28: POKE 55,250: POKE 52,28: POKE 51,250 and hit RETURN. Now type FRE(X) and hit RETURN, again. You'll see the difference. BASIC has been fooled into thinking the end of its memory is closer than it really is, and you appear to have lost about 260 bytes of memory. Line 20 also sets the screen and border colors to white and white, like snow.

Line 30 reads X, a memory location in the protected area set up by line 20. If X is 0, then all data has been read, and control passes to the instructions starting in line 70. Otherwise, line 40 reads the values to be placed in X and the seven following bytes, and POKEs these values in. For instance, line 30 reads "7672". Line 40 then reads "16" and POKEs 7672 to 16. Then it reads "56" and POKEs 7673 to 56, then 7674 to 56, and so on.

Control then goes back to line 30 where the next value of X is read in and tested. The final data step contains a 0 for the value of X following the eight values of Y. So when all the data has been read in, line 30 ends this part of the program.

Players And Skill Levels

Lines 70-90 print the directions. Note that the symbol "T" in line 70 means to press the Commodore flag key, and then hit the "T" to underline the title. Line 100 is used for inputting the number

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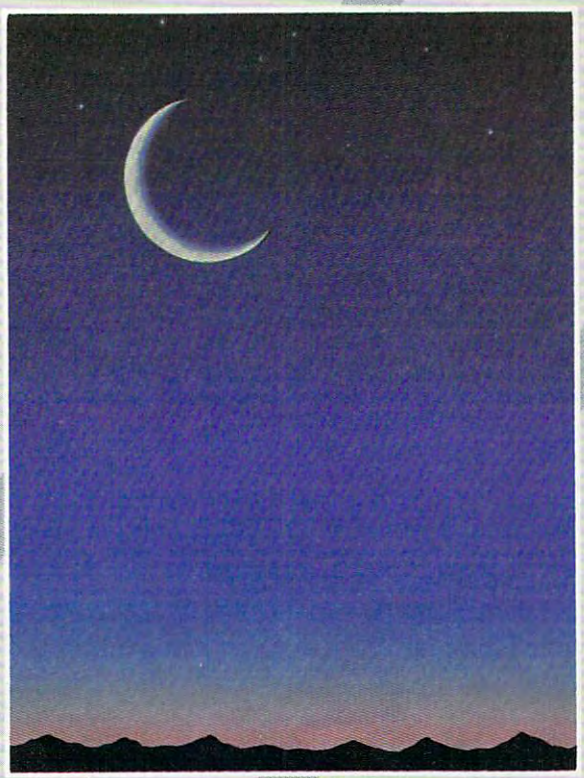

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of players and also for rejecting bad input. A value outside the allowed range passes control back to line 70; the screen is cleared, the instructions are reprinted, and you are asked for the number of players again. Line 110 accepts the number of rounds desired and rejects bad input in the same manner as line 100.

Line 120 initializes the values of R (the number of the present round) and P (the number of the present player). Lines 130-140 prompt the player skill levels, and line 150 accepts the player choice as a string variable, A$. Lines 160-200 assign values to S$ based on the skill level input, and line 210 converts A$ to the numeric variable SK. It then uses SK to establish a value for RN, which will control the number of trees printed.

The number of trees is tied to the skill level, so that the higher the skill level, the more trees there will be. If you'd like more trees, change the "1" to a larger number, but no more than 5. If SK is not an integer, or is outside the range of 1 to 5, line 210 rejects it. Moving the cursor up ten spaces and passing control back to line 130 makes it appear that the program does nothing but sit there until a correct input is given.

Speed Versus Obstacles

Line 220 establishes a new value for SK to control the speed of the program – faster for higher skill levels. Line 230 POKEs 36869 to 255 and causes the user-defined character set to be used instead of the normal set. This may cause some problems with debugging.

If an error is present after this step, the program will stop, but all you'll see on the screen will be garbage with an occasional skier or tree thrown in. If this happens, hit the CTRL and RVS keys, then type POKE 36869, 240 and RETURN. All that garbage will suddenly make sense. Line 230 also clears the screen, sets the volume, and establishes S as the noise generator.

Line 240 prints the trees on the screen for the initial setup. Each time through this loop, a random value "L" between 1 and 19 is calculated. Then a fence section is printed on the left, a tree is printed at TAB (L), and a fence section is printed on the right.

The initial value of B is set to 7910 in line 250. This is the location of the skier in screen memory. C is the difference between the screen map position and the color code map position. F is the POKE value for the skier figure; the POKE value will be 55 when he's going to the left and 53 when he's going to the right. The last three statements of line 250 insure that the player is not faced with the no-escape situation of having trees directly in front of him at the start of a run.

Line 260 POKEs the flags of the first gate onto the screen, and line 270 prints the level that was determined in lines 160-200. Line 280 puts the line between the flags for the first gate, and line 290 sounds the warning tones to let you know it's time to start. Just after the last tone, line 300 sets the timer. Line 310 then waits for you to press a key. If you don't hit a key for a while, that's okay, but the timer is running. You should use the time that the warning tones give you to plan your course through the first gate and then take off as soon as the last tone sounds.

Line 320 starts the main program loop. If SK is not zero, then the computer counts to SK before proceeding. This time delay, remember, is tied to the skill level to start with, but it may be reduced by hitting the jumps.

Skier Movement

If F is 55 in line 330, the skier is going left, and a track is POKEd in behind him using a POKE value of 58. If not, he's going right and the track's POKE value is 59. The track is handled in line 340.

Lines 350 and 360 are the keyboard control steps. If PEEK (197) – which is the memory location that contains the current key pressed – is 29, then the key for going left has been pressed. D will later be used to produce movement to the left; F is set to the figure for going left; and S, which is the noise generator, is set to 245. If any other key is pressed, or even if no key is pressed, then the skier will be going to the right, and the values needed for D, F, and S are set by line 360. You'll notice this slight change in sound when you change directions; it should sound like wind.

Gates And The Finish Line

G is incremented in line 370. If it's less than 28, control passes to line 410, because no gate or finish line is required. Otherwise, G is reset to 0 in line 380, and E, which counts the gates, is incremented. If E is 10, a finish line is printed and control passes to 460. Line 390, which causes the program to end, is executed only if the skier is past the finish line. If E is less than 10, then a random value between 2 and 11, inclusive, is calculated. A gate is then printed starting at TAB(X), X being the random number just calculated. Control then passes to line 460.

If no gate or finish line needs printing, control passes from line 370 to line 410, skipping all the above to reduce the time required for a pass through the loop. If G is 10, then line 410 prints a jump at TAB(X), X now being a random number between 4 and 13, inclusive. Fence sections are also printed at the left and right sides of the screen.

Line 240 decides whether a tree will be printed using the value of RN that was established in line 210. For skill level five, RN will have a value of .6; if a random number is more than this, no tree is

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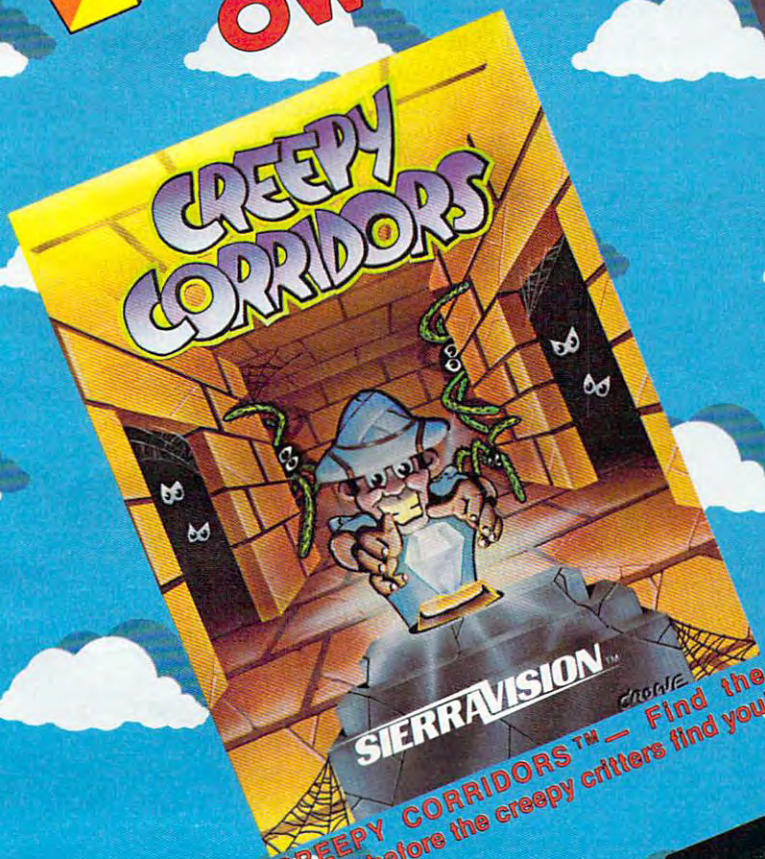

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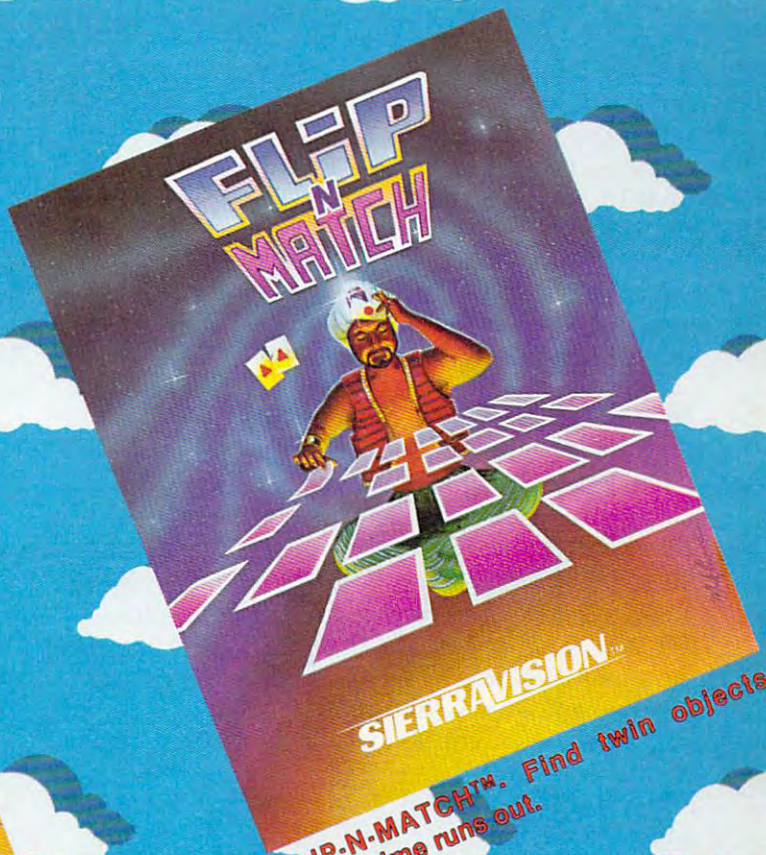

