Telecommuting: Dawn Of The Electronic Cottage

# COMPUTE!'s GAZETTE

$2.50
December 1983
Issue 6 Vol. 1, No. 6
63380 $3.25 in Canada

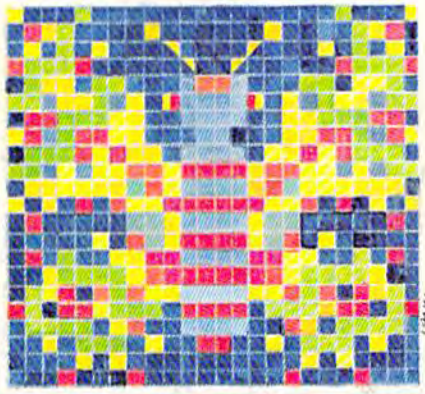
For Owners And Users Of **Commodore VIC-20**™ And **64**™ Personal Computers

## SPIKE

Arcade-Action Game For Commodore 64

Written entirely in machine language, Spike is an outstanding arcade-style game with stunning high-resolution graphics — one of the best games we've ever published. Only the skillful can evade the random power spikes and escape the Grid.

## Sprites Made Easy For Commodore 64



A simple program to add sprite commands to Commodore BASIC. Examples show how you can animate shapes on the screen in your own programs with a minimum of tricky PEEKs and POKEs.

## Educational Games: A Kid's View

A teenager speaks out on what youngsters like to see in educational computer games — and he includes his own game for the VIC-20 and Commodore 64 to show exactly what he means.

## *A SURVIVAL GUIDE FOR BEGINNERS*

Lost in the woods without a compass? Here's a complete guide to finding help through user groups, computer classes, books and magazines, and your fellow computerists.

### Also In This Issue



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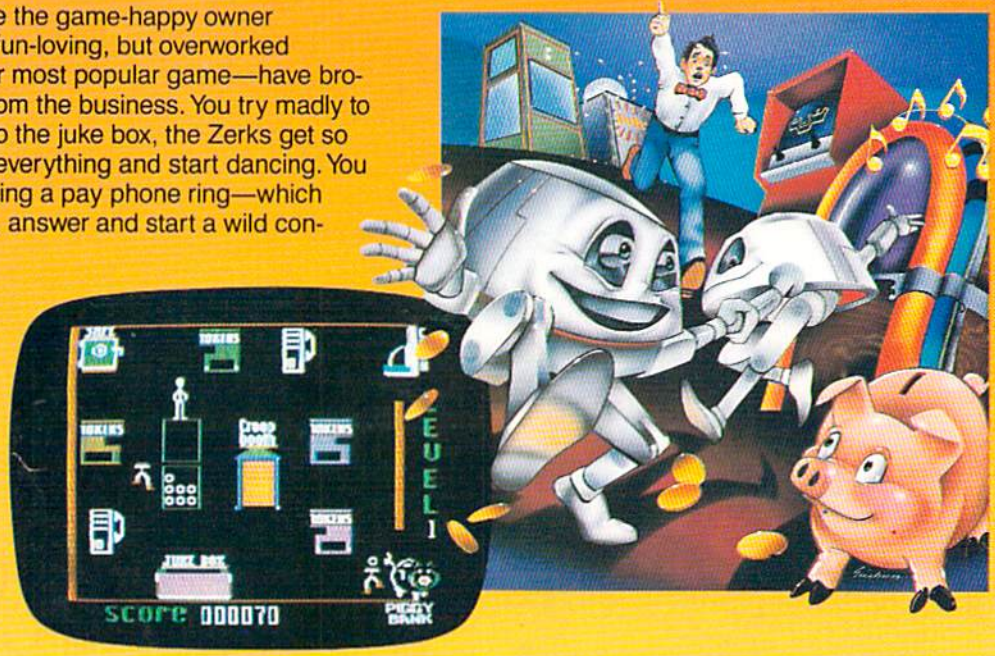
# A million laughs

**SPARE CHANGE™** You are the game-happy owner of the Spare Change Arcade. Two fun-loving, but overworked Zerks—the main characters in your most popular game—have broken loose and are trying to retire from the business. You try madly to stop them. If you can get a coin into the juke box, the Zerks get so caught up in the music, they drop everything and start dancing. You also try popping popcorn and making a pay phone ring—which immediately makes the Zerks stop, answer and start a wild conversation. If you "win" the game, there are rib tickling cartoons by the Zerks to reward your efforts. It's a game full of sight gags, surprises and comedy. From the best. Brøderbund! **For the Apple® II/II+/IIe, Atari® Computers, and Commodore 64™ in disk format.**




# and an endless challenge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ALL INSIDE BASIC programs come with both the Commodore 64 and VIC 20 versions on the same disk or cassette. If you plan to upgrade to the Commodore 64, *you won't lose your investment in software.* And if you have both computers you can use the program on either unit.

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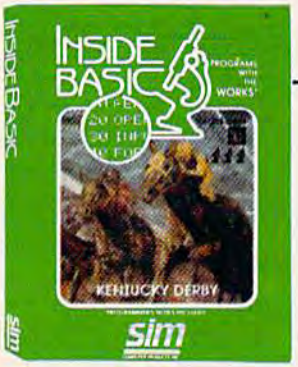
†Programmer's notes available free with response card and include program overview, line by line description, complete listing, variable chart, and suggested changes.

## Entertainment




### Kentucky Derby Bet on your favorite horses

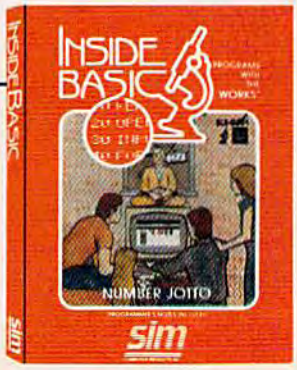
There's nothing more fun than a day at the races. Especially when you don't have to leave your living room. This popular program features colorful hi-resolution graphics and authentic sounds. Pick your favorite horse or ask Hot Tip Sam. Bet to win, place, or show and watch them gallop off! Experience the thrill as your horse crosses the finish line and your payoff appears on the tote board. KENTUCKY DERBY is an exciting game for all ages and may be played with up to four players.

Commodore 64/VIC 20+8K
(suggested retail: $19.95)*

### Number Jotto Outwit your opponents

Deduction, logic, and patience are the skills you must master to win the game. The object is to discover your secret jotto number using the least number of tries. Each move is your probe that the computer must respond to with two hints. Think carefully, examine your guess chart on the screen, eliminate and choose wisely. Your opponent may show no mercy. NUMBER JOTTO is an ideal strategy game for the entire family and may be played with up to four people.

Commodore 64/VIC 20+8K
(suggested retail: $14.95)*




sim

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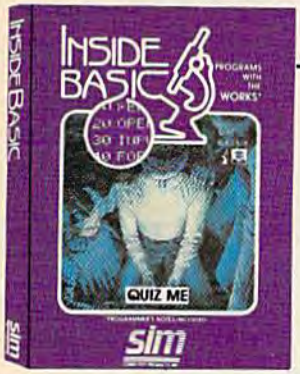
# Education




## Quiz Me Test your knowledge and build study skills

QUIZ ME is a computer aided testing program. Using its powerful editor, parents and teachers can easily create a quiz for any subject. You can load, save, and print out your quizzes. Create as many quizzes as you like with up to 50 problems per quiz on the Commodore 64.

QUIZ ME is designed to allow multiple choice, fill in the blanks, and for those questions where spelling is not important, approximate answers. You can specify the number of tries per problem. There are advanced features that allow you to specify the time you have to answer and the number of points awarded for each problem. Upon completion of the quiz, automatic scoring, percentage scaling, and letter grading give the student his complete results.

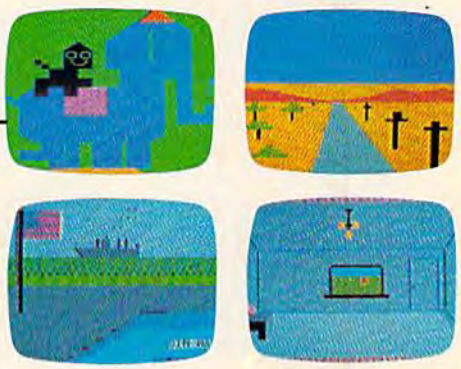
QUIZ ME gives continuous reinforcement and encourages you to try harder and learn more. QUIZ ME is an exceptional program for parents and teachers who wish to make learning more enjoyable.

Commodore 64/VIC 20+8K
(suggested retail: $19.95)*

## Colorcraft Etch, sketch, and animate your way to a better understanding of computers.

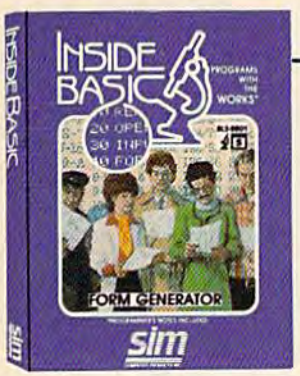
Using the keyboard, children can create their own fun-filled stories with full color graphics. COLORCRAFT will then take their story and animate it on the screen. Hours of enjoyment await, and the fun does not have to end today. You can save your story for tomorrow.

Plus, COLORCRAFT helps children and adults become familiar with computer basics like cursors, graphics and function keys, and simple word processing commands. After a child learns the fundamentals, there are advanced features like speed control and diagonal cursor movement. COLORCRAFT comes with an easy to follow user manual including a glossary of computer terms and a step by step sample animation. COLORCRAFT will teach and entertain your entire family while stimulating your children's creativity.



Commodore 64/VIC 20 - memory expansion not required
(suggested retail: $24.95)*

# Business/Home




## Form Generator Input, calculate, and fill in the blanks

You can use your existing forms or create your own right on the screen. Applications include all types of business forms, invoices, vouchers, statements, and labels. FORM GENERATOR lets you set up a master which you can use to generate completed forms. Anytime you wish to print out a form, simply load in the master and run. FORM GENERATOR will ask you for the fill-in information needed to complete the form. Next, it will calculate and fill in the blanks. You can then print or save your completed form. It's that easy. You'll be amazed at the time you save and the professional look of your forms.

Requirements: Commodore 1525, 1526 or compatible printer.
16K memory expander recommended on the VIC 20.

Features: labels and formulas: add, subtract, multiply, divide
automatic information prompting
default input values
fixed decimal number formatting
repeat sequences (a must for invoicing)
multiple copy printing

Commodore 64/VIC 20+8K
(suggested retail: $29.95)*

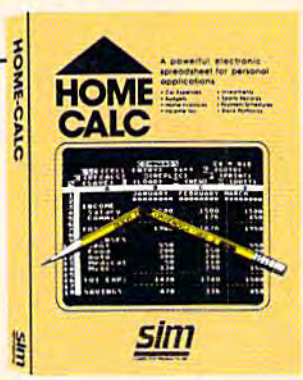
## Home-Calc The lowest priced, easiest to use spreadsheet

Spreadsheets are one of the most popular programs and have many applications in the home: investments, payment schedules, home finances, car expenses, and more. The easy reading manual, simple instructions, and easy-to-execute commands make setting up a spreadsheet a snap. HOME-CALC doesn't confuse you with lots of fancy functions and commands. A beginner can have a home budget sheet working in an hour. If you're more sophisticated and want to use it in your business that's okay too. HOME-CALC is ready to handle "what if?, how much?, and bottom line" calculations. Load, save, and print spreadsheets.

Features: sum, replicate, recalculate
title and formula capability
add, subtract, multiply, and divide
selectable column width and number formats
machine language speed

Requirements: Commodore 1525, 1526 or compatible printer

Commodore 64
(suggested retail: $24.95)*

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December 1983 Vol. 1, No. 6

# FEATURES



# GAMES



# REVIEWS



# EDUCATION/HOME APPLICATIONS



# PROGRAMMING



# DEPARTMENTS



# PROGRAM LISTINGS



* = General, **V** = VIC-20, **64** = Commodore 64.

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# THE EDITOR'S *notes*

*Because we've received numerous letters concerning the Commodore 1541 Disk Drive, I asked Tom Halfhill, Editor of* COMPUTE!'s Gazette, *to write an editorial commenting on this matter.*

*— Robert Lock*

Although every monthly issue of COMPUTE!'s Gazette goes out to more than 200,000 people, in a way we consider each magazine a personal communication with each individual reader. In turn, many hundreds of you write personally to us each month. In this way we keep each other in touch with our problems, discoveries, opinions, and concerns.

For the past month (this is written in September), we have been receiving an unusual number of letters and phone calls on one particular topic: Commodore 1541 Disk Drives. We are hearing that 1541 drives are virtually unavailable, and that many drives purchased before the supply dried up suffer from reliability problems. Most of you who are writing or phoning us are doing so as a last resort — you have first sought answers from your dealers, or even Commodore itself, but have gotten few answers.

Commodore's official line — repeated both to you and to us — is that demand for 1541 disk drives has far exceeded the company's projections, leading to a supply crunch at the distributor level and scarcity in retail stores. Commodore promises the shortage will be relieved in a few weeks. Commodore's response to your other major concern — reliability — is that the 1541s suffer from no unusual problems.

To deal with the supply question first, there is little doubt that Commodore indeed underestimated the great demand for 1541s. A recent survey showed that 90 percent of new Commodore 64 owners bought a disk drive with their computer — a far higher percentage than anyone suspected. With hindsight this isn't surprising: 1541s retail for $250 – $300, hundreds of dollars less than disk drives for other computers.

But even this unexpected demand does not explain the nearly total absence of 1541s from dealers' shelves in August and September. At this moment COMPUTE! Publications sorely needs additional 1541s for in-house use, yet we can't find any to buy. After numerous phone calls over several days, we were able to locate only two units in the entire continental United States. If the problem were merely one of supply and demand, dealers would be telling us that their 1541s are selling as fast as they receive them from Commodore. Instead, dealers say they aren't receiving any 1541s from Commodore at all.

There have been lots of rumors and industry scuttlebutt to explain why 1541s are unavailable. At the risk of disappointing some people, we will not repeat the rumors here until we can find hard facts to support them. Unsupported rumors are potentially damaging — not only to Commodore, but also to the hundreds of Commodore dealers who are as blameless and frustrated as everyone else.

However, as many of you have concluded, there does appear to be a connection between the supply shortage and the reliability problems you have experienced. Commodore will not comment on the matter, but by all accounts (including those of readers, dealers, and our own experience), the 1541 drives are plagued with an abnormally high failure rate. As near as we can determine — our information comes largely from cooperative Commodore dealers — much of the trouble can be traced to a part designed to keep the drive properly aligned. One Commodore dealer who handles service for numerous states told us he has repaired several hundred drives recently, and this part was to blame in all but three cases. Of the seven 1541 drives at COMPUTE! Publications, four have succumbed to the same problem.

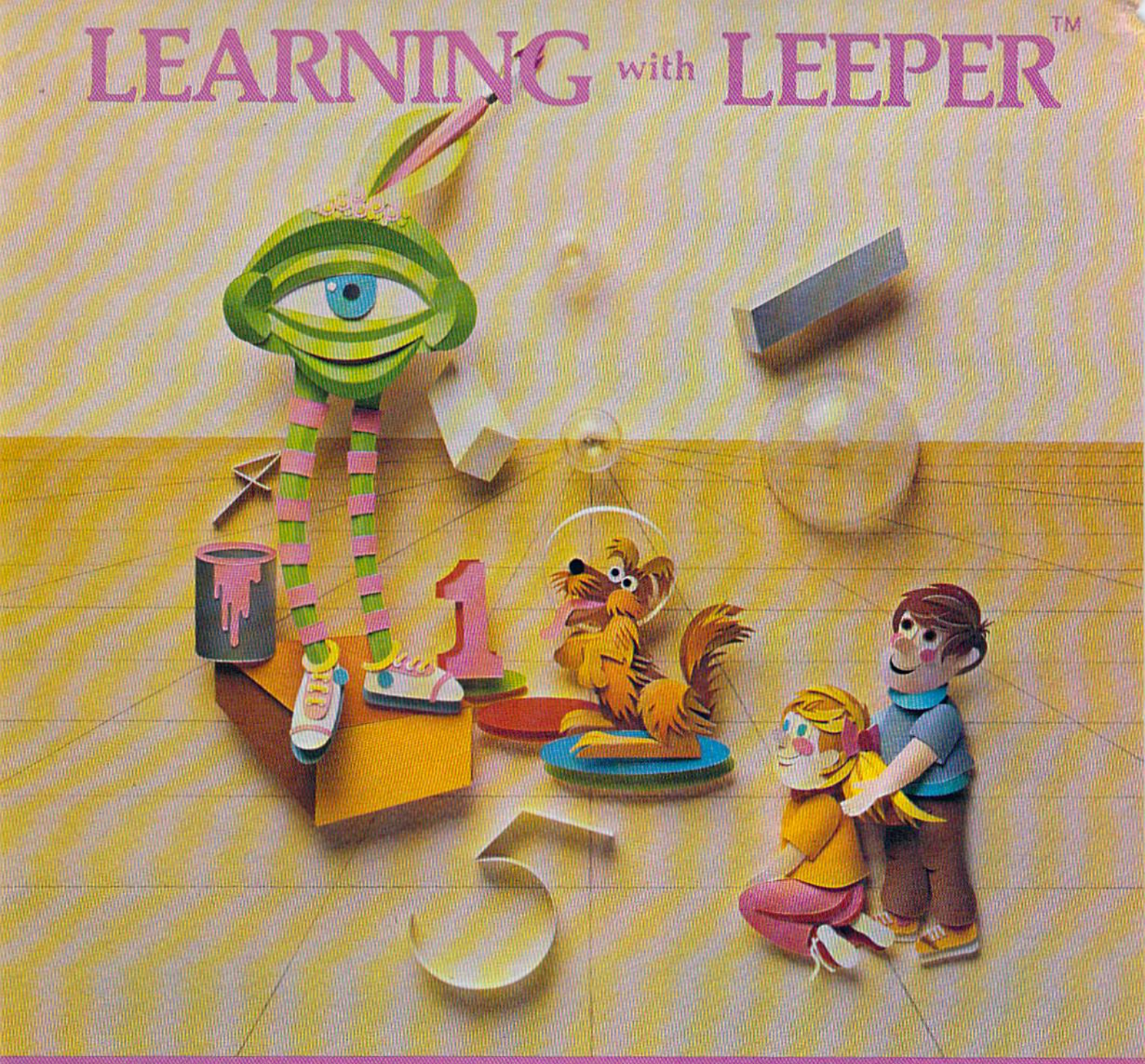
We have also learned, unofficially, that Commodore is aware of the problem and is trying to fix it at the manufacturing level. In the meantime, no 1541s are reaching the market. Users and dealers are frustrated and upset, and Commodore is deferring hundreds of thousands of dollars in potential sales.

It is, of course, possible to conclude that the 1541 situation may represent some serious general quality-control problems. The return rate for other equipment also seems to be relatively high.

If you are suffering from these problems, we urge you not to take your frustrations out on the dealers. Although as local representatives of Commodore they are easiest to blame, legitimate dealers will handle your problems in an honest and straightforward manner. Remember, high failure rates hurt them, too.

Since no one benefits from a situation like this — not the manufacturer, nor the dealer, nor the consumer — a solution will likely present itself soon. Until then, the owners of 1541 disk drives (and those who would like to buy them) can only join with the rest of us in wondering what, exactly, is happening.

# LEARNING with LEEPER™



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Telephone: 919-275-9809
Office Hours: 8:30 AM to 4:30 PM Monday-Friday

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# GAZETTE FEEDBACK

EDITORS AND READERS

## Diskette Safety

I recently purchased a 1541 disk drive to use with my 64. I have a couple of questions about its use.

Is it harmful to store a disk in the drive when the drive is not in use?

When I power up my drive, the red read/write light comes on. Is it safe to leave a diskette in the drive during this?

Is it safe to use both sides of a single-sided diskette?

Dan Dabson

*It is not a good idea to leave a diskette in the drive when it is not in use (powered off). You might forget to remove the disk before you turn the drive back on. When the drive is powered up, it is not ready for a disk. The read/write head could be in a bad location, and could be momentarily magnetized. The head might erase part of the disk or write bad data to it.*

*As for using both sides of single-density floppy disks,* don't. *Here are a couple of reasons why. First is the danger of dust contamination. As you use the normal side, the disk always spins in one direction. Dust tends to collect in certain places inside the disk's protective jacket (that's the purpose of the felt liner). When you use the other side, the disk spins in the opposite direction. This could "spin" that dust out of the corners and onto the disk, causing great damage.*

*Second, and most important, don't use that second side because it may already have been proven substandard. Most disk manufacturers produce disks in the following way. The disks are originally manufactured as double-sided disks with the same magnetic oxide coating and processing on both sides. The disks are then tested (both sides) to see if they meet specifications. If both sides test out OK (they're* certified*), the disk is packaged and marketed as double-sided. However, if one side tests good, and the other side fails, the good side is labeled and sold as a single-sided disk. This means the second side may have been tested and rejected as bad. The manufacturers we contacted all stressed this point: if you use that second side of a single-sided floppy, you do so at your own risk.*

*Also consider the possibility that if the disk is lost or damaged, you could lose double the amount of data.*

## Learning Machine Language

I own a VIC-20 and have been trying to learn machine language. I also have a VICMON (machine language monitor/assembler cartridge) and know about 14 mnemonic commands. My problem is that I don't know the other commands and how to use them.

What I would like to know is if there are books to help me learn machine language. I already have the *Programmer's Reference Guide* for the VIC. Are there any books for machine language?

Steven Booth

*There are a number of good books available that will help you learn how to program in machine language. One is Richard Mansfield's* Machine Language for Beginners, *by COMPUTE! Books. Also, see his monthly column in this magazine, "Machine Language for Beginners."*

## Larger Screen For VIC

Could you publish a program that would turn the VIC's 22-character line length into 40 or even 64 columns? I understand about TVs versus monitors for screen clarity using more characters per line, etc. What I am looking for (and have failed in my attempts to program) is a BASIC program to allow the use of 40 or 64 characters per line.

I am not even thinking of graphics, and I understand that the VIC is not a 22-character Commodore 64. The reason for all this is that there is plenty of good, free software available to anybody with a library card. There is so much software out there for most any computer that uses Microsoft BASIC but doesn't require special graphics. The only trouble is that a lot of it uses and depends on many columns of data. Sure, I've tried to convert them to the VIC's screen configuration, but many times the result is complicated juggling of screen displays.

I'm sure many hackers with a VIC would appreciate a BASIC program to expand the VIC's screen. (I'm surprised Commodore doesn't

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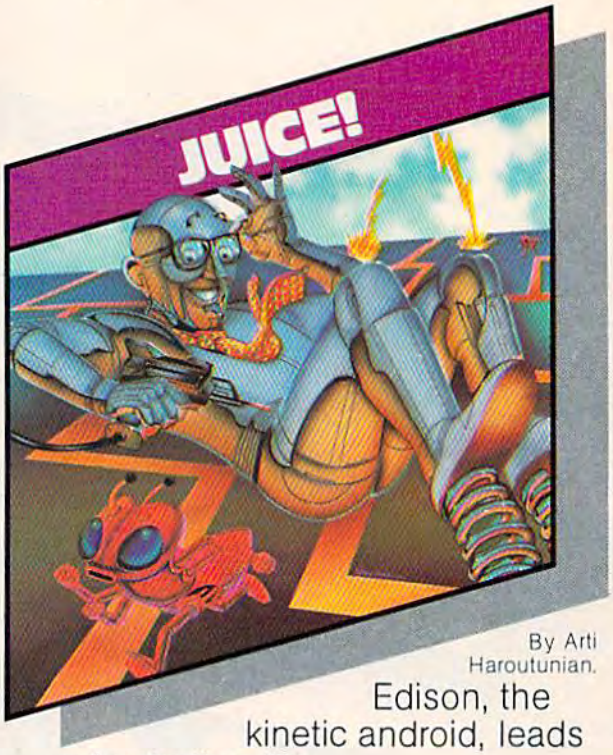


By Arti Haroutunian.

Edison, the kinetic android, leads a frustrating life.

All he wants to do is build his circuit boards and go with the flow. But things keep getting in the way.

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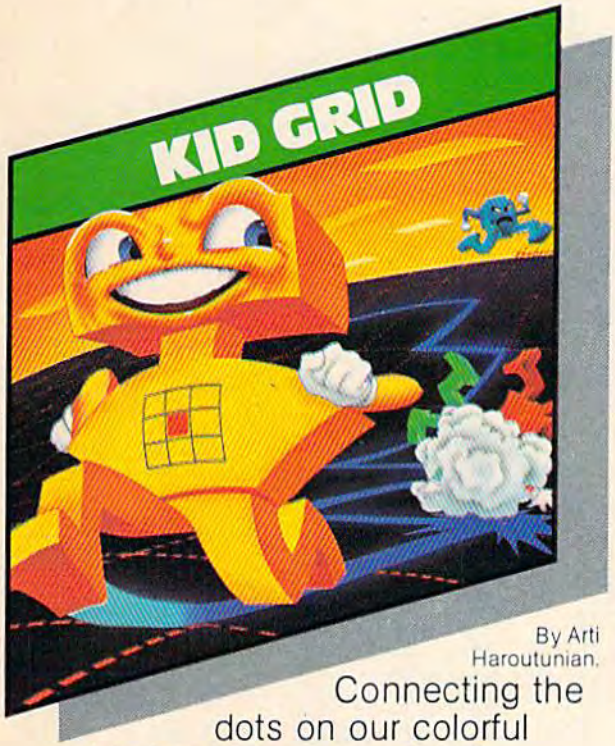
And the cunning Killerwatt is out to fry poor Edison's brains.

You'll get a charge out of this one. And a few jolts, too!

(Suggested retail $34.95)




By Arti Haroutunian.

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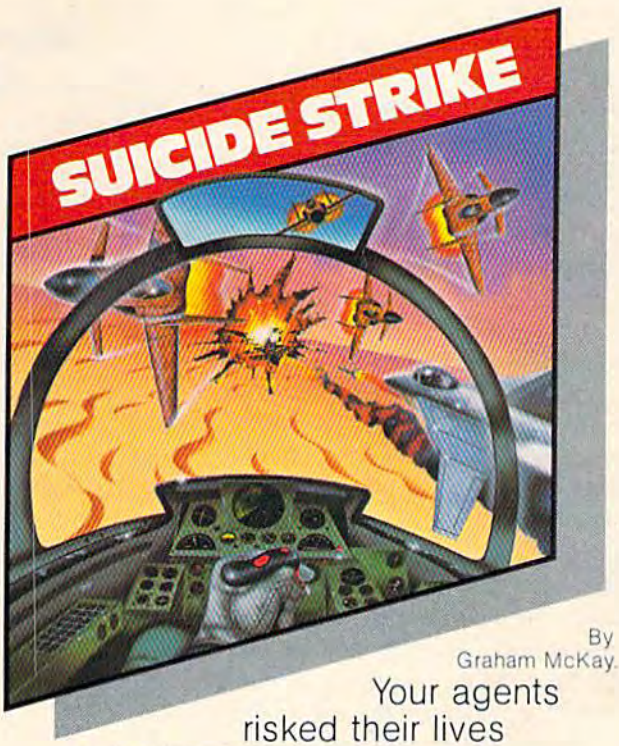


By Graham McKay.

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develop a ROM cartridge for this purpose.)

Brian Greer

*Although it is possible to convert the VIC-20 screen to a width of 40 columns through programming, it would be impractical in BASIC. Such a program almost certainly would require some machine language to maintain decently fast key response. Also, the VIC would require memory expansion to leave enough room for the application program.*

*An example of a 40-column program for the VIC is* Terminal-40 *from Midwest Micro Associates (Kansas City, Missouri). This was reviewed in our September 1983 issue. However,* Terminal-40 *is a telecomputing terminal program, not a general-purpose, 40-column converter.*

*Commodore does not make a 40-column cartridge for the VIC, but a few independent companies do. Some of them advertise from time to time in* COMPUTE!'s Gazette *or our parent magazine,* COMPUTE!. *One product even expands the VIC to a full 80-column width, although anything over 40 columns will require a special computer monitor, since standard TV sets cannot resolve characters that small. We may be reviewing some of these products in the near future.*

*In the meantime, if any machine language programmers out there feel up to writing a general-purpose, 40-column utility for the VIC,* COMPUTE!'s Gazette *would be glad to consider such a program for publication.*

## Keycode Values

Charles Brannon's article in the September 1983 issue was most helpful in showing how to use the Commodore function keys in a program.

I have since noticed programs that also use the function keys without any mention of the particular key or the usual GET or INPUT statement that invites keyboard response. Hours of searching finally revealed a K=PEEK(197) statement.

My question is, where do these "key numbers" come from? Are these numbers decoded to generate the BASIC keyword and CHR$ codes? The *Programmer's Reference Guide* and other similar books have sketchy or no information on the mentioned techniques.

W. K. Brander

*The memory location you mentioned (197) is the location to PEEK in both the VIC-20 and the Commodore 64 to detect the* current key pressed. *When no keys are pressed, the value of location 197 is 64, and when a key is pressed, the value changes. The value will be the same even if the SHIFT or CTRL key is pressed simultaneously. In the 64, for example, pressing SHIFT/A, CTRL/A, or A all return a value of 10 in location 197.*

*PEEK(197) can be used if, for some reason, you do not wish to use the GET or INPUT commands. A few IF-THENs can process the information the same way you would using GET.*

*Below is a table of the values returned by location 197 when a key is pressed on either the VIC-20 or the 64.*

### Keycode Values

| KEY PRESSED | C64 | VIC |
|---|---|---|
| A | 10 | 17 |
| B | 28 | 35 |
| C | 20 | 34 |
| D | 18 | 18 |
| E | 14 | 49 |
| F | 21 | 42 |
| G | 26 | 19 |
| H | 29 | 43 |
| I | 33 | 12 |
| J | 34 | 20 |
| K | 37 | 44 |
| L | 42 | 21 |
| M | 36 | 36 |
| N | 39 | 28 |
| O | 38 | 52 |
| P | 41 | 13 |
| Q | 62 | 48 |
| R | 17 | 10 |
| S | 13 | 41 |
| T | 22 | 50 |
| U | 30 | 51 |
| V | 31 | 27 |
| W | 9 | 9 |
| X | 23 | 26 |
| Y | 25 | 11 |
| Z | 12 | 33 |
| 0 | 35 | 60 |
| 1 | 56 | 0 |
| 2 | 59 | 56 |
| 3 | 8 | 1 |
| 4 | 11 | 57 |
| 5 | 16 | 2 |
| 6 | 19 | 58 |
| 7 | 24 | 3 |
| 8 | 27 | 59 |
| 9 | 32 | 4 |
| ← | 57 | 8 |
| + | 40 | 5 |
| − | 43 | 61 |
| £ | 48 | 6 |
| CLR/HOME | 51 | 62 |
| INST/DEL | 0 | 7 |
| @ | 46 | 53 |
| * | 49 | 14 |
| ↑ | 54 | 54 |
| : | 45 | 45 |
| ; | 50 | 22 |
| = | 53 | 46 |
| , | 47 | 29 |
| . | 44 | 37 |
| / | 55 | 30 |
| CRSR ↕ | 7 | 31 |
| CRSR ↔ | 2 | 23 |
| F1 | 4 | 39 |
| F3 | 5 | 47 |
| F5 | 6 | 55 |
| F7 | 3 | 63 |
| RETURN | 1 | 15 |
| STOP | 63 | 24 |
| NO KEY | 64 | 64 |
| SPACE BAR | 60 | 32 |

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## Colorless Color Monitor

I have an all-Commodore setup, and I have noticed a problem. When I switch off the 64 to clear and reset the computer, my Commodore 1701 color monitor reverts to black and white. Could you please tell me why this happens? I am using the three-lead connector located in the back of the monitor. I have checked the switch on the back of the monitor, and it is indeed switched to the rear position.