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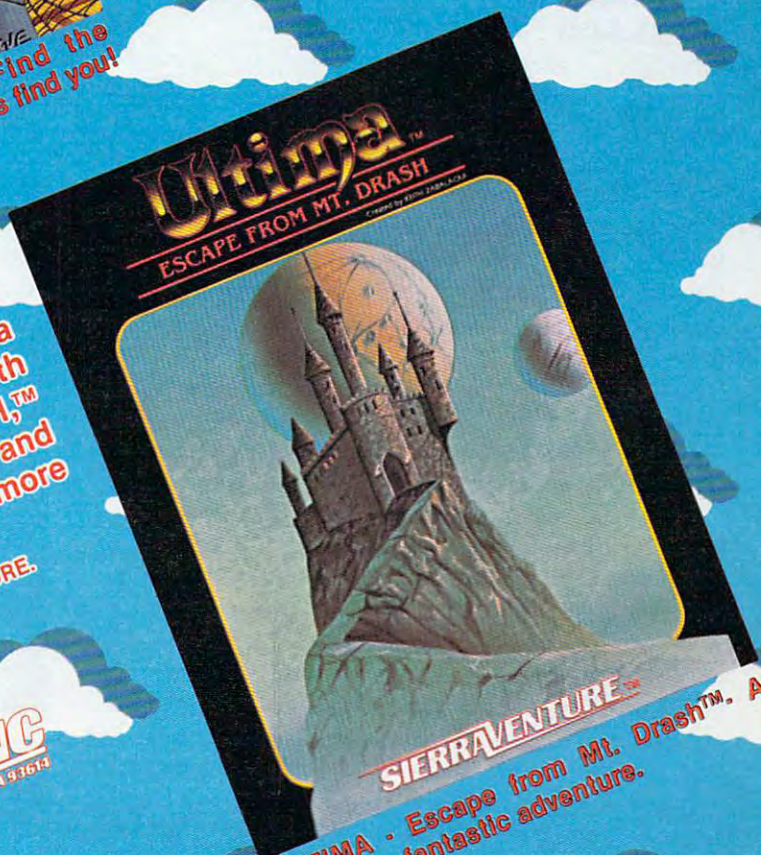

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printed. This means a tree will be printed roughly 60 percent of the time. For the lower skill levels, this probability is reduced so that the lower the skill level, the fewer trees there will be. If no tree is to be printed, line 440 prints only the fence sections. Otherwise, line 430 prints a tree at TAB(L), L being a random value between 1 and 19, inclusive.

If PEEK (B) in line 450 is not 32 (a blank), then the skier has run into something and control passes to line 500 to find out what the skier has run into and what to do about it.

The Illusion Of Motion

Line 460 POKEs the skier's location blank, then calculates a new position by adding the value of D (determined in lines 350 and 360) to B, the skier's location. It then POKEs the appropriate figure into that location. Essentially, the skier is placed on a horizontal line on the screen and is allowed to move only back and forth on that line. However, the screen is scrolling upward beneath him, so the illusion of forward motion is created.

The movement taken care of, control passes back to line 320 for another pass through the main loop. This loop, lines 320-470, has been kept as small as possible in order to minimize the time required for each pass through it. I have tried to be very stingy with time in this section, figuring that even one instruction repeated a few hundred times adds a lot of potentially unnecessary time.

Flags And Fences

Line 500 is reached when line 450 detects that something has been struck. This entire section was originally a part of the main loop, but removing it from the loop and replacing it with the single statement in line 450 produced a significant increase in speed. Line 500 checks to see if a gate was hit. If so, it sounds a high tone to let you know you got credit for the gate, then increments H, the number of gates hit, and passes control back into the main loop.

Line 510 checks to see if a finish line was struck. If so, H is changed to the number of gates missed, the elapsed time is placed in TM, and control passes to line 640 to end the run.

If a flag was hit, line 520 sounds a low tone to let you know you were close but get no credit for the gate. Control then passes to line 570.

If a jump wasn't hit, line 530 transfers control to 570. Lines 540-560 handle the jumps. The skier is moved two spaces horizontally in the direction (D) that he was going, the value of G is stepped up to bring the next gate closer, the screen is skipped up ten spaces, and the value of SK is reduced, which results in a slight increase in speed. The skier is moved down one line on the screen unless he is already three lines below the center. Moving him further down makes seeing what is coming very difficult, but if you'd like to try it, one way is to put a larger negative value here in place of the -3. If, for instance, you put a -10, the skier will move down every time you hit a jump. Another way would be to start the skier at a lower position on the screen. This would require simply changing the initial value of B in line 250.

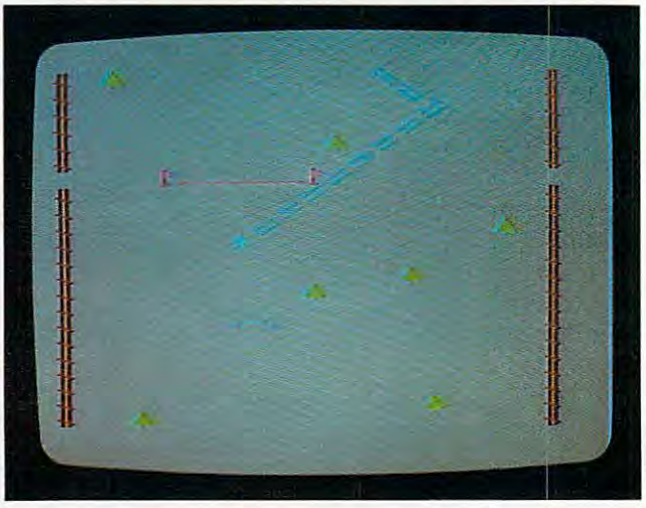
Line 570 checks to see if a fence section was hit. If so, it changes your direction and passes control to 610 for the sound effect. Getting out of the fence may take a couple of tries. If a tree was struck, then line 580 changes the figure to a cross and passes control to line 600. Line 590 POKEs S-3 to 0 in case it was set by hitting a flag in line 520, then passes you back to the main loop.

Shaking The Screen

Line 600 causes the screen to shake a bit when you hit a tree. The inner loop here counts from 3 to 7, then from 4 to 6, and stops at 5. POKEing these values into location 36864, which controls horizontal centering, shifts the screen rapidly back and forth around the normal value of 5. Line 610 increments OS, the number of objects that have been struck, and also controls both the sound effect and the changes in color of the cross in line 580. If a tree was struck, line 620 moves the skier up a line, adjusts the value of U, and checks to see if U has reached its limit of 10. If so, the run is aborted and you are given another chance. If not, line 630 passes control back to the main loop.

Line 640, the finish line sound effect, is reached only if the finish line was detected in line 510. Lines 650-660 print out the statistics on the run just completed and finish off the sound effect. Line 660 also POKEs 36869 back to its normal state so that the scores can be printed.

Line 670 computes the player's cumulative score, adding the score for the run just completed to his total from previous rounds, and also prints



Downhill racing on the VIC-20 in SpeedSki.

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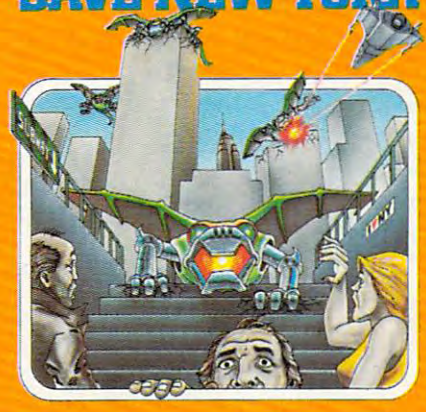

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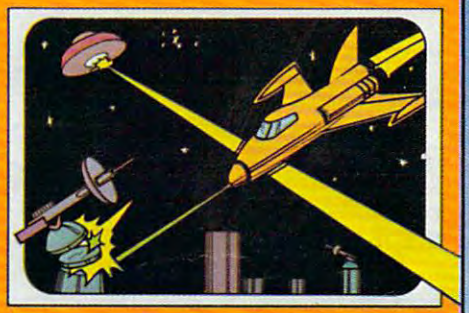

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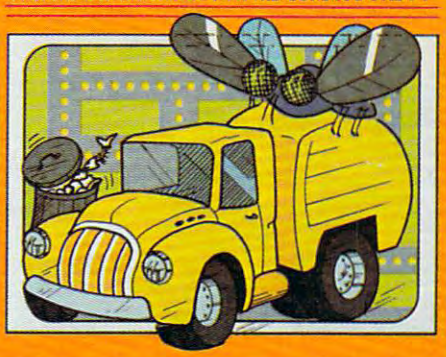

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CAR COSTS

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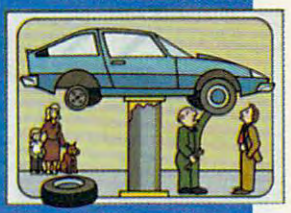

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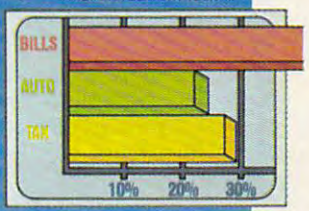
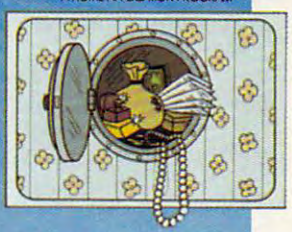


HOME INVENTORY

A HOME APPLICATION PROGRAM



DECISION MAKER

A HOME APPLICATION PROGRAM

These Home Application Programs are also available for the VIC-20.

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the round number. Line 680 then prints the cumulative scores for all the players, and line 690 reinitializes for the next run.

Line 700 increments the player number; if the last player hasn't gone yet, control passes back to line 130 to start another run. If the last player has just gone, line 710 increments the round number and checks to see if the game is over. If not, the player number is changed to 1 and a new round is begun. Otherwise, line 720 lets you know the game is over. It then turns the cursor white.

To rerun the program, hit RETURN, then type RUN and hit RETURN again. The reason for this odd procedure: it isn't visible because it's white on a white background, but some garbage has been picked up during the run and lies on the same line as the cursor. During the program this garbage is disposed of by the loop that rejects bad input for the skill level. There is no such loop at the end of the program, though.

Okay, time to get the program typed in, then hit the slopes. There's a world record waiting to be broken. Good luck.

Variable Listing

NP	Number of players
NR	Number of rounds
R	Present round number
P	Present player number
S$	Slope title
SK	Time delay factor in main loop
RN	Controls probability of a tree being printed
S	Noise generator (36877)
L	Random variable used to position trees
B	Skier's location
C	Difference between screen map and color code map
F	Skier figure
TI$	System clock
D	Direction (1 or -1) to be added to skier's location
G	Counts spaces between gates and jumps
E	Counts gates
X	Random variable used to position gates and jumps
H	Counts gates hit
TM	Elapsed time for run
U	Controls vertical movement of skier on screen
OS	Counts number of trees and fence sections struck
SC	Player's score for a run
Z(P)	Player's cumulative score where P is the player number

BEGINNING PROGRAMMERS

If you're new to computing, please read "How To Type COMPUTE!'s Programs" and "A Beginner's Guide To Typing In Programs."