Also, I have noticed that when I use SYS64738 to clear memory, all it does is reset the BASIC pointers. Is there a command that will really reset my machine?

Ken Mehawk

*For the problem of the 1701 reverting to black and white, we have no real solution. The problem might be with your equipment. However, we can offer these suggestions.*

*First, when you turn off the 64 (or any computer), wait a good ten seconds before you turn it back on. Some computers, when rapidly turned off and back on, behave strangely. Second, check all your cables and connections for shorts or breaks. Another thing to check is the adjustments (vertical hold, etc.) on the front panel of the 1701 monitor. Especially check the horizontal position. On some TV sets and monitors, if the horizontal position (or horizontal hold) is not centered just right, the color will drop off. If none of these suggestions help, take your 64 and 1701 monitor back to the dealer and have them check it out for you.*

*The SYS64738 you mentioned is indeed a system reset, but only a partial one. When you enter SYS64738, it does the following:*

1) *Resets the BASIC pointers.*
2) *Reinitializes the VIC chip.*
3) *Resets the vector pointers.*
4) *Reinitializes zero page.*
5) *Clears memory from 679 to 767 and 828 to 1019.*
6) *Resets the first ten bytes of BASIC RAM memory.*

*It does NOT:*

1) *Erase all of BASIC memory.*
2) *Erase RAM memory from 49152 to 53247.*

*The fact that it does not clear out BASIC memory, and memory from 49152 to 53247, can be a plus. If you are running a program, and the system becomes partially "hung," you can use this SYS to reset the computer without erasing your BASIC program or any machine language programs (like an assembler/monitor) that may be in 49152 – 53247. After you SYS64738 and type LIST, it may appear as though your BASIC program is gone, but it is not; only the pointers have been reset. You can restore that BASIC program by running the handy "VIC/64 Program Lifesaver,"* COMPUTE!'s Gazette, *November 1983.*

## 64 Mystery Bit

While browsing through the *Commodore 64 Programmer's Reference Guide*, I spotted something interesting on page 322 of the BASIC to machine language section. The description of the I/O assignment of location 53270, bit 5, is "ALWAYS SET THIS BIT TO 0!". I am curious to find out just what would happen if I didn't heed that warning. But I don't wish to risk my Commodore 64 in doing so.

J. Berger

*Have no fear — you cannot damage a computer with a bad poke or a "bug-infested" program.*

*To quote the instruction manual* (Personal Computing on the VIC-20) *included with the VIC, from page 80, "We want to repeat what we told you way back in chapter one:* There is no way you can hurt the computer by typing on the keyboard...not even with a POKE."

*You could, of course, damage it if you have a heavy touch on the keyboard, but as mentioned, a bad POKE to a wrong location will not permanently damage your VIC or 64. You can temporarily mess things up pretty bad if you don't know what you're doing. For example, turn your computer off, then on, and enter POKE 788,0 for the VIC or POKE 1,0 for the 64. These POKEs may lock up the computer, but if they do, simply press RUN/STOP-RESTORE to recover. If this doesn't work, turning your computer off, then on again, will completely reset it back to normal. Don't be afraid to experiment, it won't hurt. Just don't do so with any valuable programs in memory, or you may lose them if you have to turn the computer off to reset it.*

*As to your original question, we ran tests with bit 5 of location 53270 both off and on, and it seemed to have no effect. To be safe, leave it set at zero.*

## Fuzzy About Function Keys

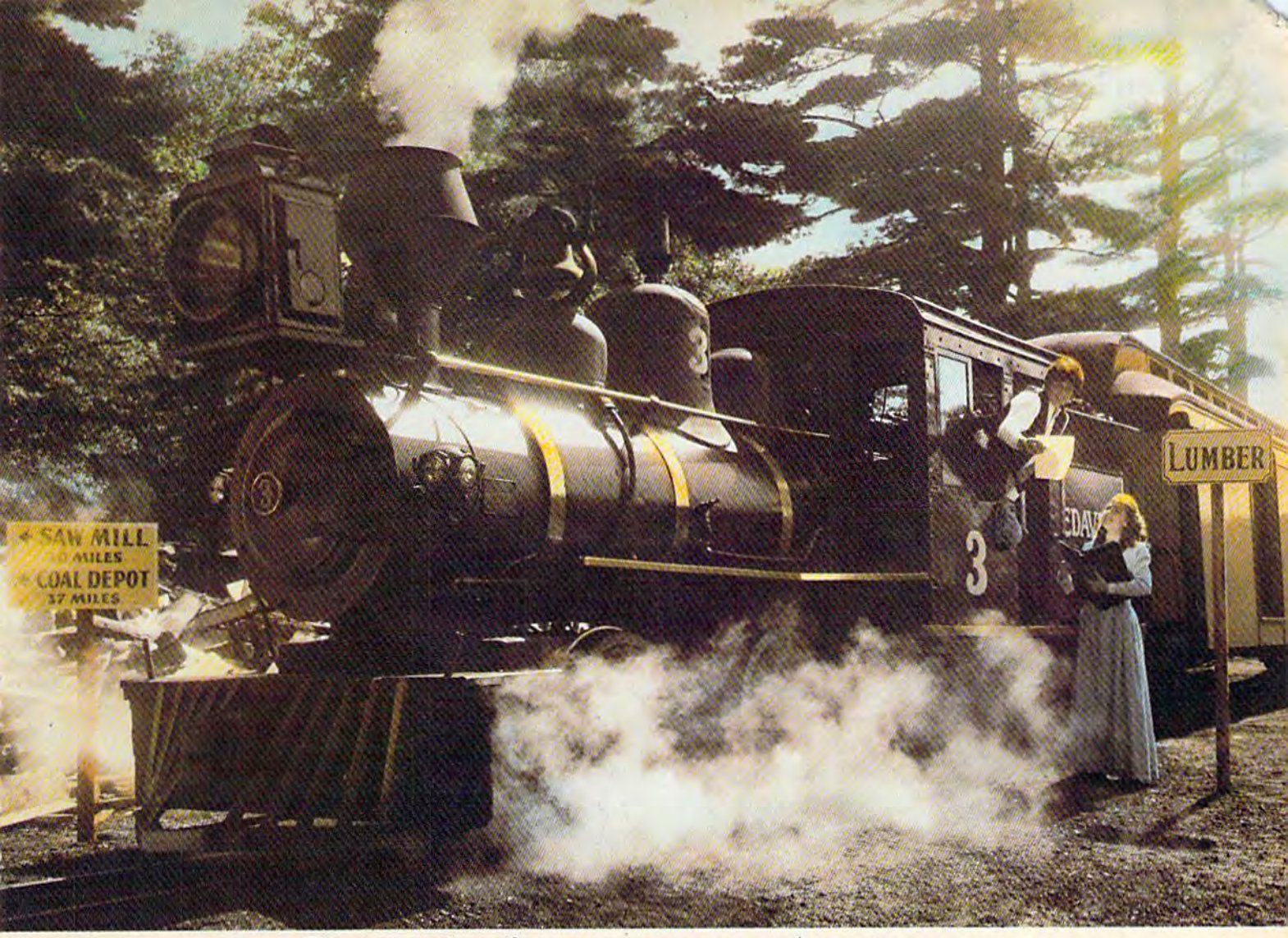
In your September 1983 issue of COMPUTE!'s Gazette, you had an article about how to use function keys. I didn't really understand it all that much, so I was wondering if you could send to me or publish a program using the function keys. I'll try to see if I can use the function keys properly:

```
10 PRINT "{CLR}PRESS FUNCTION KEY ONE (F1
   ) TO TYPE A{3 SPACES}CERTAIN NAME."
20 PRINT "WHAT IS THE NAME";
30 INPUT A$
40 PRINT:PRINT "NOW WHEN YOU PRESS F1, ";
   A$;" WILL PRINT ON THE SCREEN."
50 PRINT:PRINT "TRY IT NOW!"
60 GET B$:IF B$="{F1}" THEN PRINT A$
```

Is this the proper way to program the function keys?

Jack Farnsworth III

*Your program is very close, but if you RUN it, you'll see that A$ (the string variable containing the name) does not print on the screen when you press the f1*

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*function key. The program ends before it detects the keypress.*

*The solution is to program a* loop *— a series of instructions that keeps the computer constantly circling around, waiting for input. Add these lines to your program:*

```
60 GET B$:IF B$<>"{F1}" THEN GOTO 60
70 IF B$="{F1}" THEN PRINT A$
```

*Line 60 is the loop. The computer constantly executes line 60 as long as the condition is satisfied — that is, as long as B$ (the keyboard input) is "<>" or "not equal" to the f1 function key. When f1 is pressed, the condition is no longer met, so the computer continues to line 70. And line 70 prints A$, the person's name. Such loops are extremely common in programming. We suggest you reread the September article while sitting at your computer so you can type in and try the numerous programming examples.*

## VIC Games On The 64

I went to several computer and video stores and asked if you could play VIC-20 games on the 64. Their answer was no. Is there any way this is possible?

Thomas Maciejewski

*Yes, you can run some VIC programs on the 64. However, most, if not all, commercial games and programs will not.*

*Most noncommercial VIC programs will run if they are converted. Because the BASIC in the VIC-20 and the 64 is the same, it can remain almost untouched. The PRINT statements might have to be rewritten because of the difference in screen sizes of the VIC and the 64.*

*But the biggest task in conversion is with the PEEKs and POKEs. Because the VIC and 64's color memory, screen memory, sound chip memory, etc. are different, these conversions could be extensive, depending on how many PEEKs and POKEs the program uses.*

*Of course, there are some programs that simply cannot be converted. For instance, a sophisticated sound program written for the 64 cannot be converted because the VIC doesn't have the SID (sound interface device) chip found in the 64.*

## VIC Scrolling With POKEs

I own a VIC-20 and would like to know if you could list any POKEs that could be used to make the screen scroll up, down, right, left, and diagonally.

Jeremy Kropp

*There are two locations on the VIC-II chip that control the horizontal and vertical centering. The bytes (36864 and 36865 respectively) can be POKEd with different values to change the positioning of the screen. Although they offer only partial control of scrolling (you cannot scroll completely in all four directions), you can use them to create some interesting special effects.*

*Enter and then RUN this short sample program which will demonstrate the scrolling techniques:*

```
10 POKE36879,27:PRINT"{CLR}{DOWN} {BLK}SC
   ROLLING DOWN"
15 FORT=1TO500:NEXTT
20 FORA=25 TO 130: POKE 36865,A: FORT= 1
   {SPACE}TO 5: NEXTT: NEXTA
30 PRINT"{CLR}{DOWN} {RED}SCROLLING UP"
40 FORA=130 TO 25 STEP-1: POKE 36865,A: F
   ORT= 1 TO 5: NEXTT: NEXTA
50 FORT=1TO1000:NEXTT
60 PRINT"{CLR}{DOWN} {BLU}SCROLLING RIGHT
   "
65 FORT=1TO500:NEXTT
70 FORA=5 TO 50: POKE 36864,A: FORT= 1 TO
    10: NEXTT: NEXTA
80 FORT=1TO500:NEXTT
85 PRINT"{CLR}{DOWN} {BLK}SCROLLING LEFT"
90 FORA=50 TO 5 STEP-1: POKE 36864,A: FOR
   T= 1 TO 10: NEXTT: NEXTA
100 FORT=1TO1000:NEXTT
```

*Location 36864 normally contains a value of 5. POKEing integers larger than 5 into this location will scroll the screen to the right. If you POKE a value larger than 18, the screen will display garbage. Just POKE 5 to return the screen to normal.*

*The normal value in location 36865 is 25. POKEing a value larger than 25 will cause the screen to scroll down. The screen will seem to have disappeared with values of 130 and larger. Again, here you are also limited in that you cannot scroll up completely.*

*Diagonal scrolling can be accomplished using combinations of both 36864 and 36865.*

## Disk Drive Solutions

As a Commodore dealer in the province of Nova Scotia, I would like to respond to two items in the "Gazette Feedback" (August 1983).

• Disk drive conversion. Yes, the 1540 can be converted to a 1541 by replacing one ROM. We have had the 1541 conversion ROM for about six months (part #901229-01). There is also a conversion ROM to upgrade the 1525 printer to a 1525E to work with the Commodore 64.

• Dual drive lock-ups. We received a technical bulletin from Commodore indicating that the order of turning on the various pieces of equipment is important, besides changing the disk unit device numbers. The recommended order is as follows:

1) 64, 1541, 1525E.
2) 64, 1541, 1541.
3) 64, 1541, 1541 or 1525E (only one or the other may be on).
4) 64, 1541, 1541, 1526.

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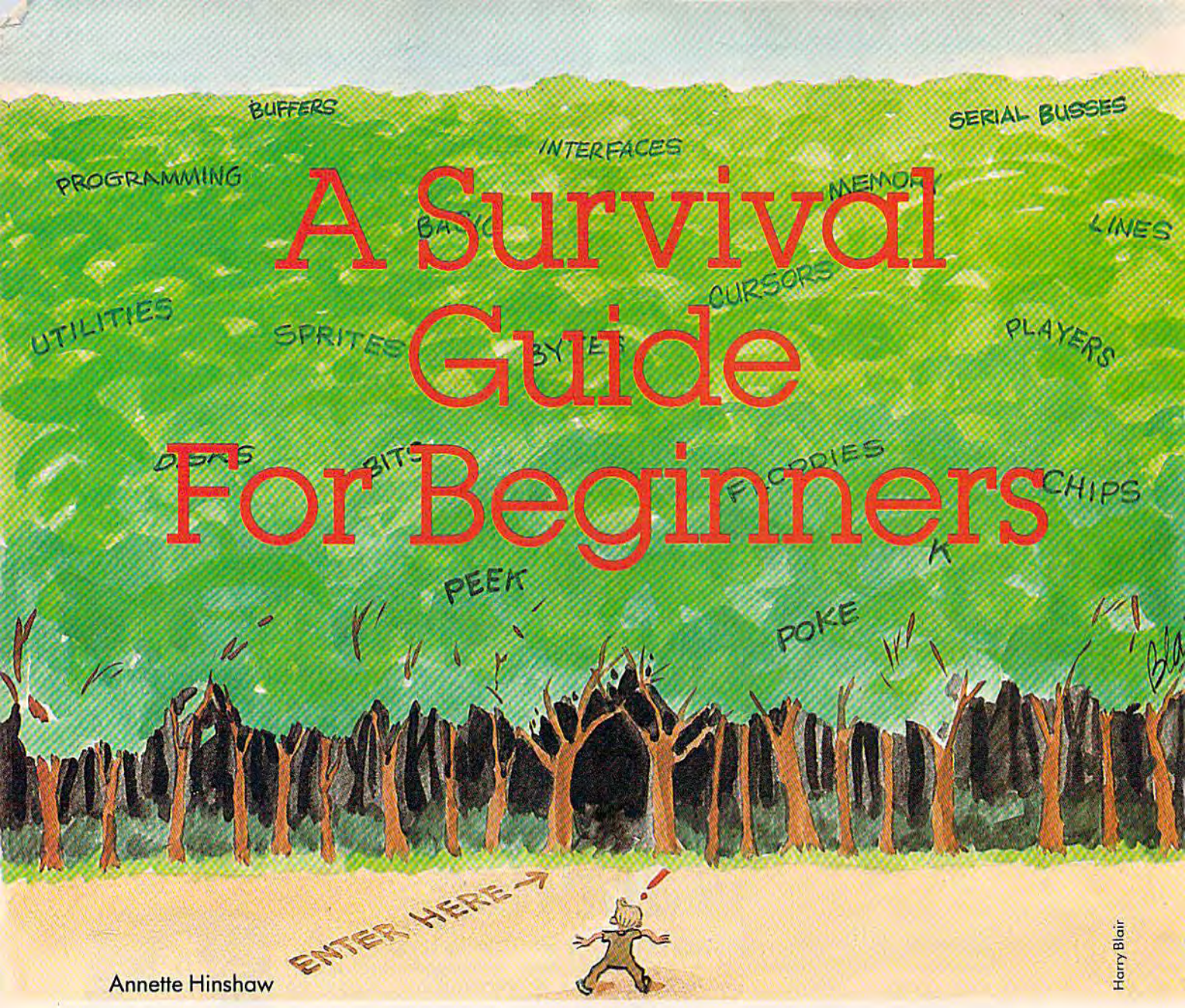


# A Survival Guide For Beginners

Annette Hinshaw

Harry Blair

**Computing can often be confusing and frustrating for people just getting started. Here are some tips and bits of advice to help sort out the confusion.**

With Commodore computers so inexpensive, many people who never before imagined owning a computer are buying them. When these computer novices get their equipment home, they inevitably find that making a computer do what they want it to is not always as simple as it looks. Hidden tricks and pitfalls seem to haunt newcomers. Whatever answers are in the book that comes with the machine escape them. Bewildered, they look around for help.

Help abounds. In fact, so much help is being offered to beginners that sometimes the problem is how to choose effectively from an array of classes, schools, books, magazines, and other sources of computer information. Fortunately, a little common sense and a look at the major sources of computer information help sort out the choices.

The first thing is to find out what you need to know. Most beginners need help in three areas:

**1. Computer Literacy/Consumer Education.** Prospective buyers or new computer owners wondering what to add to their systems need to know basic facts about what the machines will or won't do. General information on the pros and cons of different computer features or peripherals helps simplify purchasing decisions. Computer literacy information should provide immediately useful knowledge.

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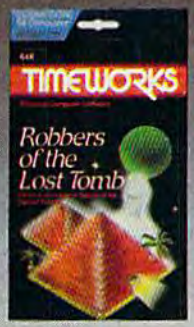


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- ☐ ColecoVision
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**2. Computer Programming.**
No one has to be a programmer to use and enjoy computers—ready-made programs are available for almost any task. However, even an elementary knowledge of programming helps beginners understand how the computer "thinks." With a little programming ability, they can better understand the possibilities and limitations of their new tools. They can become more skilled in programming if they want to and begin to modify or develop software for their peculiar needs.

**Those who are afraid their questions will sound stupid or silly shouldn't worry about it.**

Proficiency in programming requires time and practice. Not everyone is willing to invest in gaining it. But a beginners' programming class or self-teaching course is a good idea for newcomers, even if they don't pursue the skill to expertise. They can at least remove the mystique from programming and see for themselves what's going on inside their computers.

**3. Access to Operating Information.**
Beginners want to be able to find information on operating their computers as the need arises. If they can't make their printers work, or if they want to disable the RUN/STOP key, they need to be able to find out how to do it.

The best place to answer questions that are not in the users' manuals (or are buried where the novice has trouble finding them) is from a network of knowledgeable people. Second best (when you're looking for a particular answer) are books and magazines devoted to the computer involved.

Beginners should define the information they need as clearly and precisely as possible. The specific need is an important guide for choosing among available sources. Those who feel they don't know enough to ask a specific question, or are afraid their questions will sound stupid or silly, shouldn't worry about it. Almost all computer people have experienced similar problems and can often figure out what you want to know even when you can't define it yourself.

The rule of thumb for judging the value of any information source is twofold: First, ask "Do *I* need this information?" Second, ask "Can I *use* it?"

The second question is the most important. It doesn't matter whether a book or a class is good or bad. If you can't understand it, it's not useful to *you*. This is not because you are inadequate. More likely, it's beyond your stage of development or it's a poor source of information. You may grow into information above your skill level if your interests move in that direction. In the meantime, advanced material and poorly designed or inaccurate material may look the same to a novice.

New computer users should avoid anything—class, written material, or friendly advice—that doesn't make any sense at all. The information *must* include something you can effectively apply to your computer. You don't have to understand everything. If you can use a part of a class or a magazine article, you will eventually puzzle through the hard part if you persist. But the facts by themselves won't help unless they lead to actually *doing* something.

Computer classes are an obvious place to learn more about computers. Public schools and junior and four-year colleges are developing classes in adult (or continuing) education programs to meet the needs of the many new or prospective computer users. Some computer dealers and various private schools offer instruction; and local groups such as computer clubs, ham radio clubs, or the public library may sponsor classes as well.

Most classes offered in public education deal with computer literacy or beginning programming (usually in BASIC). Computer literacy courses can vary in scope. Some classes which purport to be for beginners include material that is useless or even discouraging to novices. A useful course will cover a basic vocabulary of words which are needed to learn about computers, such as *byte* and *software*. It will include discussions on what computers can do as well as some understanding of their limitations. The class also needs to address the trade-offs made from one machine to another on issues such as RAM memory, expandability, and availability of software and documentation.

A computer literacy class that spends significant time on the history of computers, binary math, or computer architecture is probably a waste of time for a newcomer. These subjects are valuable to advanced students; but for the novice, they can be discouraging because they reinforce the mistaken idea that understanding computers is only for the few.

Note that credit classes offered by colleges are not usually for beginners. A class called "Introduction to Computers" in a regular college curriculum may not deal with anything as small as a microcomputer. BASIC programming may require a strong math background. The classes

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*One player; Temple of Apshai, disk/cassette; Gateway to Apshai, cartridge, joystick control.*


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*Game Manufacturers Association, 1981

offered for real beginners, and especially home users, are usually noncredit.

A beginners' programming course is a worthwhile pursuit when it's designed for people who are really new to computers. Students are introduced to a few fundamental programming mechanisms and ideas such as variables, looping, and branching. They learn to use the most common "words" in computer language to write simple programs under the guidance of someone who can help when they get stuck. Seeing how the programs work (or don't work) educates newcomers in computer logic.

**Be suspicious of any programming class that does not have computers in the classroom or offer hands-on practice.**

A beginners' class shouldn't be too mathematical. It needs to cover basic math operators such as + and −, but not math functions such as SQR (square root) and ABS (absolute value). Almost all public education in computers has been handled by mathematicians, and even now some forget that trigonometric functions are not needed every day by most people.

Be suspicious of any programming class that does not have computers in the classroom or offer hands-on practice. Programming is almost impossible to learn as a theory, and the reinforcement by seeing how a particular program works when it is executed is essential to further understanding. Classes in schools are usually taught on whatever machine the school owns. When it's the same computer you have at home, the situation is ideal. When the machine is different, you should be prepared for frustrations. Programs written for the Apple usually don't work on the Commodore. However, computer logic is about the same in all home computers. Learning Applesoft BASIC when you have a VIC-20 is still better than not learning any programming at all.

Don't take a programming class if you don't have a computer that you can use outside of class. Programming is not a good introduction to computers unless it can be applied in personal use. Students who have a week between classes and don't practice in that time find that much of what they learn slips away between class periods. They may become discouraged or feel stupid. A computer literacy class is a better bet for people who haven't yet bought a computer.

Dealers' classes are often slanted toward the needs of their business-system customers. They are always machine-specific. A student can learn more about using his Commodore from a Commodore dealer than he can from a similar class in a school that uses TRS-80s.

Private or technical schools, especially those which teach only about computers, may be very responsive to the student's individual needs. They have to satisfy their customers because they continue to make a living by getting referrals and repeat business. They are sometimes expensive, though.

Miscellaneous groups vary a lot depending on the particular interests of the classes they sponsor. A Commodore users' group may offer the best programming class available for the VIC-20 or Commodore 64 owner. A ham radio club will probably offer strong hardware support. The public library may be able to get expert speakers on computer literacy.

When you're looking for an answer to a specific question, one of the best places to go is to a computer club. Such clubs bring together people with all levels of knowledge. Even experienced computer users come to clubs hoping to find sources for solving *their* computer problems. Within this information exchange network newcomers can usually find astonishing patience with their questions.

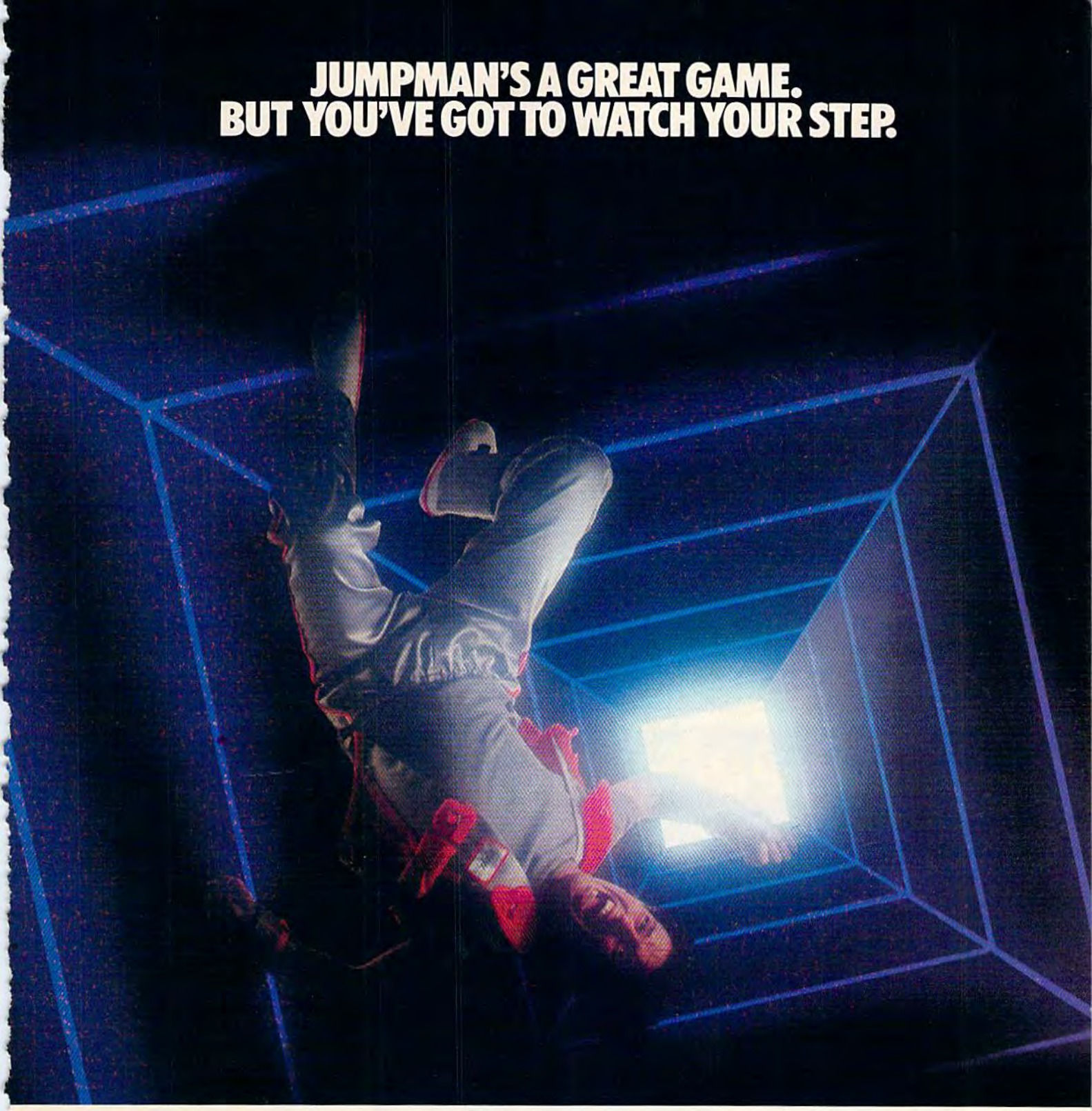
Computer clubs come in different flavors. A general club has the widest variety of members. It may lean toward hardware tinkerers or programmers. Sometimes the majority of the members will have a particular common interest, such as machine language programming or operating business computer systems. Again, you might want to shop around for a club that meets *your* interests and needs.

Finding computer clubs can be tricky, especially in metropolitan areas. Try asking the public library or the chamber of commerce. Check with any computer stores or electronic supply houses you can find. Ask anyone you know who has a computer, and check lists of local club meetings in newspapers and on radio and TV.

User groups or special interest groups (SIGs) are a more specific kind of computer club. Everyone in such a group will have one kind of computer, or be interested in a particular computer topic. Topics may range from computer languages like FORTH or LOGO to operating systems like CP/M to using computers for analyzing investments.

User groups for a particular machine are a major resource for beginners. The purpose of the

# JUMPMAN'S A GREAT GAME. BUT YOU'VE GOT TO WATCH YOUR STEP.



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*1983 C.E.S. award winner.

group is to exchange information and software for a machine that all members own. You may be able to find someone who has successfully interfaced his Commodore 64 with the printer you're thinking about buying. Someone there may have tried that piece of software that sounds so good in the ads. User groups are so valuable to beginners (and all others) that you should consider trying to start one if none has been organized in your town.

So many new book and magazine titles are appearing that a new computer owner can easily feel overwhelmed. Using the rule of thumb "Can I *use* it?" helps thin the selection. When you ignore the material on applications that don't interest you and leave out the things you can't use, you bring the information to buy or read down to manageable proportions.

In general, the more specific a publication is to your needs, the better. A book on programming games on the VIC-20 is usually more helpful than a book on designing computer games, at least at first. Magazines for Commodore machines will have more information for the Commodore 64 or VIC-20 owner than general computer magazines. A magazine that is meant for beginning to intermediate users may be more immediately useable than a magazine that caters to computer professionals.

Books, even more than magazines, are easier to use when they are for your particular machine. A general text on BASIC programming will have commands not found on the VIC-20, or which work differently on the Commodore than the book suggests. A collection of business programs which were written to run on the IBM will be hard for the inexperienced to convert to a different machine.

So much information is available on computers that newcomers may have trouble keeping a sense of perspective. All too often, they come to the computer world expecting to fail, assuming that computers require special education or talent. That may have been true once, when home computers had to be assembled by the buyer, and hardly any software was available. Nowadays, the new "friendly" computers can be used effectively by anyone who will invest some effort in learning how.

Novices should remember that there are no stupid questions about computers. Some computer expert asked the same question when he was a beginner. He reached his expertise by persisting, learning a little at a time, and getting help from others. You can too.