SpeedSki

```
10 PRINT"{CLR}{9 DOWN}{3 SPACES}SPEED-SKI":PRINT"{9 DOWN}"
20 POKE56,28:POKE55,250:POKE52,28:POKE51,250:POKE36879,25
30 READX:IFX=0THEN70
40 FORI=XTOX+7:READY:POKEI,Y:NEXTI:GOTO30
50 DATA7672,16,56,56,124,124,254,254,16
51 DATA7664,0,0,15,32,64,128,0,0
52 DATA7656,0,0,240,4,2,1,0,0
53 DATA7648,40,40,40,40,104,56,44,40
54 DATA7640,32,16,136,68,34,17,8,4
55 DATA7632,4,8,17,34,68,136,16,32
56 DATA7624,16,28,30,28,16,16,16,56
57 DATA7616,0,0,0,0,255,85,170,255
58 DATA7608,16,24,126,24,26,44,72,16
59 DATA7424,0,0,0,0,0,0,0,0
60 DATA7592,8,24,126,24,88,52,18,8
61 DATA7584,0,0,0,0,0,0,255,0
62 DATA7576,8,8,28,8,62,8,127,8
63 DATA7568,8,8,62,8,8,8,0,0,0
70 PRINT"{CLR}{BLK}{5 SPACES}SPEED-SKI":PRINT"{22 T}"
80 PRINT"{UP}{BLU}YOUR SCORE IS ELAPSED TIME + 5 FOR EACH GATEMISSED.
   {2 SPACES}LOWEST SCORE WINS."
90 PRINT"{DOWN}PRESS {RVS}<{OFF} TO GO LEFT{4 SPACES}AND {RVS}>{OFF}TO GO RIGHT."
100 INPUT"{DOWN}NO. PLAYERS (1-4)";NP:IFNP<1ORNP>4THEN70
110 INPUT"{DOWN}NO. ROUNDS{2 SPACES}(1-5)";NR:IFNR<1ORNR>5THEN70
120 R=1:P=1
130 PRINT"{DOWN}{RVS}{CYN}SKIER #";P:PRINT"{DOWN}{BLU}SLOPE DESIRED":PRINT"1=BEGINNER":PRINT"2=INTERMEDIATE"
140 PRINT"3=ADVANCED":PRINT"4=OLYMPIC":PRINT"5=PROFESSIONAL"
150 A$="":GETA$:IFA$=""THEN150
160 IFA$="1"THENS$="{2 SPACES}BEGINNER"
170 IFA$="2"THENS$="INTERMEDIATE"
180 IFA$="3"THENS$="{2 SPACES}ADVANCED"
190 IFA$="4"THENS$="{2 SPACES}OLYMPIC"
200 IFA$="5"THENS$="PROFESSIONAL"
210 SK=VAL(A$):RN=(SK+1)/10:IFSK<1ORSK>5ORSK<>INT(SK)THENPRINT"{10 UP}":GOTO130
220 SK=35-5*SK
230 POKE36869,255:PRINT"{CLR}":POKE36878,15:S=36877
240 FORI=1TO22:L=INT(RND(1)*19)+1:PRINT"{RED}<";TAB(L);"{GRN}?";TAB(20)"{RED}<":NEXTI
250 B=7910:C=30720:F=55:POKEB,F:POKEB+C,3:POKEB+22,32:POKEB+21,32:POKEB+23,32
260 POKE8125,57:POKE8131,57:POKE8125+C,4:POKE8131+C,4
270 PRINT"{HOME}{8 DOWN}{4 SPACES}{RVS}";S$;"{13 DOWN}"
280 FORI=8126TO8130:POKEI,52:POKEI+C,4:NEXTI
290 FORI=1TO5:POKES-1,220+5*I:FORT=1TO100:NEXTT:POKES-1,0:NEXTI
300 TI$="000000"
310 GETA$:IFA$=""THEN310
320 IFSKTHENFORT=1TOSK:NEXTT
330 IFF=55THENPOKEB-21,58:GOTO350
340 POKEB-23,59
350 IFPEEK(197)=29THEND=-1:F=55:POKES,245:GOTO370
360 D=1:F=53:POKES,246
370 G=G+1:IFG<28THEN410
380 G=0:E=E+1:IFE=10THENPRINT"{PUR}9888888888888888":GOTO460
```


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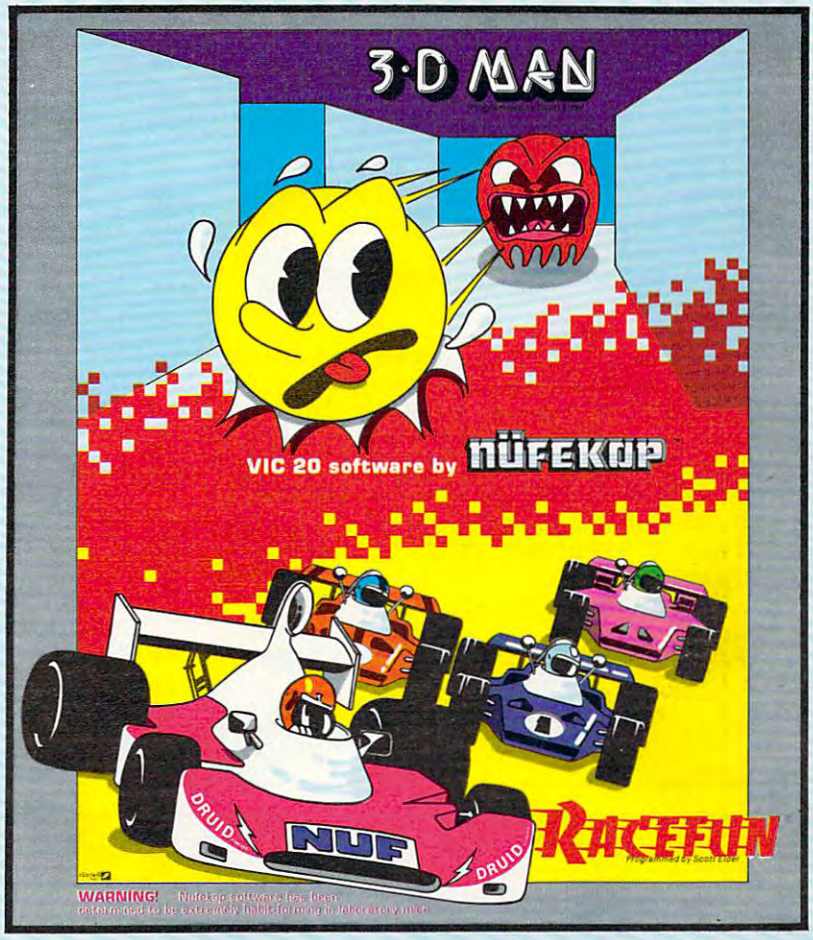
Exterminator **By Ken Grant**
Just about as action-packed and complex as is nufisically possible in your standard 5K VIC 20. This extremely well-written, machine code game is invariably praised by customers and has been called the second best tape game made for the VIC of 1982 (oh, no, not by us, we don't agree with that opinion). Rapidfire from the bottom of the screen at moving insects and creatures . . . anything that moves, and even anything that doesn't. Just don't be overrun by any or all. It's as much fun the hundredth time you play it as it was the first. This game plays stick or key and runs in standard 5K VIC 20.

3-D Man Not just another eat-the-dots-in-a-maze game, this! Though you find yourself in an edible dot-littered floor plan that may seem vaguely familiar, we guarantee you have never looked at it from this perspective (eye level) before. The dots diminish into the distance as you race down a hallway eating them one after the other. The dot-remaining counter on the right clicks downward. Race through a 4-way intersection and whoops! Head to head with one of the ghosts that haunt these halls! Back quickly on the stick puts you facing the dotless hall you just cleaned out when . . . another ghost! A quick left turn into that junction saves you, but in the confusion you've lost direction momentarily and must check the miniature radar plotting screen to set things straight. . . . Definitely, an ordinary maze game this one is *not*. 3-D Man requires a joystick and at least 3K extra memory.

Racefun Extensive use of multi-color character graphic capabilities of the VIC make this game very appealing to the eye. Fast all-machine language action, quick response to the stick or keyboard-controlled throttle, combine with the challenge of driving in ever-faster traffic to make it appeal to the rest of the body. Plays joystick or keyboard.



Antimatter Splatter! A more dastardly alien could scarcely be found than one who would wipe out an entire civilization by dropping anti-matter anti-canisters, right? If your opinion of this alien troublemaker is the same as ours, probably your first thought was, get some matter! We say calm down! All is not lost. A mobile rapid splatter cannon capable of both breaking through his standard alien moving force fields and laying waste to the ever-increasing number of anti-canisters is even now hovering above us. If only our cannoneer hadn't called in sick...say, what are you doing today? *Anti-Matter Splatter* is 100% machine language and runs in standard 5K VIC.

Defender on Tri As pilot of the experimental Defender-style ship "Skyes Limited," you are the only hope for an advance party of scientists trapped in ancient alien sphere which suddenly (heat from collision course with sun presumably—G.E.) came to life. Four screens worth of unique defenses, on-off shields, fuel deposits, alien treasures, running timer, energy, score and very nice graphics display make this one that does not quickly wax old. *Defender on TRI* requires at least 3K memory expander, but will run with any memory add-on (8K, 16K, 24K, etc.) we have come across.

Alien Panic Standard 5K VIC 20/combination stick & keyboard. This arcade-type game pits you against time and an alien on a six level construction sight with ladders and pitfalls, but *not to worry!* You have a shovel.