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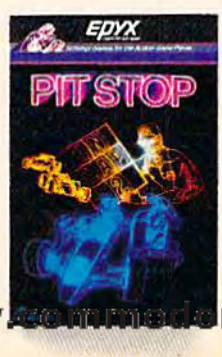


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See your retailer for available computer formats.

# Telecommuting:

# Dawn Of The Electronic Cottage

Gregg Peele, Assistant Programming Supervisor

**The invention of the telephone a century ago opened a new age of remote communication, weaving the world together with a network of wires. Today, the invention of the microprocessor is revolutionizing our communication system. One of the spin-offs may be a return to the decentralized living of yesterday—people working at home on remote terminals or microcomputers instead of battling the morning and evening rush-hour traffic into the city. As this article shows, "telecommuting" is becoming a viable alternative.**

From the barn behind his rural Wisconsin home, Rohn Engh publishes a newsletter that goes out to hundreds of people all over the nation. Published both on paper and in a new electronic edition, Engh's *THE PHOTOLETTER* pairs photo editors for magazines and other publications with photographers. Without microcomputers, Engh might still be caught up in metropolitan hustle and bustle.

Based in Osceola, Wisconsin, Engh left a big city to live and work in his slower-paced rural setting. In rustic surroundings, he has built his business from a small beginning to a newsletter with more than 1700 subscribers, each paying $75 per year. He feels that working at home has been not only profitable, but also has helped him strengthen family ties with his children. "In a time when many don't have time to participate with their children, our sons had us to be there for them."

To handle the accounting for his subscribers, Rohn Engh uses a Radio Shack TRS-80 Model II computer. Recently he put his newsletter on NewsNet, an electronic news and information service. Using his computer, he hopes to develop a network to connect thousands of photographers with his business.

Engh says the choice between pursuing a career in the big city or working out of his home in the country came down to a matter of opposing lifestyles: "I had to decide between making a living or making a life."

More and more people are making the same choice as Engh—to "telecommute" by computer from their homes instead of commuting by car or mass transit to the metropolis. Ironically, this computer-age phenomenon actually is a throwback to the decentralized work patterns of the pre-industrial age.

In the 18th century, before the Industrial Revolution, so-called cottage industries were common in agricultural areas where farmers experienced seasonal unemployment. In the winters,

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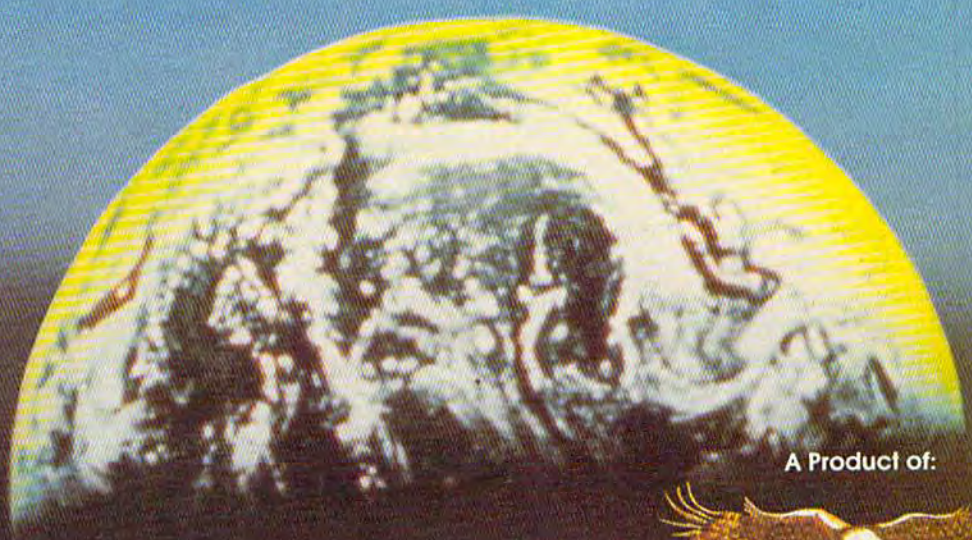

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they made ends meet by making consumer goods at home. Middlemen tried to coordinate this loosely organized network of home producers, supplying raw materials and equipment, and collecting and selling the finished goods.

As demand increased, and the number of domestic producers grew, supply, supervision, and distribution became more difficult. The widely scattered nature of this loose network, in an age before mass transportation, made it economically inefficient. During the Industrial Revolution it was replaced by the factory system—collecting workers under one roof. Industrialization, in turn, led to mass centralization and urbanization. Production became vastly more efficient, but new problems cropped up.

As most of us who lurch out of bed to an alarm clock and fight rush-hour traffic realize, modern society clings to the habit of collecting workers under one roof even though it doesn't always seem necessary. Think about your job. Could you do some or all of your work at home? What would you need in order to do so? Communication and information jobs, and jobs requiring thinking and creativity skills with very little capital equipment, could just as well be done at home as in a distant office.

We may soon see history repeating itself. "The electronic cottage," a term borrowed from the 18th-century cottage industries, describes the computerized home workplace. Only this time, the problem of widely scattered workers is being solved with electronic communication.

Hundreds of thousands of employees at banks, insurance companies, and other businesses already are using computers or computer terminals at work. Recently, some businesses have started using remote terminals to link employees in their homes to the main office computer. These workers, dubbed "telecommuters" by researcher John Niles, perform their duties without having to make the daily trip to and from the office. Telecommuting jobs vary from those which are clerical in nature (data entry, word processing) to those in professional categories (lawyers, stockbrokers, insurance agents, programmers). Then there are workers who are physically handicapped, or who need or prefer to work at home. These people find that telecommuting balances the necessity to earn a living with the advantages of working in their own dwelling.

The University of California at Berkeley's Melvyl Division of Library Automation is implementing a huge project designed to make the library's services available to home users. Employees working on this project have the option of working at home rather than at the university. Already, 200 terminals have been distributed throughout the school and in the project members' homes.

Mary Engle, system analyst for the computing resources group, believes that employees with home terminals can use their time much more flexibly. "Having a terminal at home allows the employee to avoid the early-morning California traffic and still accomplish the same amount of work," she says.

Although the workers are separated by many miles, Engle says that communications are actually more efficient. Messages can be left for workers and supervisors without them ever having to come in contact with each other.

*Rohn Engh and his wife, Jeri, using their computer in their barn/office. (Photo courtesy Robert Meier)*

Telecommuting, however, raises many issues, and one of them could slow a trend away from central workplaces: working at home with computers is likely to alter many entrenched ideas about employer/employee relations. For instance, the absence of employees from the central workplace forces managers to devise new means of supervision. How does a boss know if an employee working at home is taking a 30-minute coffee break or chatting with the neighbor about the weather? Possible solutions include requiring employees to report to the office occasionally, or to pay them based on the amount of work they complete.

One company experimenting with telecommuting, Blue Cross and Blue Shield of South Carolina, assigns work in its "Cottage Keyer" program according to employee seniority. Only those employees who have proven themselves dependable may work at home.

# COMPUTE! Books

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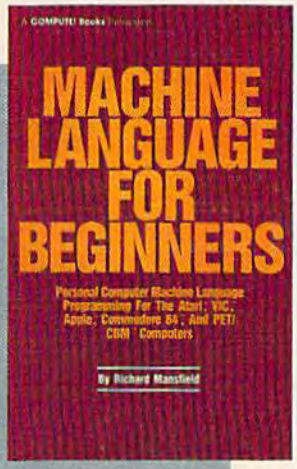


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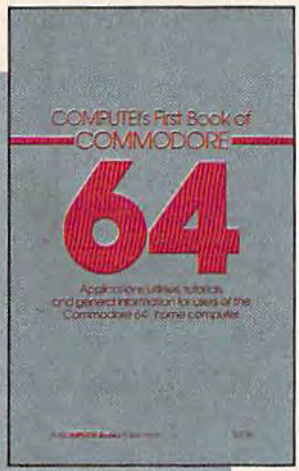


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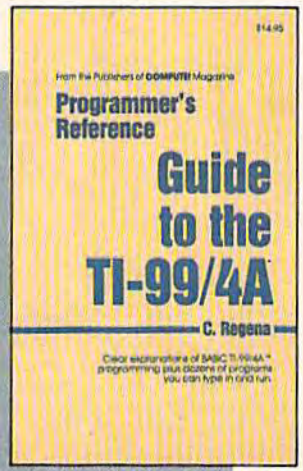


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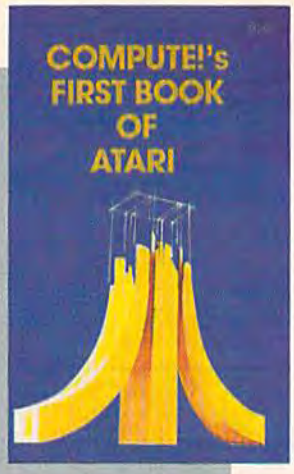


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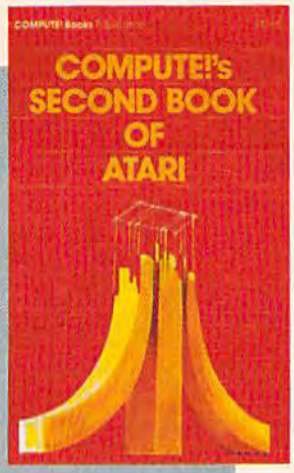


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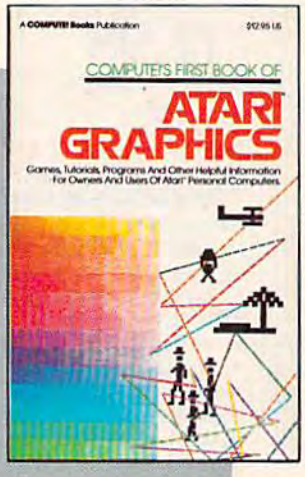


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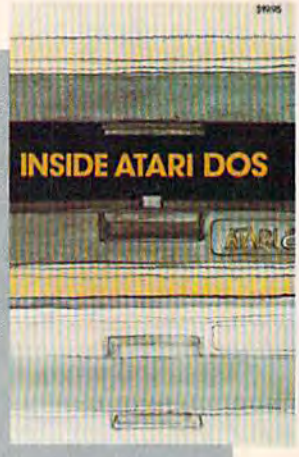


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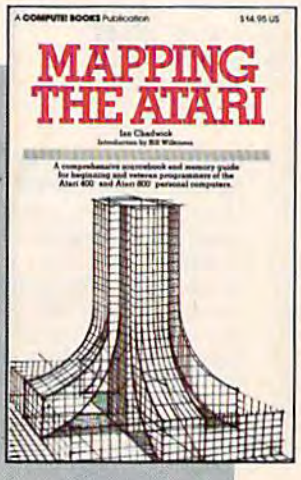


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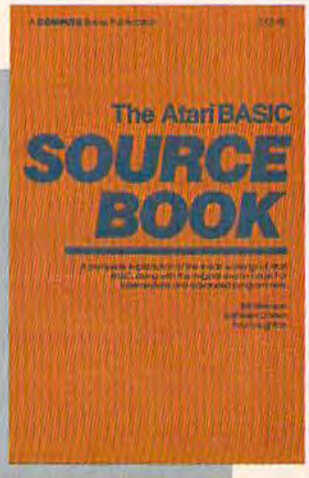


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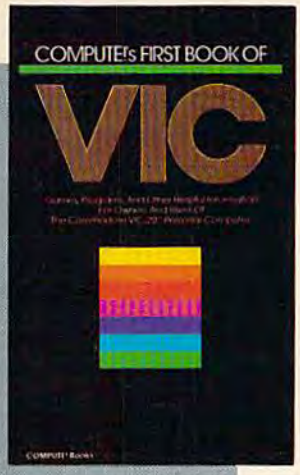


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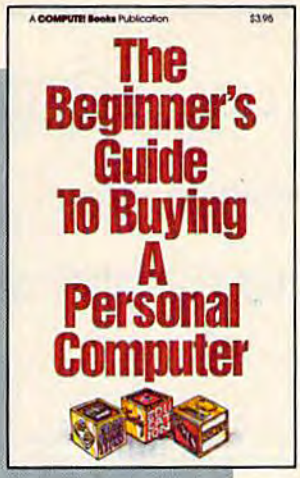


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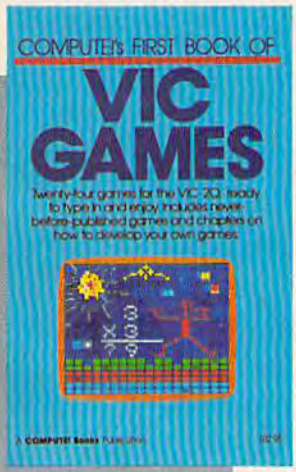


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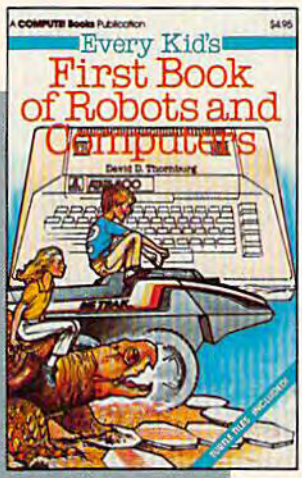


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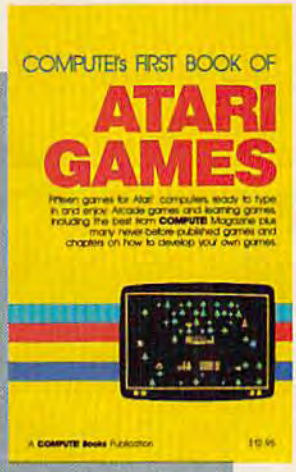


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Other large companies experimenting with telecommuting include Control Data Corporation and the Aetna Insurance Company. Seattle Public Health Hospital employs eight to ten telecommuters involved in medical research and application programming. Larry Rothenburg, operations director at the hospital, believes telecommuting is becoming more and more popular. "People do it all the time. Here, it's so common it's not a big deal." Hospital researchers use home terminals to compile information for their research projects. Even nonadministrative employees use terminals to help meet deadlines and complete work after regular hours.

Some professional people are using home-based computers to set up their own businesses, preferring the privacy and friendly atmosphere of the home to the frenetic pace of the city. James Ward, once managing director in charge of bond trading at Dillon Read and Co., a securities firm in downtown New York, is now using a computer at home to sell corporate bonds and securities. Computer technology has given him the tools to keep track of both the rise and fall of securities prices and his growing clientele.

As telecommuting spreads, some of its more subtle consequences will become increasingly clear. Besides transforming the traditional workplace, it could also dramatically change the role of the home in post-industrial society. There are inherent drawbacks and benefits, depending on your point of view. Here are some possible advantages and disadvantages of telecommuting:

*More efficient use of the potential workforce.* Lots of human resources are going to waste these days because it costs money to hold a job. Telecommuting can reduce some of these costs. For example, many families today need two incomes, but sometimes both spouses cannot work full-time jobs because it requires buying a second car and/or paying for professional day care for the children. If one spouse were a telecommuter, a second car might be unnecessary. Other work-related expenses also could be avoided—gasoline and maintenance for the second car, a new wardrobe of dress clothes, lunches downtown, etc. Day care expenses also might be avoided, since the telecommuting spouse could care for the children at home (admittedly, this could be a disadvantage, depending on the kids).

*Lower costs for employers.* The cost of adding new employees is usually less if the employees are telecommuters. In terms of equipment, the company would have to install a remote terminal or microcomputer and perhaps a desk and additional telephone line in the employee's home. This equipment would be necessary even if the employee worked at the central office. The company saves money by not having to provide office space. Consider how much money a business would save if it could expand operations without having to lease or build new offices on expensive downtown or suburban commercial property. Plus, it's that much less space to heat and cool.

On the other hand, some of these costs are shifted to the employee. Room that could otherwise be used for living space must be devoted to work space. People who turn down the heat or air conditioning when the house is empty during the day would have to maintain it at more comfortable (and more expensive) levels. However, it's possible that some of these expenses could be written off on income taxes.

*Changing social contacts.* Before the industrial age, most people's social contacts were based on proximity—out of necessity, their friends were their neighbors. Today, for the office-bound, the workplace is the most important source of social contact. If people work at home all day, perhaps alone, they might feel isolated. Since most of the dynamics of human relations is from our interactions with others, telecommuters may lack the social stimulation that office employees enjoy. They might even be forced to make friends with their neighbors. Of course, if other family members were at home during the day, the family unit might grow stronger. And someday, part of the youngsters' education might involve staying at home and using *their* terminals.

*More relaxed atmosphere, enhancing creativity and productivity.* Some companies see telecommuting as a means of making best use of employee creativity. "Many companies want their engineers to take advantage of creative ideas that they may have at home," says Chris Leach of Network Products in Raleigh, North Carolina, a specialized telecommunications networking firm. "If an engineer comes up at midnight with a brilliant idea that may save the company money, companies want to be able to take full advantage of that idea at its conception."

*Part-time versus full-time employment.* Some companies might find it more efficient to hire part-time telecommuters, perhaps on a contract basis, instead of extra full-time staff. Advantages: Again, the company saves money by avoiding the need for additional office space; the company pays less for salaries and benefits, including health plans and pensions; and more part-time jobs are opened up for people who cannot work full-time. Disadvantages: Part-time employees lose out on benefits, including health plans and pensions; and fewer full-time jobs are opened up for people who need them. These opposing interests are not unique to telecommuting, but they may be exaggerated by telecommuting if it makes part-time

hiring more attractive to employers than full-time hiring.

In addition to the above effects—which are more immediate and immediately obvious—widespread telecommuting could have significant impacts in other ways as well. Futurist Alvin Toffler discusses some of the fascinating possibilities in his landmark book *The Third Wave*. Telecommuting on a very large scale could reverse the trend toward centralization that started with the Industrial Revolution. In a post-industrial, decentralized society where workers are connected by telecommunications instead of transportation systems, there may be relief from such problems as decaying cities, overburdened urban services, traffic jams, energy shortages, pollution, and concentrations of overpopulation.

In the 18th century, working at home provided the best of both worlds—the opportunity to be near one's family and to gain the financial security of regular income. Today's telecommuters have that same opportunity, plus the exciting chance to be pioneers—awakening in their electronic cottages to the dawn of telecommuting.

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C. REGENA

# Computer Choreography

In previous columns I have written about graphics and music. (For the Commodore 64 refer to Chapter 7 of the *User's Guide* for music.) Combining graphics with music, which I call "computer choreography," can be a lot of fun.

## Synchronizing Sound With Graphics

After sound commands, we usually use a delay loop to play the sound for a certain length of time, then change the tone or turn off the sound. For example:

**VIC-20 version**

```
10 POKE 36878,15          Turns volume on.
20 POKE 36876,183         Plays a tone.
30 FOR D=1 TO 800:NEXT    Delays.
40 POKE 36876,0           Turns off tone.
```

**Commodore 64 version**

```
10 POKE 54296,15          Turns volume on.
11 POKE 54277,9           Sets attack/decay.
12 POKE 54278,128         Sets sustain/release.
20 POKE 54273,34:POKE     Plays a tone.
54272,75
25 POKE 54276,17          Sets waveform.
30 FOR D=1 TO 800:NEXT    Delays.
40 POKE 54276,16          Turns off waveform.
```

The above programs play a tone. Notice that while the computer is playing a tone it can also be doing something else. In this case the computer is performing line 30, counting to 800 for a delay loop. You could be making calculations instead. You could also be drawing graphics—using either PRINT or POKE statements.

Change line 30 above to:

```
30 FOR D=1 TO 40:PRINT TAB(D);"** HELLO **":NEXT
```

Now the computer prints a message 40 times while the tone plays. Try using different tones and printing different messages for a series of tones. Using the same idea, design a picture and PRINT graphics while you are playing music. Intermingle sound statements with graphics statements. You may still need delay loops to play the tones long enough.

I have enjoyed mixing graphics with music by drawing pictures to go with a song. If the song has words, you can make pictures appear exactly when appropriate with the lyrics. It takes a little practice, but soon you'll be able to judge how much you can


*Program 4 draws a holiday message while playing a carol. (64 version; VIC version similar.)*


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do between sound statements. It usually takes some experimentation to coordinate the graphics with the sound.

Try animation with music. Using PRINT statements or POKEing graphics, you need to erase an object in its old position and redraw it in its new position to make it appear to move. You could draw a background during introductory music, then draw a man and make him dance to the music.

With the Commodore 64 you can move sprites in your choreography. You may want to define your sprites while you're playing some music, then later, when it's appropriate in the music, make the sprite appear. Even later in the music you may want to move the sprite around. When you RUN the program, you will hear the music, but the computer is actually also defining sprites for later graphics.

If you have young children, you might try programming the music to some nursery songs, then adding graphics to draw the little characters or animals in the song. Draw a flag while you play a patriotic song. Use a song with a specific theme and draw objects to match the words. Compose your own music to go with a pretty scene of trees and mountains. Use your imagination to create your own choreographic production.

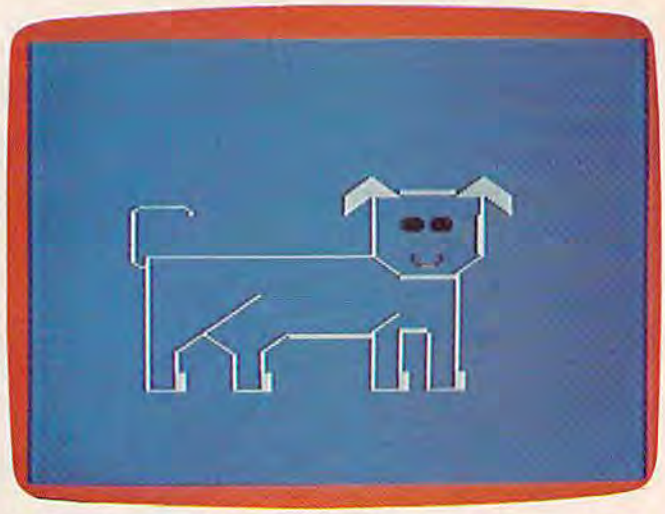
You don't have to be a musician to program music. Find some sheet music or get a book of popular songs. Usually the top note in the treble clef for each word of the song is the melody note. Translate the melody notes to numbers by using the charts in the *User's Guides* (tables of letter names of the musical notes with the corresponding POKE values). If you can't read music, get a beginning piano book (primer level). There are books of songs using single-note melodies with no accompaniment notes to worry about, and some song books have the names of the notes right with the notes.

You don't have to be an artist to program graphics. Scan children's coloring books for line drawings. You can probably find some really cute animals or objects that are quite easy to draw. Draw or trace the picture on graph paper, then match up the lines to the graphic symbols that are available on the computer. Another good source of pictures is in the sewing department of a store. Look for needlepoint or counted cross-stitch pattern books. These patterns are already drawn on squares, and you can use squares of different colors to create a picture.

## An Example Of Choreography

Program 1 (VIC version) and Program 2 (64 version) illustrate how it is possible to combine music with POKE graphics in a program nicknamed "Dog."

Lines 10-20 are preliminary statements to get ready to play music. Line 10 turns on the volume to level 15. In the 64 version the attack/decay and sustain/release parameters are also set. Line 20 defines



*Synchronizing graphics with sound, Program 1 draws a dog while playing a tune. (VIC version; 64 version similar.)*

variables so later we can POKE values into voice 1. This month's programs use only the melody note in voice 1. Feel free to add accompaniment voices.

Line 30 plays the first note of the song. I usually program all the music first, then later add the graphics by inserting graphics statements between the music statements—with a lot of experimentation to get the choreography right. In Dog I started the sound statements with line 30, then incremented the line numbers by 20 for each successive sound statement, so the sound statements are on lines 30, 50, 70, 90, etc. Delay loops are set up in lines 820-830. Depending on how long the note should be played, the command would be GOSUB 820, GOSUB 825, or GOSUB 830. To test the song, I used the GOSUB method to delay between notes.

The next step was to draw the graphics. I made a simple line drawing of a dog on graph paper representing the screen memory locations of the computer and using lines that are available from the keyboard. The code numbers for the graphics symbols are found in the Screen Codes table in the Appendix (pages 141-42 of the *VIC-20 User's Guide* and pages 132-34 of the *Commodore 64 User's Guide*).

The final step of choreography is to combine the graphics with the music. Just start inserting graphics statements between the music statements. The number of graphics statements between music statements will determine how long a note will be played, so you need to make sure you don't have too many statements causing unwanted delays. In the case of Dog, I drew the dog in several steps between music statements and still needed some of the delay loops in lines 820-830 to keep the music playing at the right tempo. This programming step is the crux of choreography, and you may need to experiment with several sequences to get exactly what you want.

Line 810 is GOTO 810 so the computer picture

stays on the screen without the READY message. To stop the program press the RUN/STOP key. Since I've changed the screen color for this program, you won't be able to read the printing, so press RUN/STOP and RESTORE at the same time to recover the original screen color.

If you have trouble running this program, check for typing errors. There are a lot of numbers to be typed, so that is the most likely place for errors. If you use the "Automatic Proofreader" (elsewhere in this issue) for entering these programs, you should be safe. All the DATA statements contain numbers for graphics and will contain pairs of numbers—a screen location and a character number to POKE. All of the graphics commands (line numbers divisible by 20 or lines not ending in zero) contain POKE with a screen location number (four digits) and a character number (two or three digits).

All of the sound commands in the VIC-20 version start with POKES (which is "POKE S" without the space), a comma, then a note number. In the Commodore 64 version the POKE commands for sound are POKESH and POKESL (for sound high and sound low).

Program 3 (VIC version) and Program 4 (64 version) are my Christmas presents to you for this December issue. This program can be used as an electronic Christmas card for your friends who own Commodore computers.

Lines 2 to 5 are the preliminary POKE commands to create music. Lines 6 to 8 contain the delay subroutines to play a note a certain length of time. Again, I first programmed the music, then inserted the graphics. This program illustrates the use of PRINTed graphics. The RVS ON is used to get a solid green square. Press RUN/STOP to end the program, then RUN/STOP and RESTORE to get back to the original screen.

Until next month—happy holiday season!

*See program listings on page 210.*

# HOTWARE

## A Look At This Month's Best Sellers And The Software Industry

Kathy Yakal, Editorial Assistant

### Commodore 64 Entertainment

| This Month | | Last Month |
|---|---|---|
| 1 | *Jumpman* (Epyx) | 1 |
| 2 | *Fort Apocalypse* (Synapse) | 4 |
| 3 | *Temple of Apshai* (Epyx) | 5 |
| 4 | *Frogger* (Sierra On-Line) | 2 |
| 5 | *Neutral Zone* (Access) | – |
| 6 | *Sword of Fargoal* (Epyx) | 6 |
| 7 | *Gridrunner* (HesWare) | 3 |
| 8 | *Supercuda* (CommData) | 8 |
| 9 | *Telengard* (Avalon Hill) | 7 |
| 10 | *Planetfall* (Infocom) | – |

### Commodore 64 Home/Business/Utility

| This Month | | Last Month |
|---|---|---|
| 1 | *WordPro 3 Plus/64* (Professional) | 1 |
| 2 | *Quick Brown Fox* (Quick Brown Fox) | 3 |
| 3 | *Inventory Manager* (Timeworks) | 4 |
| 4 | *PractiCalc* (Micro Software International) | – |
| 5 | *Money Manager* (Timeworks) | 5 |
| 6 | *Electronic Checkbook* (Timeworks) | – |
| 7 | *Household Finance* (Creative) | 7 |
| 8 | *PaperClip* (Batteries Included) | – |
| 9 | *TOTL.Text* (TOTL) | 6 |
| 10 | *Turtle Graphics* (HesWare) | 2 |
| 11 | *M File* (M Soft) | – |

### Commodore 64 Educational

| This Month | | Last Month |
|---|---|---|
| 1 | *KinderComp* (Spinnaker) | – |
| 2 | *Touch Typing Tutor* (Taylormade) | – |
| 3 | *Up For Grabs* (Spinnaker) | – |
| 4 | *Facemaker* (Spinnaker) | 1 |
| 5 | *Primary Math Tutor* (CommData) | – |
| 6 | *Alphabet Zoo* (Spinnaker) | – |
| 7 | *Typing Tutor* (Academy) | – |
| 8 | *Hey Diddle Diddle* (Spinnaker) | – |

### VIC-20 Entertainment

| This Month | | Last Month |
|---|---|---|
| 1 | *Gridrunner* (HesWare) | 1 |
| 2 | *Choplifter* (Creative) | 6 |
| 3 | *Shamus* (HesWare) | – |
| 4 | *Temple of Apshai* (HesWare) | – |
| 5 | *Kongo Kong* (Victory) | – |
| 6 | *Paratrooper* (Computer Mat) | – |
| 7 | *Exterminator* (Nüfekop) | – |
| 8 | *Robbers of the Lost Tomb* (Timeworks) | – |
| 9 | *Predator* (HesWare) | – |
| 10 | *Amok* (UMI) | 2 |

### VIC-20 Home/Business/Utility

| This Month | | Last Month |
|---|---|---|
| 1 | *Quick Brown Fox* (Quick Brown Fox) | 1 |
| 2 | *Turtle Graphics* (HesWare) | – |
| 3 | *HES Writer* (HesWare) | 2 |
| 4 | *HES Mon* (HesWare) | 3 |
| 5 | *Household Finance* (Creative) | 5 |
| 6 | *Home Office* (Creative) | – |
| 7 | *VIC Forth* (HesWare) | – |

### VIC-20 Educational

| This Month | | Last Month |
|---|---|---|
| 1 | *Touch Typing Tutor* (Taylormade) | 2 |
| 2 | *Type Attack* (Sirius) | – |
| 3 | *English Invaders* (CommData) | 4 |
| 4 | *Hangman/Hangmath* (Creative) | – |
| 5 | *Gotcha Math Games* (CommData) | – |

# Best Of The 1983 Best Sellers

**In the five months that HOTWARE has been tracking the software industry for Commodore 64 and VIC-20 computers, some programs have consistently won high positions. Here's a look at those programs and at the new structure this market is beginning to develop.**

## Commodore 64 Entertainment

**First Place:** *Jumpman* (Epyx)

| | |
|---|---|
| December | 1 |
| November | 1 |
| October | 1 |
| September | 1 |

**Honorable Mention:** *Temple of Apshai* (Epyx)

| | |
|---|---|
| December | 3 |
| November | 5 |
| October | 4 |
| September | 3 |
| August | 1 |

## Commodore 64 Home/Business/Utility

**First Place:** *WordPro 3 Plus/64* (Professional)

| | |
|---|---|
| December | 1 |
| November | 1 |
| October | 1 |
| September | 1 |
| August | 3 |

## Commodore 64 Educational

**First Place:** Spinnaker

| | | |
|---|---|---|
| December | 1 | (*KinderComp*) |
| | 3 | (*Up For Grabs*) |
| | 4 | (*Facemaker*) |
| | 6 | (*Alphabet Zoo*) |
| | 8 | (*Hey Diddle Diddle*) |
| November | 1 | (*Facemaker*) |
| | 2 | (*Kids On Keys*) |
| October | 1 | (*KinderComp*) |
| | 2 | (*Facemaker*) |
| | 3 | (*Hey Diddle Diddle*) |
| September | 2 | (*KinderComp*) |
| | 3 | (*Facemaker*) |
| | 4 | (*Hey Diddle Diddle*) |

## VIC-20 Entertainment

**First Place:** *Choplifter* (Creative)

| | |
|---|---|
| December | 2 |
| November | 6 |
| October | 1 |
| September | 1 |
| August | 1 |

**Honorable Mention:** *Gridrunner* (HesWare)

| | |
|---|---|
| December | 1 |
| November | 1 |
| October | 3 |
| September | 3 |
| August | 7 |

## VIC-20 Home/Business/Utility

**First Place:** *Quick Brown Fox* (Quick Brown Fox)

| | |
|---|---|
| December | 1 |
| November | 1 |
| October | 8 |
| August | 1 |

## VIC-20 Educational

**First Place:** *Touch Typing Tutor* (Taylormade)

| | |
|---|---|
| December | 1 |
| November | 2 |
| October | 2 |
| September | 3 |

## Best Of The Best Sellers

Our year-end "Best Of The Best Sellers" is based on the last five months of 1983, not the entire year (HOTWARE debuted in August). It would have been difficult to rank Commodore 64 software before summer anyway, since there was not a great deal available.