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```
390 IFE>10THENPOKEB,56:GOTO510
400 X=INT(RND(1)*10)+2:PRINTTAB(X)"{PUR}
    9444449":GOTO460
410 IFG=10THENX=INT(RND(1)*10)+4:PRINT"
    {UP}{RED}<";TAB(X)"{CYN}>=";TAB(20);
    "{RED}<"
420 IFRND(1)>RNTHEN440
430 L=INT(RND(1)*19)+1:PRINT"{RED}<";TAB
    (L)"{GRN}?";TAB(20)"{RED}<":GOTO450
440 PRINT"{RED}<";TAB(20);"<"
450 IFPEEK(B)<>32THEN500
460 POKEB,32:B=B+D:POKEB,F:POKEB+C,3
470 GOTO320
480 END
500 IFPEEK(B)=52THENH=H+1:POKES-1,240:FO
    RT=1TO30:NEXTT:POKES-1,0:GOTO460
510 IFPEEK(B)=56THENH=10-H:TM=INT(TI/60)
    :POKES-1,0:POKEB+D,F:GOTO640
520 IFPEEK(B)=57THENPOKES-3,220:GOTO570
530 IFPEEK(B)<>62ANDPEEK(B)<>61THEN570
540 POKES,253:D=D*2:G=G+10:FORI=1TO10:PR
    INT"{RED}<";TAB(20)"{RED}<":NEXTI:IF
    SK>0THENSK=SK-2
550 IFU>-3THENB=B+22:U=U-1
560 GOTO460
570 IFPEEK(B)=60THENPOKEB,60:D=D*-2:GOTO
    600
580 IFPEEK(B)=63THENPOKEB-22,50:POKEB,51
    :GOTO600
590 POKES-3,0:GOTO460
600 FORJ=2TO0STEP-1:FORI=5-JTO5+J:POKE36
    864,I:NEXTI,J
610 OS=OS+1:FORT=0TO127:POKES,255-T:POKE
    B-22+C,INT(T/22)+2:NEXTT:POKES-1,0
620 IFPEEK(B)=51THEND=-22:U=U+1:IFU=10TH
    ENPRINT"{RVS}{CLR}TRY AGAIN":POKE368
    69,240:GOTO690
630 GOTO460
640 POKES,0:FORT=128TO255:POKES-3,T:NEXT
    T:POKES-3,0
650 U=0:PRINT"{CLR}{RVS}OBJECTS HIT=";OS
    :PRINT"{RVS}GATES MISSED=";H:PRINT"
    {RVS}TIME="TM:SC=TM+5*H
660 PRINT"{RVS}SCORE="SC:POKES-2,220:FOR
    T=1TO100:NEXTT:POKES-2,0:POKE36869,2
    40
670 Z(P)=Z(P)+SC:PRINT"{2 DOWN}
    {7 SPACES}{RVS}ROUND";R:PRINT" ":FOR
    I=1TONP
680 PRINT"{3 SPACES}SKIER #";I;Z(I):NEXT
    I
690 SC=0:G=0:E=0:OS=0:H=0:IFU=10THENU=0:
    POKES,0:GOTO130
700 P=P+1:IFP<NP+1THEN130
710 R=R+1:IFR<NR+1THENP=1:GOTO130
720 PRINT"{2 DOWN}{6 SPACES}{RVS}GAME OV
    ER":PRINT"{WHT}":END
```


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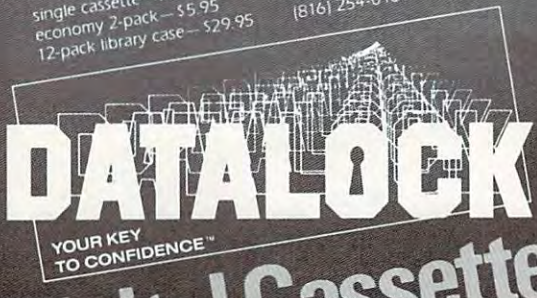

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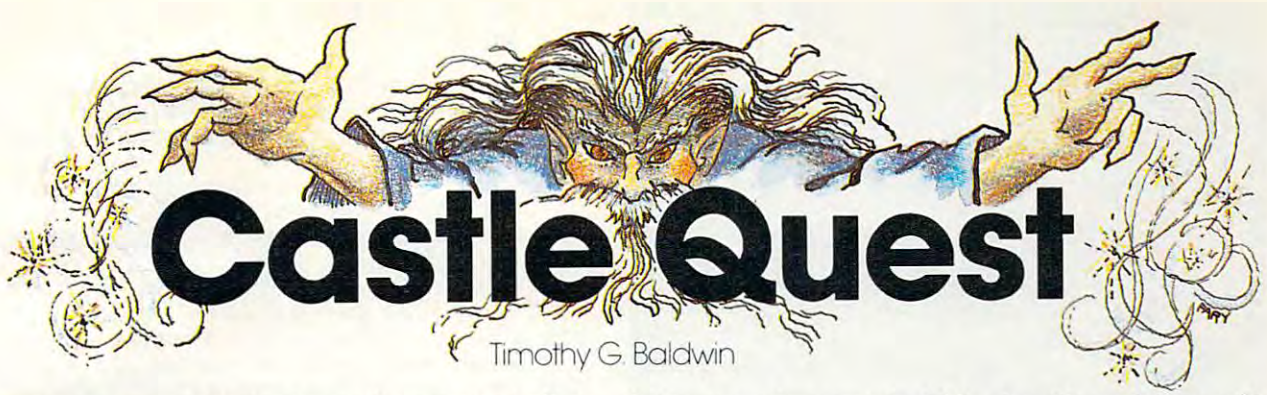

Janice Fary

Castle Quest

Timothy G. Baldwin

This entrancing, well-designed game for any Atari offers you the best of both worlds. It has the drama, variety, and mystery of a good adventure game combined with the fast-paced excitement of an arcade game.

Your job is to rid the kingdom of the three evil wizards. All this would be easy if the wizards weren't so zealously guarded by servants whose names reflect their personalities: bat-wingers, blinkers, chokers, crushers, and stompers.

You are in love with the Princess Dilayna and have asked her father the King for her hand in marriage. Her father does not particularly like you. He challenges you to demonstrate your worthiness by capturing the three evil wizards that have been ravaging the kingdom for years. They each live in their own castle protected by their servants – the bat-wingers, the blinkers, the chokers, the stompers, and the crushers. The castle rooms are rumored to be deadly, with untouchable walls, fast-moving enemies, and no exits. You reluctantly accept the King's challenge.

Fortunately, a friendly magician gives you a cloak that makes its wearer invisible. But the cloak's power works only for a limited time in each room. Once the time is up, you are instantly destroyed. The magician also gives you a magic spell that temporarily freezes all servants in a room. But you must use this spell with care: it will consume a portion of the cloak's power each time it is used.

Armed with these aids, you leave on your quest. The King wishes you good luck – or did he say good riddance?

The Three Wizards

The object of "Castle Quest" is to capture the three wizards. To reach each wizard, you must pass through the ten rooms of his castle. The rooms are inhabited by the wizard's servants, who move about quickly in an unpredictable manner. The higher numbered rooms in each castle have more servants (up to 32). The servants move progressively faster as you complete more rooms.

You have three (3) lives to capture the first wizard. Capturing a wizard earns you three additional lives. Touching a servant or a room wall or failing to exit a room within the allotted time will cause loss of a life. You cannot exit a room until you capture both door keys in that room by touching them. One key is invisible until the other key is touched.

Once both keys are captured, the room's exit appears – unless you are in a castle's tenth room. In this case, the wizard appears, and you must capture him before you can escape. Also, once you capture the first key, your presence becomes known to the wizard, and he causes room wall segments to move to block your escape. You must move quickly to avoid destruction.

Secret Passages

A counter at the top of the screen signals the amount of "cloak time" remaining. Pressing the joystick fire button will temporarily freeze the action, permitting you to move safely past a tight corner, but you lose 50 units of cloak time each time you use the freeze option. The room number and the number of your remaining lives are displayed at the top left of the screen. Your score – a measure of your ability to elude the many dangers involved – is displayed at the top right of the screen.

Room patterns, key locations, servant locations, and wizard placement are randomly generated, so be prepared to touch keys partially embedded in walls, move through weird mazes, etc. Sometimes a secret passageway is created at the screen bottom or in a room's right wall. You may use these passageways for a quick, easy escape.

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Castle Quest

```
10 REM {5 SPACES}MEMORY SAVER
   {14 SPACES}
20 C0=0:C1=1:C2=2:C3=3:C4=4:C5=5:C6=
   6:C7=7:C8=8:C9=9:C10=10:C15=15:C1
   6=16:C256=256:RAMTOP=PEEK(106):MI
   SSION=C1
30 REM  INITIALIZATION ROUTINE
   {7 SPACES}
```


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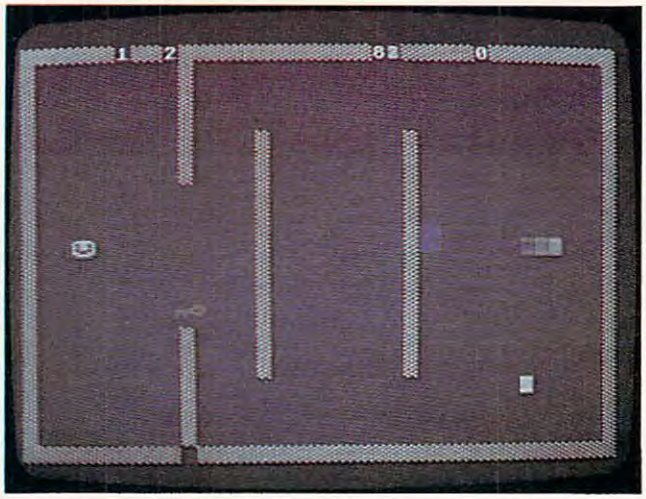

Searching for the keys to the hidden door on Atari's Castle Quest.