Keep in mind that HOTWARE is based on actual unit sales figures obtained from participating retailers and distributors across the country. The rankings are not subject to editorial bias and do not represent a judgment of quality.

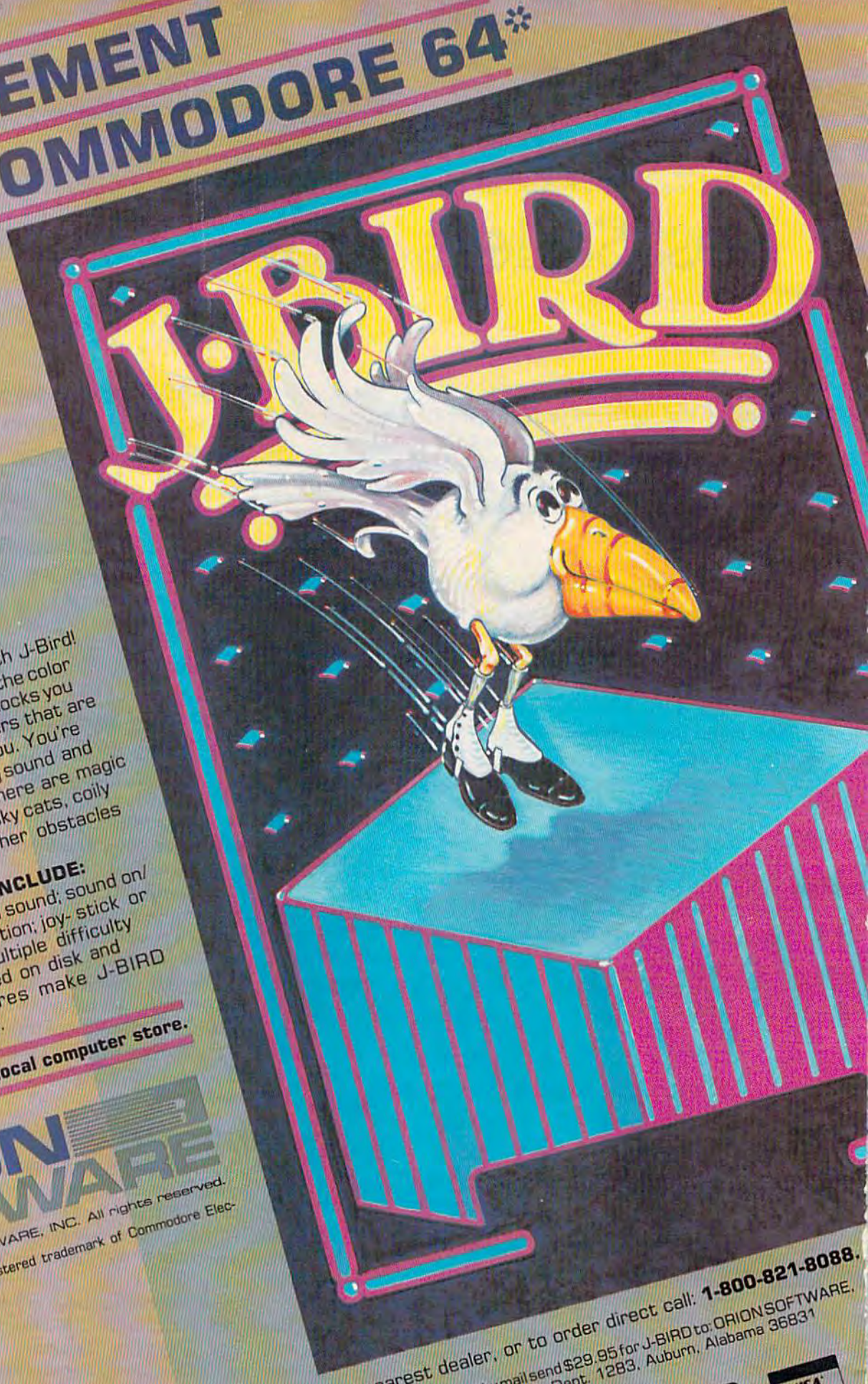
This month, we talked to some of the designers and distributors of these best sellers to find out why they think their programs have done so well, and what trends they see carrying over into 1984.

## Divisions Of Labor

When a new industry emerges, its first products are usually conceived, manufactured, marketed, and sold by the same person or a small group of people. Eventually, when demand for the product becomes greater, its producers must take on more specialized jobs.

The software industry is beginning to develop that kind of structure. "It's not a cottage industry anymore," says Jim Connelley, a game designer for The Connelley Group in Mountain View, California.

# NEW EXCITEMENT FOR COMMODORE 64*

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The Connelley Group is a good example of this evolution. Connelley founded Epyx Software a few years ago to produce and market microcomputer software. *Temple of Apshai* was one of those programs. "But as the company grew, I found I had little time left for product development," says Connelley. "The people who started the industry had to do a little bit of everything."

Now, Connelley and nine other game designers work in a think-tank type of environment. They spend their time conceptualizing and designing games for several different software publishers. They *don't* spend their time in marketing. Or sales. Or production. Just designing.

"The corporate environment is different from the think tank. We're trying to create a very creative environment here," explains Connelley. "The industry is moving toward a structure where there are advantages to separating authors from publishers. It almost had to happen."

## Going It Alone

The new division of labor Connelley refers to is becoming more evident in the structure of many major software houses.

An exception to what is fast becoming the rule is Taylormade Software. Its *Touch Typing Tutor* has enjoyed a good deal of success; both the VIC-20 and Commodore 64 versions have held high positions on the HOTWARE list for the last several months.

Taylormade is not your typical East or West Coast software company. It's located in the Midwest — Lincoln, Nebraska — and it's basically a one-person operation: Marion Taylor, who has been programming computers for 28 years. "It's nice to know that one person can still do it alone," she says.

It might seem a bit strange that a typing tutorial would outsell programs dealing with more traditional educational subjects. Taylor thinks it makes a lot of sense. "One of the most popular uses of home computers is word processing," she notes. "Before you can do that, you have to learn to type. In fact, anything you use a computer for requires some knowledge of the keyboard."

Taylor attributes the success of her particular typing program to its wide age appeal and lesson-type format. "*Touch Typing Tutor* appeals to people from eight to 80," she says. "Its 19 lessons make use of color and an actual keyboard display to help teach you not to look at the keyboard while you're typing. And it's not a game — educational programs don't have to be game-like to appeal to people."

## More Depth

*Jumpman*, which didn't even appear in August HOTWARE, leaped to the Number 1 position in September and has remained there ever since.

Randy Glover, who designed this best-selling game for Epyx Software, believes he knows why it's been such a success: "Depth of play. Some games look real nice and are fun for a while, but they don't ever really change. *Jumpman's* many levels provide great playability."

We awarded an Honorable Mention in the Commodore 64 entertainment category to *Temple of Apshai*, another Epyx game. *Temple* is a graphics/text adventure that requires great player involvement.

"It's a one-of-a-kind game," explains Glover. "It gets you very involved with your character, and you want to succeed with it. It also has a very long play time."

Glover believes the next year will see greater popularity for games which involve a lot more time and thought.

In addition, the more powerful personal computers, such as the Commodore 64, can support more complex programs. "A computer with 64K memory and a disk drive allows you to store and retrieve an enormous number of situations, like those in *Temple*," says Glover. "We will continue to make both kinds of games — arcade games and those with more depth — as long as people want them."

## Other Trends

Here are some more trends that seem to be developing in the volatile Commodore software market:

- Full-line software houses. Many companies that started out publishing only one kind of software, such as games, are starting to branch out and find success in other areas. HesWare, Creative Software, and Sirius Software are examples of this.
- Commodore dealers are finding it increasingly difficult to compete with mass retailers and discount stores selling Commodore hardware and software at very low prices. Some dealers have stopped stocking the line entirely and have gone back to concentrating on business systems; some are trying to stay in the market by providing more service and support to customers.
- Competition is really heating up in the area of word processing packages. A large percentage of computer owners want to use their machines for word processing, and there are plenty of good programs available. Expect to see the best-selling programs in this area scramble as new ones enter the market.
- Software manufacturers are still trying to determine the most popular format for their products: disk, tape, or cartridge. Disks seem to be preferable — retailers are surprised at the tremendous number of Commodore owners who are adding disk drives to their systems.

# The Inner World Of Computers

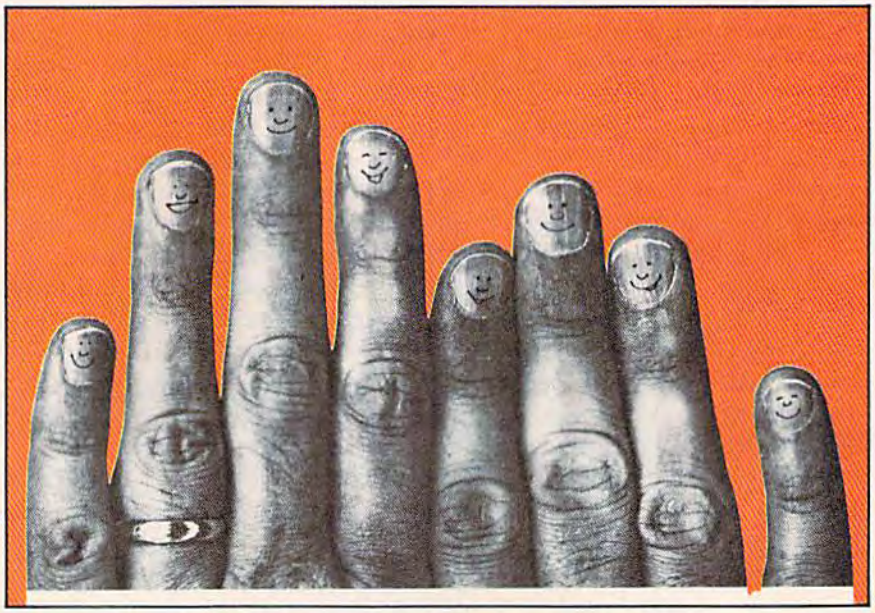
## Part 2: Why Computers Are Logical

Tom Prendergast

**Do you ever wonder what happens after you type RUN? What goes on inside the computer? How a machine can "think" just by manipulating numbers? This series shows how computers work by explaining computer math in a nontechnical way. It's especially recommended for those who are following our monthly column "Machine Language For Beginners."**

We got some flak on last month's article telling about the magic patterns used by the little ELFS (ELectronic FingerS) to set tiny electronic switches inside the computer. The big complaint was that we didn't show any proof for the existence of the ELFS—just a drawing.

Sorry about that. Like all magical folk, ELFS are invisible, and we had to draw on our imagination. To the best of our knowledge, no one had ever seen an ELF, but just as we were about to give up hope of ever being able to present any hard scientific evidence, we got a nice long letter from an ELF thanking us for giving her family this long-delayed recognition. She enclosed a photo taken at a recent family picnic and the letter was signed "Anne Elf," so it must be authentic. We can't reproduce the letter because it was written in invisible ink, but the picture should give you a pretty good idea of what real ELFS look like.



*Rare photograph of ELFS gathered for a byte at family picnic.*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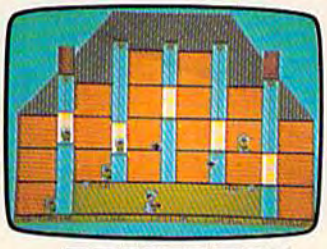

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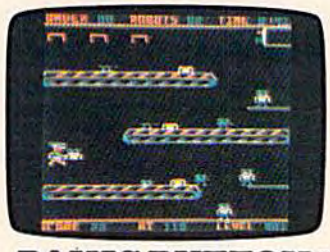

### PANIC BUTTON™

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Vic-20 Home Computer by Wayne Lam



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Another complaint was that the "magic patterns" we showed were nothing but sugar-coated binary.

OK, we admit that. We never said we weren't trying to teach you binary. But whether you want to call them magic patterns or binary patterns, the more you know about how the tiny electronic switches are turned on and off inside your computer, the better you'll be able to understand how a computer "thinks."

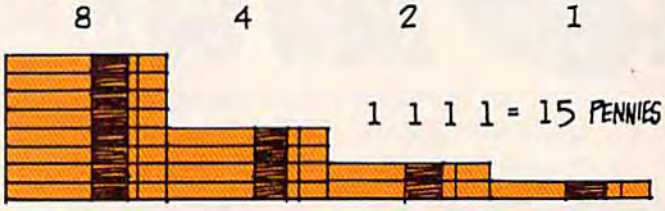
Years ago when computers were the size of a barn and had big banks of switches in front instead of a keyboard, the operators had to plan how to turn all those switches ON or OFF at various times while the computer was running. Finally, some genius—probably John Atanasoff—noticed that the little marks they'd jotted down for the different switch settings resembled binary, and presto!—computer programming was born.

Computers have shrunk a lot in size since then, but how a computer computes hasn't changed. You may think your VIC or 64 is adding 2+2, but the little ELFS inside are turning tiny microswitches ON and OFF like this:

| Switch Patterns: | Off | Off | On | Off |
|---|---|---|---|---|
| | +Off | Off | On | Off |
| Binary = | 0 | 1 | 0 | 0 |

If you worked with the "15-cent computer" last month (15 pennies in piles of 8,4,2, and 1) you'll know that 0100 is 4 (decimal) in binary.