```
40 GOSUB 1080:GOSUB 770:GRAPHICS C16
   :? "{CLEAR}":POKE 752,C1:SETCOLOR
    C2,C0,C0:GOSUB 310
50 T1=C8:GOSUB 1150:T1=C16:GOSUB 115
   0:G=C0:L=C3:Q=C0:C=C0:X1=C0:SCORE
   =C0
60 GOSUB 320
70 REM {4 SPACES}ROOM SETUP ROUTINE
   {9 SPACES}
80 GOSUB 970:GOSUB 450:GOSUB 1340:GO
   SUB 1500:POKE 1568,C1:POKE 77,0:P
   OKE 53248,60:POKE 53249,W1
90 IF C=C10 THEN GOSUB 340
100 X=USR(1767):FOR I=C0 TO 100:NEXT
    I:POKE 1568,F
110 REM {6 SPACES}MAIN PROGRAM LOOP
   {8 SPACES}
120 G=G-C1:IF (PEEK(1566)<>C0) OR (G
   <C0) THEN 400
130 IF PEEK(203)>204 THEN 520
140 POSITION 23-(G>999)-(G>99)-(G>C9
   ),C0:? CHR$(B);G;CHR$(B):IF G<10
   0 THEN SETCOLOR C2,C4,C0
150 X=PEEK(53260):IF (X-X1)>=C2 THEN
    POKE 53250,W2:POKE 53249,C0:IF
   PEEK(706)<>N THEN GOSUB 380:POKE
    706,N
160 IF X-X1>=C4 THEN POKE 53251,W3:P
   OKE 53250,C0
170 IF X>=C6 THEN GOSUB 260
180 IF STRIG(C0)=C0 THEN POKE 1568,C
   1:G=G-50:FOR I=0 TO 250:NEXT I:P
   OKE 1568,F
190 CHBASE=RAMTOP-C8-C8*(INT(G/2)=G/
   2):POKE 756,CHBASE
200 IF PEEK(706)=N THEN IF RND(C0)>0
   .95 THEN PLOT INT(RND(C0)*38),IN
   T(RND(C0)*22):GOSUB 240
210 IF STICK(C0)<>15 THEN SOUND C2,1
   00,C6,C8:SOUND C2,C0,C0,C0
220 GOTO 120
230 REM {3 SPACES}"SHOOTING" SOUND R
   OUTINE{3 SPACES}
240 FOR I=C0 TO 30:SOUND C0,I,C0,C15
   :NEXT I:SOUND C0,C0,C0,C0:RETURN
250 REM ROOM EXIT OPENING ROUTINE
   {4 SPACES}
260 IF C=C10 THEN IF X<>14 THEN RETU
   RN
270 FOR I=C0 TO C5:POKE SC+C10*40+I*
   40-C1,C0:NEXT I:POKE 53278,255:F
   OR I=C15 TO C0 STEP -C1:SOUND C0
   ,C10,C10,I
280 SOUND C1,11,C10,I+C1:SOUND C2,12
   ,C10,I+C2:SOUND 3,13,10,I+3:NEXT
    I:FOR I=0 TO 3:SOUND I,C0,C0,C0
   :NEXT I
290 POKE 53251,C0:POKE 53250,C0:POKE
    53278,255:RETURN
300 REM USER INFORMATION ROUTINES
   {3 SPACES}
310 POSITION C10+C1,C10:? "Wait for
   game setup":RETURN
320 C=C+C1:POSITION C10,C10:? "Get r
   eady for Room ";C:C=C-C1:RETURN
330 REM WIZARD PLOTTING ROUTINE
   {6 SPACES}
340 PL=(RAMTOP-9)*256:PL=PL+52+INT(R
   ND(C0)*151):RESTORE 350:FOR I=C0
    TO 11:READ Z:POKE PL+I,Z:NEXT I
350 DATA 102,36,126,90,126,126,66,90
   ,60,60,36,102
360 W3=70+INT(RND(C0)*130):POKE 707,
   P:RETURN
370 REM "KEY TOUCHING" SOUND ROUTIN
   E
380 SOUND C2,20,C10,C10:SOUND C1,80,
   C10,C10:FOR I=0 TO 30:NEXT I:SOU
   ND C1,C0,C0,C0:SOUND C2,C0,C0,C0
   :RETURN
390 REM USER FAILS TO ESCAPE ROOM
   {3 SPACES}{8 SPACES} ROUTINE
   {21 SPACES}
400 FOR I=C0 TO C3:POKE 53248+I,C1:N
   EXT I:POKE 1568,C1:? "{CLEAR}":S
   ETCOLOR C2,C0,C0:IF Q THEN RETUR
   N
410 POKE DL+C15,C7:POSITION C4,C10:I
   F Q THEN RETURN
420 POKE 756,224:? "TOUGH LUCK!":FOR
    I=C0 TO 200:SOUND C0,C6,100,C8:
   NEXT I:SOUND C0,C0,C0,C0:T2=C1
430 POKE DL+C15,C2:L=L-C1:? "{CLEAR}
   ":C=C-1:GOSUB 320:C=C+1:GOTO 80+
   500*(L<=C0)
440 REM DETERMINE NEXT ROOM'S
   {9 SPACES}{8 SPACES}CHARACTERIST
   ICS ROUTINE{7 SPACES}
450 A=INT(C16*RND(C0))*C16+C6:M=INT(
   C16*RND(C0))*C16+C2:N=INT(C16*RN
   D(C0))*C16+C4:P=INT(C16*RND(C0))
   *C16+C8
460 B=33+C-C6*(C>5):C=C+C1:D=C2+C2*(
   C>C1)+C4*(C>C3)+C8*(C>C6)+C16*(C
   >C9)
470 E=INT(RND(0)*5+7):POKE 1763,E
480 F=C2+(C>C9)+C2*(MISSION-C1)
490 G=100+C*50:COLOR B:POKE 1578,31:
   POKE 1566,C0:POKE 756,RAMTOP-C8:
   POKE 53278,255:X1=C0
500 SETCOLOR 2,C7*(C=7)+C2*(C=8)+C1*
   (C=9)+C3*(C=10),C0:RETURN
510 REM USER ESCAPES FROM A ROOM
   {5 SPACES}{8 SPACES} ROUTINE
   {22 SPACES}
520 Q=C1:GOSUB 400:GOSUB 410:POKE 75
   6,224:? "{3 SPACES}ATTABOY!":Q=C
   0
530 FOR I=C0 TO C5:SOUND C0,C10,50,C
   8:POKE 705,C10:POKE 706,C10:POKE
    710,C10:POKE 712,C10:FOR J=C0 T
   O 50:NEXT J
540 SOUND C0,C10,100,C8:POKE 705,C0:
   POKE 706,C0:POKE 710,C0:POKE 712
```


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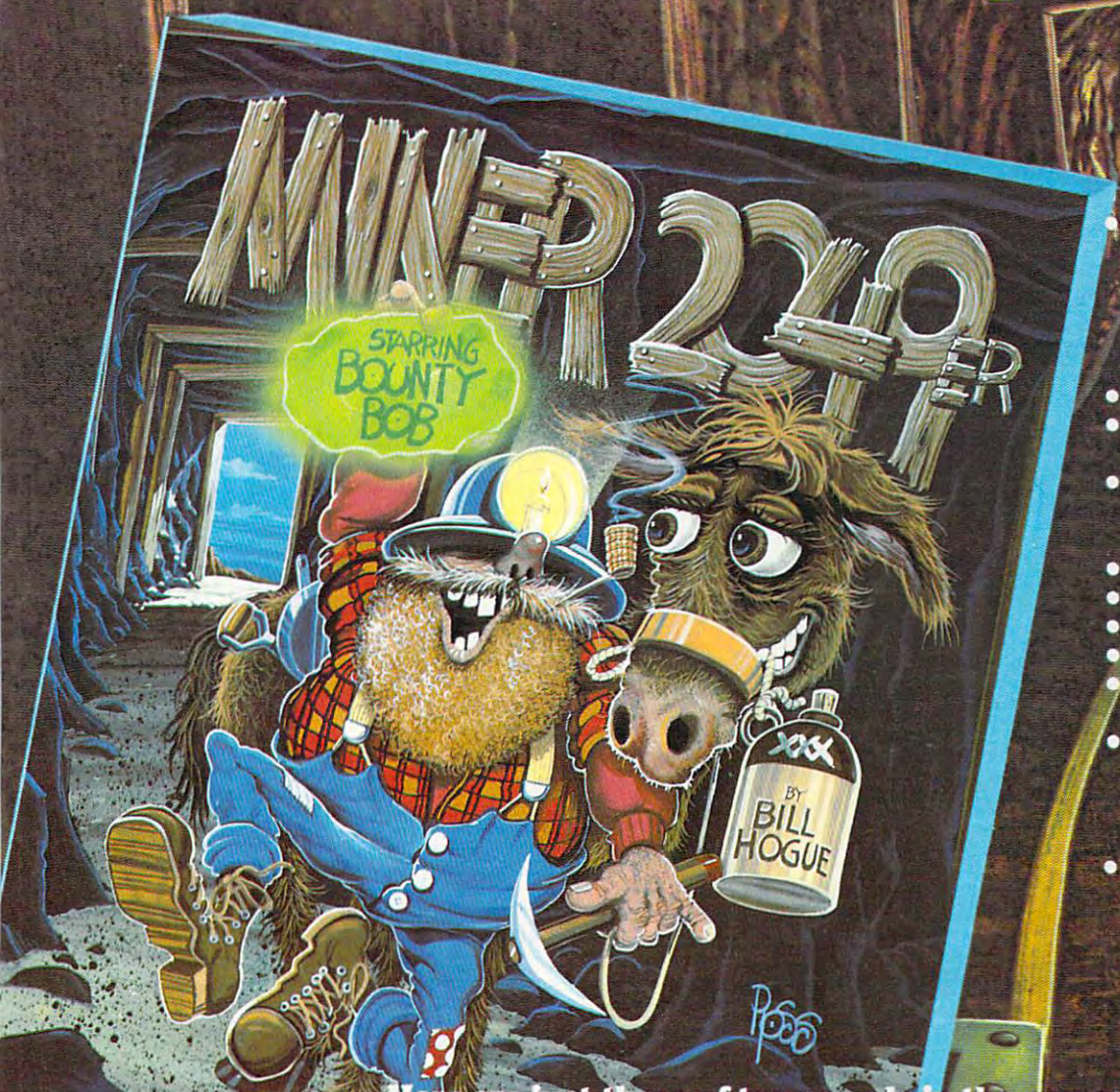

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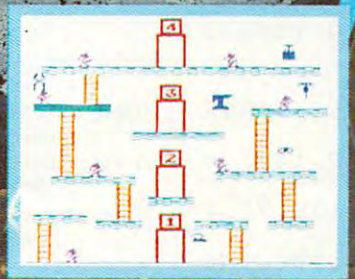

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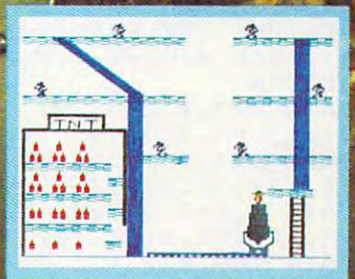
Beam yourself up!



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```
    ,C0:FOR J=C0 TO 50:NEXT J:NEXT I
550 SOUND C0,C0,C0,C0:POKE DL+C15,C2
    :? "{CLEAR}":GOSUB 320:SCORE=SCO
    RE+MISSION*INT((G*C)/C10)
560 IF C=C10 THEN GOTO 580+110*(MISS
    ION=C3)
570 GOTO 80
580 REM {3 SPACES}END A QUEST ROUTIN
    E{8 SPACES}
590 ? "{CLEAR}":POKE DL+C9,C6:POKE D
    L+11,C6:POKE DL+13,C6:POKE DL+15
    ,C6:POKE 707,C0:IF L<=C0 THEN 66
    0
600 POSITION C2,C4:? "Congratulation
    s!":POSITION 26,C5:? "YOU HAVE":
    POSITION C3,C7:? "COMPLETED YOUR
    "
610 POSITION 27,C8:? "QUEST":C=C0:L=
    L+C3
620 POSITION C5,15:? "Press START t
    o continue":POSITION C5,17:? "Pr
    ess SYSTEM RESET to quit"
630 POSITION C5,19:? "SCORE: ";SCORE
640 POKE 53279,C8:IF PEEK(53279)<>C6
     THEN 640
650 ? "{CLEAR}":POKE DL+C9,C2:POKE D
    L+11,C2:POKE DL+13,C2:POKE DL+15
    ,C2:MISSION=MISSION+(L>C0)*C1:GO
    TO 60+620*(L<=C0)
660 POSITION C7,C4:? "SORRY!":POSITI
    ON 24,C5:? "you blew it.":POSITI
    ON C2,C7:? "quests completed ";M
    ISSION-C1
670 GOTO 620
680 RUN
690 REM USER WINS THE GAME ROUTINE!
    {3 SPACES}
700 GRAPHICS 2:SETCOLOR C2,C0,C0:POS
    ITION C6,C4:? #6;"YOU WON!":? "P
    ress SYSTEM RESET and then 'RUN'
     to";
710 POKE 752,1:? :? "begin a new gam
    e."
720 POSITION C1,C7:? #6;"final score
     ";SCORE
730 FOR I=255 TO C0 STEP -C1:SOUND C
    0,I,10,10:POKE 712,I:POKE 710,I:
    NEXT I
740 GOTO 740
750 POKE 1568,C1:RUN
760 REM PUT A VERTICAL BLANK INTERRU
    PT{8 SPACES} ROUTINE IN PAGE 6 O
    F MEMORY
770 RESTORE 790:FOR I=1536 TO 1536+2
    47:READ A:POKE I,A:NEXT I
780 RETURN
790 DATA 173,4,208,201,4,240,2,208,2
    2,173,99,228,141,36,2
800 DATA 173,100,228,141,37,2,141,30
    ,6,141,30,208,76,98,228
810 DATA 0,162,2,202,240,42,138,72,1
    73,10,210,41,7,10,170
820 DATA 189,0,1,133,206,133,208,232
    ,189,0,1,133,207,133,209
830 DATA 32,148,6,165,207,157,0,1,20
    2,165,206,157,0,1,104
840 DATA 170,208,211,162,5,173,120,2
    ,202,240,197,24,106,176,249
850 DATA 72,224,2,240,8,224,1,208,13
    ,230,203,208,2,198,203
860 DATA 165,203,141,0,208,208,32,16
    9,0,224,4,240,8,168,145
870 DATA 204,230,204,76,134,6,160,7,
    145,204,198,204,160,0,185
880 DATA 240,6,145,204,200,192,8,208
    ,246,104,76,83,6,160,0
890 DATA 152,145,206,173,10,210,41,1
    ,208,15,169,56,141,201,6
900 DATA 169,233,141,204,6,141,210,6
    ,208,13,169,24,141,201,6
910 DATA 169,105,141,204,6,141,210,6
    ,173,10,210,41,1,208,2
920 DATA 169,40,141,205,6,216,0,165,
    206,0,0,133,206,165,207,0
930 DATA 0,133,207,177,206,240,8,165
    ,208,133,206,165,209,133,207
940 DATA 169,11,145,206,96,104,168,1
    62,6,169,7,76,92,228,60
950 DATA 126,90,126,90,102,126,60
960 REM SETUP PLAYER-MISSILE GRAPH-
    ■{9 SPACES}ICS ROUTINE
    {18 SPACES}
970 POKE 559,62:POKE 54279,RAMTOP-C1
    6:POKE 53248,C1:POKE 53277,C3
980 PL=RAMTOP-12:Y=PEEK(88):Z=PEEK(8
    9):POKE 88,C0:POKE 89,PL:POKE 10
    6,PL+C3:? "{CLEAR}":POKE 88,Y:PO
    KE 89,Z
990 POKE 106,PL+12:PL=PL*C256+120:IF
     C=C0 OR C=C10 THEN Z=(RAMTOP-C9
    )*C256:FOR I=Z TO Z+255:POKE I,C
    0:NEXT I
1000 FOR I=C0 TO C7:POKE PL+I,PEEK(1
     776+I):NEXT I
1010 POKE 203,60:POKE 204,PL-INT(PL/
     C256)*C256:POKE 205,INT(PL/C256
    )
1020 PL=(RAMTOP-11)*C256:PL=PL+52+IN
     T(RND(C0)*151):RESTORE 1030:FOR
     I=C0 TO C7:READ Z:POKE PL+I,Z:
     NEXT I
1030 DATA 0,6,15,249,255,166,160,0
1040 W1=70+INT(RND(C0)*130):PL=(RAMT
     OP-C10)*C256:PL=PL+52+INT(RND(C
     0)*151):RESTORE 1030:FOR I=C0 T
     O C7
1050 READ Z:POKE PL+I,Z:NEXT I:W2=70
     +INT(RND(C0)*130):POKE 705,M:IF
      T2=C1 THEN C=C-C1:T2=C0
1060 POKE 53249,C0:POKE 53250,C0:RET
     URN
1070 REM {4 SPACES}TITLE PAGE ROUTIN
    E{7 SPACES}
1080 GRAPHICS 18:SETCOLOR C2,C0,C0:P
     OKE 708,202:POSITION C5,C2:? #C
     6;"CASTLE":POSITION C9,C4:? #C6
     ;"QUEST"
1090 DL=PEEK(560)+C256*PEEK(561):POK
     E DL+13,C2
1100 POSITION C3,C8:? #C6;"How many
     rooms can you survive?"
1110 FOR I=C0 TO C3:POKE 708,C0:SOUN
     D C0,60,C10,C8:FOR J=C0 TO 100:
     NEXT J:SOUND C0,160,C10,C8:POKE
      708,202
1120 FOR J=C0 TO 100:NEXT J:NEXT I
1130 SOUND C0,C0,C0,C0:RETURN
1140 REM SETUP SPECIAL CHARACTER SET
    S {9 SPACES}ROUTINE{22 SPACES}
1150 RESTORE 1160:CL=(RAMTOP-T1)*C25
     6:FOR I=CL+C8 TO CL+95:READ A:P
     OKE I,A:NEXT I
1160 DATA 204,51,204,51,204,51,204,5
     1,102,153,102,153,102,153,102,1
     53
1170 DATA 136,34,136,34,136,34,136,3
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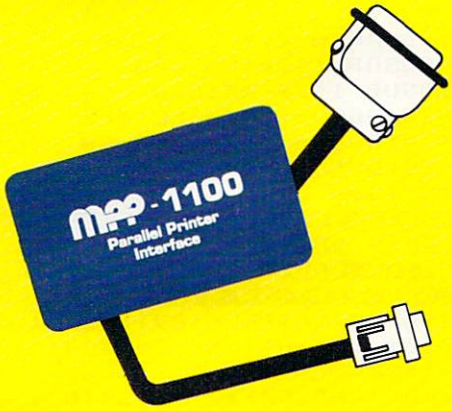

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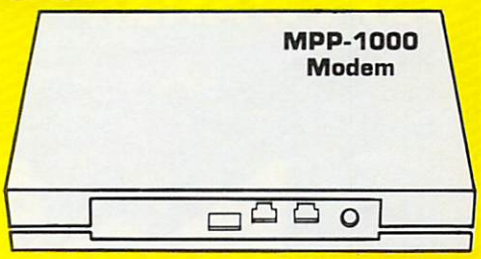

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     4,68,17,68,17,68,17,68,17
1180 DATA 36,146,73,36,146,73,36,146
     ,255,255,255,255,255,255,255,25
     5
1190 DATA 195,102,60,24,24,0,0,0
1200 DATA 255,255,195,195,195,195,25
     5,255
1210 DATA 255,255,0,0,0,0,255,255
1220 DATA 24,24,60,24,255,199,199,25
     5
1230 DATA 24,255,0,0,0,0,0,0
1240 FOR I=128 TO 224:POKE CL+I,PEEK
     (57344+I):NEXT I
1250 DL=PEEK(560)+C256*PEEK(561):IF
     T1=C16 THEN RESTORE 1260:FOR I=
     CL+56 TO CL+95:READ A:POKE I,A:
     NEXT I
1260 DATA 0,0,0,24,24,60,102,195
1270 DATA 0,0,60,60,60,60,0,0
1280 DATA 0,0,255,255,255,255,0,0
1290 DATA 60,24,24,24,60,60,0,0
1300 DATA 24,24,24,24,24,24,24,255
1310 IF T1=C16 THEN FOR I=CL TO CL+C
     7:POKE I,C0:NEXT I
1320 RETURN
1330 REM  RANDOM ROOM MAZE GENERATO
     R {9 SPACES}  ROUTINE
     {20 SPACES}
1340 ? "{CLEAR}":POKE 752,C1
1350 PLOT C0,C0:DRAWTO 39,C0:DRAWTO
     39,23:DRAWTO C0,23:DRAWTO C0,C0
1360 X=C10:Y=C0:Z=C7:GOSUB 1400:X=C1
     5:Y=C5:Z=13:GOSUB 1400:X=C10:Y=
     C16:Z=C7:GOSUB 1400
1370 IF RND(C0)<0.5 THEN PLOT RND(C0
     )*31+C8,11:DRAWTO RND(C0)*31+C8
     ,11
1380 POSITION C6,C0:? C:POKE 704,A:P
     OKE 705,M
1390 POSITION C9,C0:? L:POSITION 30,
     C0:? SCORE:RETURN
1400 ON INT(RND(C0)*C8+C1) GOSUB 141
     0,1420,1430,1440,1450,1460,1470
     ,1480
1410 RETURN
1420 PLOT X,Y:DRAWTO X,Y+Z:RETURN
1430 X=X+C10:GOSUB 1420:RETURN
1440 X=X+20:GOSUB 1420:RETURN
1450 GOSUB 1420:GOSUB 1430:RETURN
1460 GOSUB 1430:GOSUB 1430:RETURN
1470 GOSUB 1420:GOSUB 1460:RETURN
1480 POP :GOTO 1360
1490 REM  WIZARD'S SERVANTS PLOTTING
     {3 SPACES}{9 SPACES} AND ADDRESS
      CALCULATION ROUT-{9 SPACES} INE
     . ADDRESSES KEPT IN STACK
1500 SC=PEEK(88)+C256*PEEK(89):FOR I
     =C0 TO D-C1:IF INT(RND(C0)*C4)>
     C2 THEN 1520
1510 H=SC+40+INT(RND(C0)*279):GOTO 1
     530
1520 H=SC+680+INT(RND(C0)*239)
1530 HI=INT(H/C256):LO=H-HI*C256:POK
     E C256+I*C2,LO:POKE H,E
1540 POKE C256+I*C2+C1,HI:NEXT I:IF
     D=32 THEN RETURN
1550 FOR I=(D-C1) TO 31:POKE C256+I*
     C2+C1,254:NEXT I:RETURN
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The Fortress Of Adnil

George W. Miller

Janice Fary

"The Fortress of Adnil" is an adventure game for the Timex/Sinclair 1000 using the graphics mode. The program is entirely in BASIC and includes several routines you'll find useful in other programs. It requires the 16K RAM expansion module.

Your objective in this game is to accumulate points by gathering energy pellets and recovering the treasure, while avoiding obstacles on the display. Each move costs you one unit of energy; using the laser sword costs more, depending on the range and the object you use it on.

Each move you make is accompanied by random placement of "NAWS" (defined as guards) on the screen. If this random placement puts a guard in the space you intend to occupy, you are captured. If your energy level is greater than 1000, the computer will allow you to pay a ransom, deduct the ransom from your score, and allow you to continue.

You can use your laser sword to cut a hole through any barricade and to oppose the guards. But be warned: the odds are even in any battle with the guards, and you may lose.

Since this game is written in BASIC, don't expect fast-paced action. The game began as a learning exercise in PEEKing and POKEing into the display file.

PEEK And POKE Programming

Enter lines 50 to 120 into your computer. They will print a border around the display and will provide a boundary limiting later POKE commands to the display file.

Now enter lines 220, 250 - 355, 510, and this line:

```
520 PRINT AT 21,0;PEEK (PEEK 16396 + PEEK
    16397*256 + S)
```

Then enter lines 530 and 610.

This will allow you to move a character around the screen and also find the CODE of the character stored in that address.

SAVE this before you try it, because if you POKE outside the display file, the program will crash. You'll have to turn off the power and start over.

Now add the missing lines to print a variety of characters on the screen, but don't change line 520 yet. Move around the screen and look at the codes returned from the different locations.

Lines 400 to 430 limit the movement to areas in the display file. Lines 450 to 500 check for the code at that address.

If this is new to you, just remember that POKEing is putting a value into an address, and PEEKing is looking at the value in an address.

Now change line 520 to the line as shown in the program listing. Enter the rest of the listing, and you'll have the complete game The Fortress of Adnil.

If you find the game too challenging, you can change the level of difficulty by changing the 2000 in line 525 to some lower value.

Line 9999 is a utility routine I use to keep track of the length of my program. Enter GOTO 9999, and the screen should say, "LENGTH OF PROGRAM 7456". Since I'm using a 16K RAM, with 16,384 bytes available, I'm well within the limits of memory. Note that line 9999 indicates all memory used, and includes the memory required for the variables, the display file, and the program.

Programming Hints

Now for some hints on making your programs look a little more professional.

The routine starting at line 9991 is self-starting. To SAVE the program, start your tape recorder and enter GOTO 9991. When you load the program again, you won't get the usual 0/0 display, but the program will begin to run, printing the title on the screen. To use this routine, change the program name in line 9995 to the name of your program, and the line number for the GOTO command to the first line in your program.

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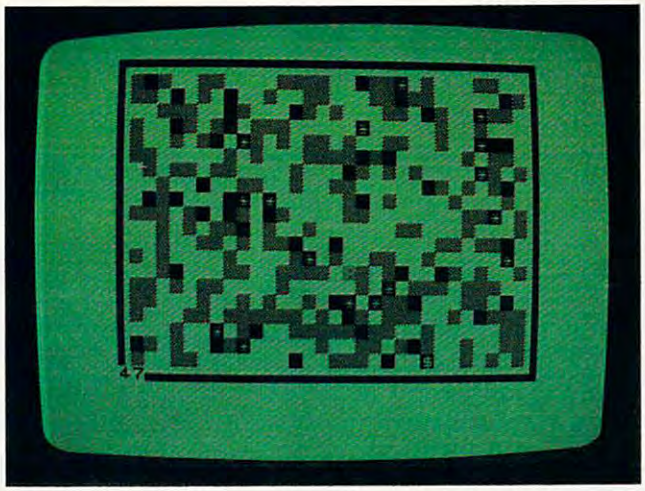

The Fortress of Adnil – an adventure game for the Timex/Sinclair 1000

This is especially useful in working with files. You can store the data in variables, and when the program comes up it automatically begins, preserving your data, and going a long way towards making the program user friendly.

I have placed this function in the menu of my program "ZX-81/TS-1000 Data Management" (**COMPUTE!**, March 1983) and saved the data by a step in the program. This makes it a subroutine and it becomes very easy for even the most inexperienced user to save and run the program correctly.

A further step in making other programs user friendly is using INKEY$ instead of INPUT whenever possible. This keeps control of the program in the computer, and the computer will wait for the command it wants to see. (See lines 8020 to 8040.) INPUT permits any number of possible incorrect (or program-stopping) entries.

Attractive Displays

In some versions of BASIC, the command FLASH will cause the display to print normal and inverse characters. The Sinclair computer doesn't have this function, but you can get the same result by a routine similar to lines 8203 to 8205 in the listing. This makes your display a little more attractive, and adds a professional touch to your programs.

When building a display, make use of the graphic mode and the various commands for printing, such as TAB and PRINT AT.

Check each line by entering a GOTO command in the immediate mode after entering the line. If you don't like what you see on the display, press EDIT.

The upper portion of the display will remain unchanged, but the bottom part of the screen will now display your last line entered. Use your edit functions to move the cursor about the line and make any necessary changes. Hit enter, and execute another GOTO command in the immediate mode to recheck your work.

BEGINNING PROGRAMMERS
If you're new to computing, please read "How To Type COMPUTE!'s Programs" and "A Beginner's Guide To Typing In Programs."

Fortress Of Adnil

Note: *All underlined characters in the program listing should be typed in* graphics mode. *The graphics characters in lines 530 and 7507 are produced by typing graphic shifted 6.*

```
5 GOTO 8100
10 LET C=0
20 LET Z=0
30 LET G=0
35 LET T=50
40 FAST
50 FOR N=1 TO 63
60 PLOT N,0
70 PLOT N,43
80 NEXT N
90 FOR M=0 TO 43
100 PLOT 0,M
110 PLOT 63,M
120 NEXT M
130 FOR A=1 TO 300
140 GOSUB 1000
150 PRINT AT X,Y;"H"
160 NEXT A
170 FOR B=1 TO 20
180 GOSUB 1000
190 PRINT AT X,Y;"*"
200 NEXT B
202 IF G=1 THEN GOTO 250
205 PRINT AT 21,0;T
210 SLOW
220 LET S=347
230 GOSUB 1000
240 PRINT AT X,Y;"$"
250 POKE PEEK 16396+PEEK 16397*256+S,149
260 POKE PEEK 16396+PEEK 16397*256+S,149
270 POKE PEEK 16396+PEEK 16397*256+S,21
280 IF INKEY$="" THEN GOTO 250
290 LET P=S
300 LET A$=INKEY$
310 LET S=S-(1 AND A$="5")
320 LET S=S+(33 AND A$="6")
330 LET S=S-(33 AND A$="7")
340 LET S=S+(1 AND A$="8")
350 IF A$="9" THEN GOSUB 2000
355 IF A$<>"5" AND A$<>"6" AND A$<>"7" A
    ND A$<>"8" AND A$<>"9" THEN GOTO 250
360 FOR N=1 TO 2
370 GOSUB 1000
380 PRINT AT X,Y;"■"
390 NEXT N
400 IF PEEK (PEEK 16396+PEEK 16397*256+S
    )=5 THEN LET S=P
410 IF PEEK (PEEK 16396+PEEK 16397*256+S
    )=3 THEN LET S=P
420 IF PEEK (PEEK 16396+PEEK 16397*256+S
    )=131 THEN LET S=P
430 IF PEEK (PEEK 16396+PEEK 16397*256+S
    )=133 THEN LET S=P
440 IF PEEK (PEEK 16396+PEEK 16397*256+S
    )=136 THEN LET S=P
```


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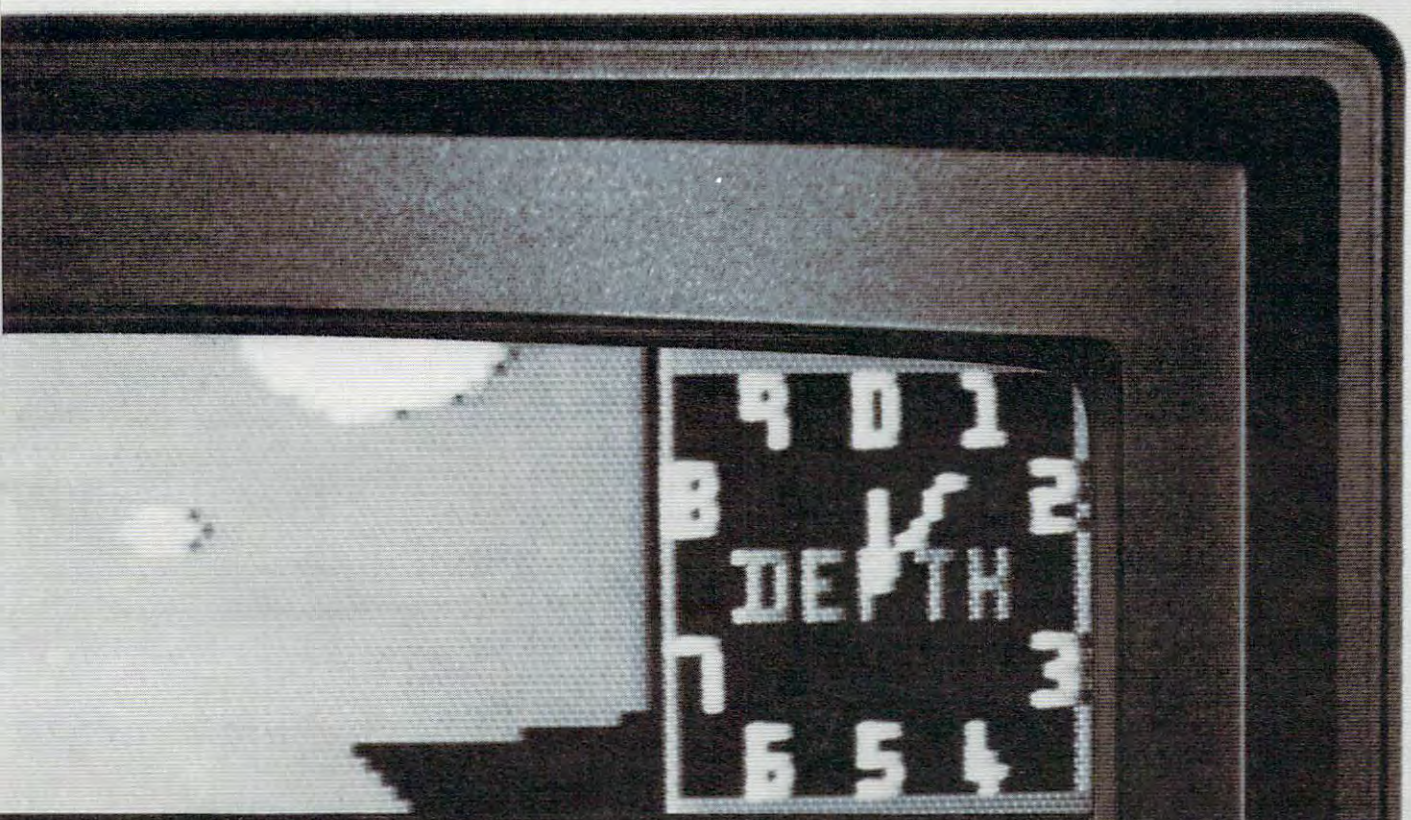

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```
450 IF PEEK (PEEK 16396+PEEK 16397*256+S
    )=141 THEN LET T=T+200
460 IF PEEK (PEEK 16396+PEEK 16397*256+S
    )=141 THEN GOSUB 1000
465 IF PEEK (PEEK 16396+PEEK 16397*256+S
    )=141 THEN PRINT AT X,Y;"S"
470 IF PEEK (PEEK 16396+PEEK 16397*256+S
    )=151 THEN LET T=T+10
480 IF PEEK (PEEK 16396+PEEK 16397*256+S
    )=151 THEN LET C=C+1
485 IF PEEK (PEEK 16396+PEEK 16397*256+S
    )=151 THEN LET M=1
490 IF C=15 THEN GOTO 170
500 IF PEEK (PEEK 16396+PEEK 16397*256+S
    )=128 THEN GOTO 7500
510 POKE PEEK 16396+PEEK 16397*256+P,0
520 LET T=T-1
525 IF T>2000 THEN GOTO 8500
530 PRINT AT 21,0;"          "
540 PRINT AT 21,0;T
550 IF T<=0 THEN GOTO 7000
560 LET Z=Z+1
570 IF Z=40 THEN GOSUB 1000
580 IF Z=40 AND RND>.3 THEN PRINT AT X,Y
    ;"S"
590 IF Z=40 THEN LET Z=0
600 LET G=1
610 GOTO 250
1000 LET X=INT(RND*20)+1
1010 LET Y=INT(RND*30)+1
1020 RETURN
2000 POKE PEEK16396+PEEK16397*256+P,149
2002 LET B=P
2005 IF INKEY$="" THEN GOTO 2000
2010 IF INKEY$="9"THEN GOTO 2000
2015 LET B$=INKEY$
2020 IF B$<>"5" AND B$<>"6" AND B$<>"7"
     AND B$<>"8" THEN GOTO 2000
2025 FOR N=1 TO 5
2030 LET B=B-(1 AND B$="5")
2040 LET B=B+(33 AND B$="6")
2050 LET B=B-(33 AND B$="7")
2060 LET B=B+(1 AND B$="8")
2065 IF PEEK (PEEK 16396+PEEK 16397*256+
     B)=128 THEN GOSUB 4500
2070 IF PEEK (PEEK 16396+PEEK 16397*256+
     B)=128 THEN LET T=T+100
2075 IF PEEK (PEEK 16396+PEEK 16397*256+
     B)=128 THEN GOTO 4000
2080 IF PEEK (PEEK 16396+PEEK 16397*256+
     B)=128 THEN LET T=T-3*N
2090 IF PEEK (PEEK 16396+PEEK 16397*256+
     B)=136 THEN GOTO 4000
3000 IF PEEK (PEEK 16396+PEEK 16397*256+
     B)=5 THEN RETURN
3010 IF PEEK (PEEK 16396+PEEK 16397*256+
     B)=3 THEN RETURN
3020 IF PEEK (PEEK 16396+PEEK 16397*256+
     B)=133 THEN RETURN
3030 IF PEEK (PEEK 16396+PEEK 16397*256+
     B)=131 THEN RETURN
3040 IF PEEK (PEEK 16396+PEEK 16397*256+
     B)=151 THEN LET T=T-5*N
3050 IF PEEK (PEEK 16396+PEEK 16397*256+
     B)=151 THEN RETURN
3060 IF PEEK (PEEK 16396+PEEK 16397*256+
     B)=5 THEN RETURN
3080 POKE PEEK 16396+PEEK 16397*256+B,22
3085 POKE PEEK 16396+PEEK 16397*256+B,0
3090 NEXT N
4000 POKE PEEK 16396+PEEK 16397*256+B,0
4005 LET P=S
4010 RETURN
4500 IF RND>.5 THEN RETURN
4505 IF B$="5" THEN GOTO 4525
4510 IF B$="8" THEN GOTO 4527
4515 IF B$="6" THEN GOTO 4531
4520 IF B$="7" THEN GOTO 4533
4525 LET B$="8"
4526 GOTO 4540
4527 LET B$="5"
4528 GOTO 4540
4531 LET B$="7"
4532 GOTO 4540
4533 LET B$="6"
4540 FOR X=1 TO N
4541 LET B=B-(1 AND B$="5")
4542 LET B=B+(33 AND B$="6")
4543 LET B=B-(33 AND B$="7")
4545 LET B=B+(1 AND B$="8")
4555 POKE PEEK 16396+PEEK 16397*256+B,12
     8
4560 POKE PEEK 16396+PEEK 16397*256+B,22
4570 POKE PEEK 16396+PEEK 16397*256+B,0
4575 IF PEEK (PEEK 16396+PEEK 16397*256+
     B)=149 THEN GOTO 8000
4577 IF PEEK (PEEK 16396+PEEK 16397*256+
     B)=21 THEN GOTO 8000
4580 NEXT X
4590 GOTO 8000
7000 PRINT AT 21,0;" YOU HAVE USED ALL Y
     OUR POWER "
7010 GOTO 8010
7500 PRINT AT 21,0;" YOU HAVE BEEN CAPTU
     RED BY ADNIL "
7501 IF T-1000<=0 THEN GOTO 8010
7502 PAUSE 200
7503 PRINT AT 21,0;" YOU HAVE PAID RANSO
     M TO ADNIL "
7504 LET S=P
7505 LET T=T-1000
7506 PAUSE 200
7507 PRINT AT 21,0;"                    
     "
7508 PRINT AT 21,0;T
7509 GOTO 250
8000 PRINT AT 21,0;"{5 SPACES}YOU HAVE B
     EEN DESTROYED{4 SPACES}"
8010 PAUSE 200
8012 PRINT AT 20,0;"{32 SPACES}"
8015 PRINT AT 20,0;"YOUR SCORE :";T
8020 PRINT AT 0,0;" PRESS ANY KEY TO PLA
     Y AGAIN{5 SPACES}"
8030 PRINT AT 0,0;" PRESS ANY KEY TO PLA
     Y AGAIN{5 SPACES}"
8040 IF INKEY$="" THEN 8020
8050 CLS
8060 GOTO 8245
8100 PRINT"{8 SPACES}THE FORTRESS
     {2 SPACES}"
8101 PRINT
8102 PRINT"{13 SPACES}OF"
8103 PRINT
8104 PRINT"{11 SPACES}ADNIL"
8140 PAUSE 600
8145 CLS
8150 PRINT AT 10,0;"DO YOU NEED INSTRUCT
     IONS?"
8160 PRINT AT 12,8;"Y OR N"
8170 IF INKEY$="" THEN GOTO 8170
```


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```
8175 LET Y$=INKEY$
8180 CLS
8190 IF CODE Y$=51 THEN GOTO 8245
8200 PRINT "YOU ARE ABOUT TO ENTER THE",
     "FORTRESS OF ADNIL, A POWERFUL"
8201 PRINT "MAGICIAN-WARRIOR IN THE KING
     DOM","OF ANNEP."
8202 PRINT "YOUR GOAL IS TO FIND AS MUCH
     ","OF THE TREASURE ($) ADNIL HAS"
8203 PRINT "PLACED IN HIS FORTRESS AS YO
     U","CAN."
8204 PRINT "YOU MUST INCREASE YOUR ENERG
     Y","BY COLLECTING ENERGY PELLETS (*
     )"
8205 PRINT "WHICH ARE SCATTERED IN THE",
     "FORTRESS.{2 SPACES}YOUR POWER WILL
      ALSO"
8206 PRINT "INCREASE IF YOU DEFEAT THE",
     "NAWS (■) ADNIL USES AS GUARDS."
8207 PRINT AT 21,0;" PRESS ANY KEY TO CO
     NTINUE{7 SPACES}"
8208 PRINT AT 21,0;" PRESS ANY KEY TO CO
     NTINUE{7 SPACES}"
8209 IF INKEY$="" THEN 8207
8210 CLS
8211 PRINT "BE CAREFUL.{2 SPACES}IF ADNI
     L IS MORE","POWERFUL THAN YOU, THEN
      THE NAWS"
8212 PRINT "WILL DESTROY YOU."
8213 PRINT "IF YOU ARE CAPTURED, YOU WIL
     L","HAVE A CHANCE TO PAY A RANSOM"
8214 PRINT "FOR YOUR RELEASE, BUT THE","
     PRICE IS HIGH AND ADNIL MAY"
8215 PRINT "NOT ACCEPT YOUR OFFER."
8216 PRINT "YOUR ONLY WEAPON IS YOUR LAS
     ER","SWORD WHICH YOU USE BY PRESSIN
     G"
8217 PRINT "THE ""9"" KEY AND CHOOSING T
     HE","DIRECTION TO ATTACK."
8218 PRINT AT 21,0;" PRESS ANY KEY TO CO
     NTINUE{6 SPACES}"
8219 PRINT AT 21,0;" PRESS ANY KEY TO CO
     NTINUE{6 SPACES}"
8220 IF INKEY$="" THEN GOTO 8218
8221 CLS
8222 PRINT "TO MOVE :"
8223 PRINT TAB 5;"LEFT PRESS 5"
8224 PRINT TAB 5;"DOWN PRESS 6"
8225 PRINT TAB 5;"UP PRESS 7"
8226 PRINT TAB 5;"RIGHT PRESS 8"
8227 PRINT TAB 5;"YOUR LASER SWORD IS 9"
8228 PRINT
8229 PRINT "USE THE KEYS TO CHOOSE YOUR"
     ,"DIRECTION OF ATTACK WITH YOUR"
8230 PRINT "LASER SWORD."
8231 PRINT "YOU WILL START WITH AN ENERG
     Y","LEVEL OF 50 UNITS.{2 SPACES}EAC
     H MOVE"
8232 PRINT "WILL COST 1 UNIT AND USE","O
     F THE LASER COSTS MORE."
8233 PRINT "CAPTURE THE TREASURE ($) AND
     ","GAIN ENERGY (*) BY MOVING TO"
8234 PRINT "THOSE SPACES."
8235 PRINT AT 21,0;" PRESS ANY KEY TO CO
     NTINUE{6 SPACES}"
8236 PRINT AT 21,0;" PRESS ANY KEY TO CO
     NTINUE{6 SPACES}"
8237 IF INKEY$="" THEN GOTO 8235
8238 CLS
8239 PRINT "IF YOU ARE TRAPPED IN THE MA
     ZE","YOU MAY USE YOUR LASER SWORD"
8240 PRINT "TO BLAST THROUGH THE WALL."
8241 PRINT AT 10,0;"GOOD LUCK...YOU WILL
      NEED IT."
8242 PRINT AT 21,3;"PRESS ANY KEY WHEN R
     EADY"
8243 PRINT AT 21,3;"PRESS ANY KEY WHEN R
     EADY"
8244 IF INKEY$=""THEN GOTO 8242
8245 CLS
8246 PRINT AT 10,0;"THE SCREEN WILL BE B
     LANK FOR"
8247 PRINT "ABOUT 15 SECONDS WHILE YOU A
     RE{2 SPACES}TRANSPORTED TO THE FORT
     RESS OF"
8248 PRINT "{13 SPACES}ADNIL"
8249 PAUSE 400
8250 CLS
8251 GOTO 10
8500 CLS
8501 PRINT AT 10,0;"YOU HAVE DEFEATED AD
     NIL"
8502 PRINT AT 12,5;"YOUR SCORE :":T
8503 GOTO 8010
9990 REM SAVE
9991 PRINT AT 10,5;" START TAPE "
9992 PAUSE 200
9993 POKE 16437,255
9994 CLS
9995 SAVE "ADNIL"
9996 GOTO 5
9999 PRINT"LENGTH OF PROGRAM ";PEEK 1639
     6+256*PEEK 16397-16583
```

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TECHNIQUES FOR WRITING YOUR OWN ADVENTURE GAME

Charles Perkins

Adventure games are as intriguing to write as they are to play. Here are a few techniques to help you create an intricate drama without running out of memory. These suggestions are useful for any computer, but the specific examples concern Commodore computers.

Remember, you have other tools at your disposal beside standard PEEKs, POKEs, and IF...THENs when programming games. One-byte pointers and ragged tables, for example, can sometimes come in handy as techniques to save memory and help with complicated game logic.

Using these techniques, I developed an adventure game entirely in BASIC for my 8K Commodore PET 2001 (actually 7167 bytes of free memory). It includes an adventure with 48 rooms, 576 vocabulary words, 12 objects (trolls, witches, etc.), and many descriptors and interactive responses. The game is table driven, and the entire adventure, including vocabulary, is stored as data. Many different adventures can be developed using this same program without change.

Computer game programs often use numbers which do not exceed the range of 0 to 255. Array indices and loop variables are common examples. The typical personal computer running BASIC does not permit one-byte variables (value range 0-255). A variable (either floating point or integer) on my PET is always seven bytes long. If your game program needs a good amount of memory and you store lots of variables with values in the range of 0-255, then this unneeded overhead is a problem.

BASIC (which causes the problem) also offers a solution. String manipulation functions permit the program to address a single character, and a character is stored in a single byte (plus some overhead which will be discussed later). With these string manipulation functions and simple algorithms to convert characters to numbers and vice versa, it is possible to efficiently store numbers in one byte.

This approach is particularly useful when a game program makes extensive use of pointers. Pointers are stored variables which "point" to specific pieces of data (i.e., the indices of a table entry). The approach is easily extended to the creation and use of "ragged" tables. A ragged table is one in which the number of columns varies with each row.

One-Byte Pointers

In its simplest form, a one-byte pointer is a value between 0 and 255 stored as a corresponding character in a string variable. Given the character (C$), its value (C) is determined by the equation C=ASC(C$). Given the value, the appropriate character is determined by the function C$=CHR$(C). Storing individual characters as individual strings is not efficient (it uses up eight bytes in the PET), so multiple variables must be stored together in a string (the overhead is constant, and each character adds only one additional byte of memory). To retrieve the Nth character from the storage string (A$), the equation is C$=MID$(A$,N,1). To store a new value in the string is a bit more trouble, but it's still just string manipulation.

Storing The Variables

The simple code number approach described above works if the one-byte variables are always kept internally in the computer. If you want to store the variables on tape or examine them on the screen, a problem arises: the internal character codes include special characters which cannot be saved or printed. In fact, only 128 characters (seven bits) can be saved or printed, and one of these (the quote mark) has special meaning to the PET and cannot be used. The usable character set in the PET has code numbers between 32 and 95 and between 160 and 223. The quote mark is character 34.

In my adventure game application, the storage strings are input from tape as data. I also chose to reserve seven characters as special flags and to eliminate the quote mark from the allowed character set for positive numbers. As a result, I was forced to use slightly more complex encoding and

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