**Figure 1: The "15-Cent Computer"**




The "8421 code" as it's sometimes called is enough to represent 16 different switch patterns (if you count 0000 as one of the patterns):

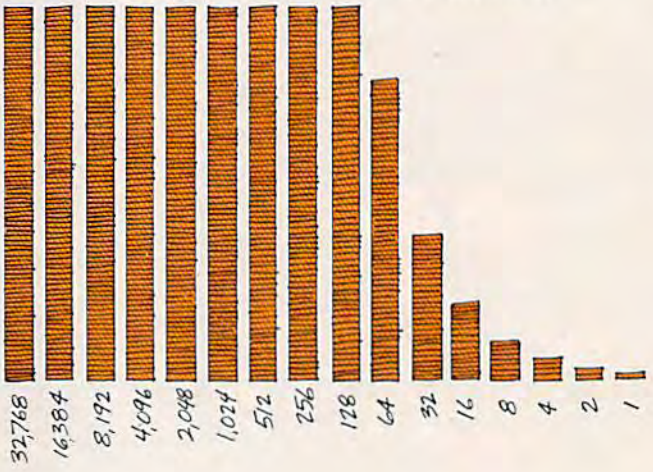
0000
0001
0010
0011
0100
0101
0110
0111
1000
1001
1010
1011
1100
1101
1110
1111

The VIC's color ROM uses these kinds of four-bit *nybbles*, and BCD (Binary Coded Decimal), which I won't confuse you with this month, uses *pairs* of nybbles, as does hexidecimal.

But the VIC and 64 use 16 bits for the AND, OR, and NOT operations we're going to show you. What are we going to do?

We could extend the penny idea to 16 places, but that would cost us $655.35—65,535 pennies, to be exact—because binary values double like rabbits every step to the left. We'd have 32,768 pennies in our leftmost pile, 16,384 in the next, and so on.

**Figure 2: Pile Of 65,535 Pennies**

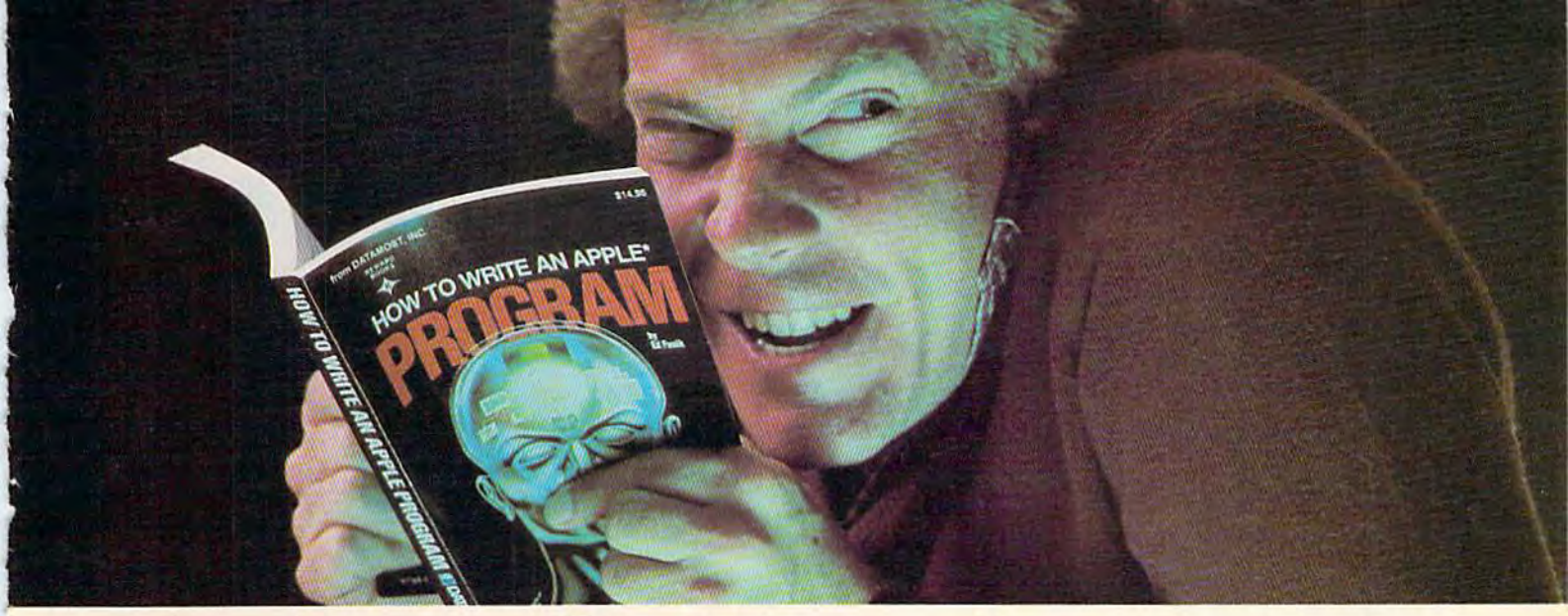



Fortunately, pennies are binary (all coins are, because they have two sides). If we agree that heads means ON and tails means OFF, flipping a penny over turns that particular switch ON or OFF. Let's begin with eight pennies because a BYTE (BinarY uniTs of Eight) is enough to demonstrate most of the patterns we're going to AND and OR (see Figure 3).

Notice that we've called 10000000 a pattern and not a binary number. Computers don't understand numbers, remember? Not even binary. And when you AND, OR, or NOT, you manipulate the individual bits—with no carries or borrowing—because AND, OR, and NOT aren't arithmetical operations.

The trouble with most computer books and manuals is that they throw binary and other complicated stuff at you before you're ready for it—things like "truth tables" and those weird diagrams of "logic gates" with arrows pointing every which way.

Take this, for instance, from the manual for the PET (it's repeated almost word-for-word in the *VIC-20 Programmer's Reference Guide*—so they must think it's a pretty good explanation). Actually, it's a very clear technical explanation, but that's the trouble—it's too technical. I'm a couple

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of years into computing and on my third computer, but I didn't have the haziest idea of what they were driving at until recently:

"Logical operators work by converting their operands to 16-bit, signed, two's-complement integers... The given operation is performed on these integers in bitwise fashion, i.e., each bit of the result is determined by the corresponding bits in the two operands.

"Thus, it is possible to use logical operators to test bytes for a particular bit pattern. For instance, the AND operator may be used to 'mask' all but one of the bits of a status byte...the OR operator may be used to 'merge' two bytes to create a particular binary value...and the NOT operator to form the two's complement of the bits of an integer plus one."

All right, so I knew that NOT, AND, and OR are *logical operators* — although sometimes they seem as logical as Alice in Wonderland. (*Alice in Wonderland*, by the way, was written by an English mathematician who was using Boolean logic long before computers were invented.) The *arithmetical operators* are +, *, −, and /, the signs for addition, multiplication, subtraction, and division; and the binary being operated on by the logical or arithmetical operators are the *operands*.

**Figure 3: A Byte With One Bit Switched On**

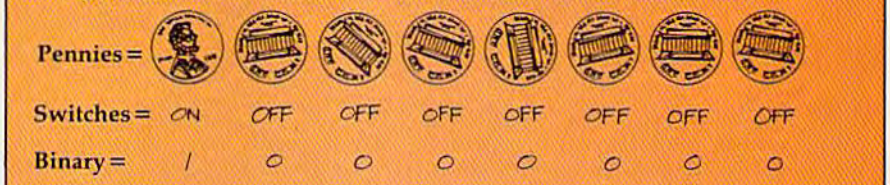



**Figure 4: A Byte Holding The Screen Code For Letter A (65)**

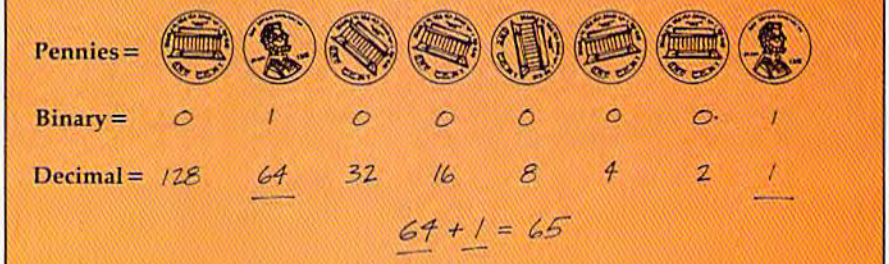



**Figure 5: 65 AND 128 = 0**

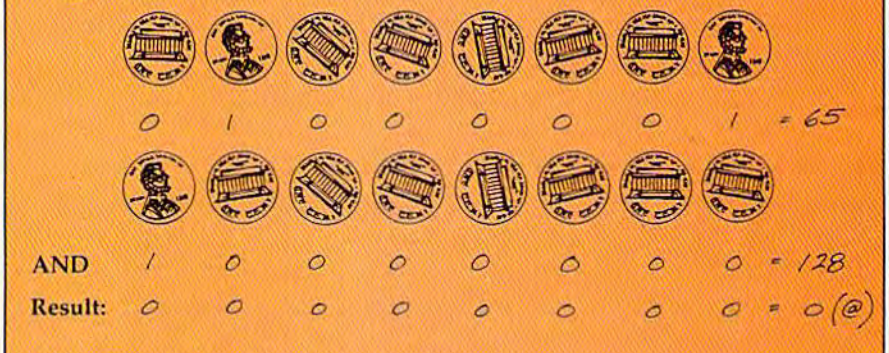
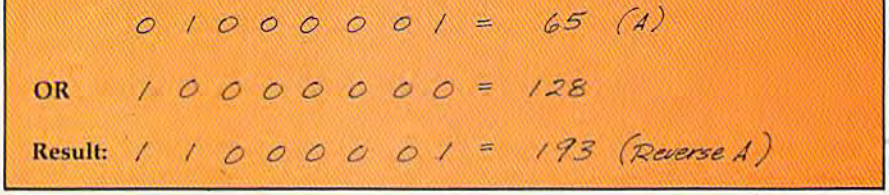



**Figure 6: 65 OR 128 = 193**




But here you are wading through all this "16-bit, two's-complement" stuff when all you wanted to find out was how a simple game program works! A line like this, for instance,

```
POKE 7724, PEEK(7724) AND 128
```

is an example of the *bit masking* they were talking about, so let's work through it bit by bit. The POKE 7724, PEEK(7724) is to read the pattern currently stored in the VIC's screen RAM at memory address 7724, and not the number 7724 itself. Let's say the pattern is the one that calls up the screen code for the letter A — 65. So we lay out eight pennies with their heads or tails like those in Figure 4.

The A will be ANDed with 128 so we put our second byte of eight pennies like those in Figure 5. AND is interested only in matching 1's and it ignores everything else. As you can see, no 1 in the top byte matches the lonesome 1 on the bottom, so the little ELFS switched every bit off—to zero. The letter A turns into the screen code for an "at" symbol: @.

An easy way to remember how the AND operation works is to think of all the straight lines making up the letters in AND as 1's, so that 1 AND 1 produces 1.

The OR operation on the letter A would look like those in Figure 6.

The OR operation works with 1 OR 0. If one bit is a 1, or both bits are 1, the result is a 1. 0 OR 0 results in 0.

By the way, don't confuse the inequality symbol <> with NOT. A line like "IF X<>15 THEN..."

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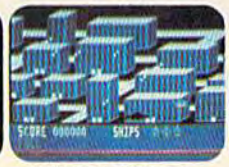

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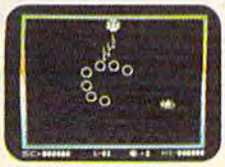

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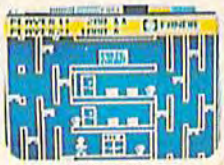

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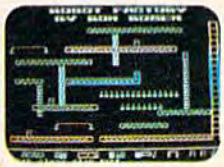

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should be read as "If X isn't equal to 15 then...."

NOT reverses every bit in a byte to its opposite. NOT 1 produces a 0, NOT 0 produces a 1. To put it simply, if you NOT 128, you flip every switch ON that was OFF, and every switch OFF that was ON:

NOT 10000000

Result: 1111111101111111

What's not so simple is that you end up with a minus result (−129) because, as it says in the manual, logical operators convert their operands to "16-bit, signed integers" and the 16th bit on the left does double-duty as a "sign" bit. A zero in that slot indicates that the number is positive, and a one indicates it's negative. This can get you into a whale of a lot of trouble if you're not careful, because you'll end up with an ILLEGAL QUANTITY ERROR.

NOT is useful to undo something you've done when combined with AND, as in: AND NOT 128. But you're probably confused enough as it is, so rather than go into the whys and wherefores of this, let's get to the keyboard and try a simple program demonstrating OR, AND, and AND NOT. Use Program 1 for the VIC and Program 2 for the Commodore 64.

(Note: If you've added memory to your VIC, the following line should be substituted for line 5:

```
5 PRINT CHR$(147):SC=4*(PEEK(36866)AND 128)
```

This relocates the start of screen memory, 7680 on the unexpanded VIC.)

## Program 1: VIC Version

```
5 PRINTCHR$(147):SC=7680                :rem 205
10 PRINT"{RVS}{RED}AMERICA THE BEAUTIFUL"
                                        :rem 212
20 FOR DELAY=1TO2000:NEXT               :rem 4
30 FOR I=1TO4:PRINT"{BLU}******{RED}
   {16 SPACES}{BLU}******":NEXT         :rem 174
40 FOR I=1TO7:PRINT"{RED}{22 SPACES}{WHT}
   :NEXT:FOR DELAY=1 TO 2000:NEXT       :rem 59
50 FOR I=0TO285:POKESC+I,PEEK(SC+I)OR128:
   NEXT                                 :rem 24
70 FOR I=0TO285:POKE SC+I,PEEK(SC+I)AND N
   OT 128:NEXT                          :rem 61
80 GOTO5                                :rem 214
```

## Program 2: 64 Version

```
5 PRINTCHR$(147):SC=1024:POKE53281,1
                                        :rem 136
10 PRINT"{RVS}{RED}AMERICA THE BEAUTIFUL"
                                        :rem 212
20 FOR DELAY=1TO2000:NEXT               :rem 4
30 FOR I=1TO4:PRINT"{BLU}******{RED}
   {34 SPACES}{BLU}******":NEXT         :rem 174
40 FOR I=1TO7:PRINT"{RED}{40 SPACES}{WHT}
   "                                    :rem 8
45 NEXT:FOR DELAY=1 TO 2000:NEXT        :rem 132
50 FOR I=0TO519:POKESC+I,PEEK(SC+I)OR128:
   NEXT                                 :rem 24
70 FOR I=0TO519:POKE SC+I,PEEK(SC+I)AND N
   OT 128:NEXT                          :rem 61
80 GOTO5                                :rem 214
```

Lines 5 to 40 set up the title AMERICA THE BEAUTIFUL and the stars and stripes for the flag. Notice that the stars, however, are not reversed; they're blue stars on a white background. (The DELAY loop at the end of line 40 gives you time to observe this.)

Now the OR in line 50 reverses the stars to white on a blue background. Line 60 starts with a REM statement, so the ELFS ignore the instructions for the moment and jump to line 70, where the AND NOT undoes what the OR in line 50 did—reverses the reverses—and line 80 sends the program back to the beginning.

After you've run the program for a few minutes, hit the RUN/STOP and RESTORE keys. This interrupts the program. Now type LIST 60. When line 60 appears, put the cursor on the F in FOR and press the INST/DEL key four times to delete the REM. After you've hit RETURN to register the line change in program memory, type RUN and RETURN.

When the program is running this time, line 60 is not ignored, so the AND in line 60 changes the POKE value of every character or graphic that's been printed to zero, producing the symbol @ where stars or stripes were before.

Using AND or OR with word strings is limited pretty much to an either/or type of operation. If you have a line such as IF Y$="YES" OR Y$="Y" THEN, either the full word or just the first letter of "YES" would be an acceptable input and the program would carry out whatever follows the THEN.

If the line were IF Y$="YES" AND X=1, both statements would have to be true for the program to proceed.

The computer can evaluate any expression and return a number. For example, the expression 5<4 will give a zero (try PRINT 5<4). The expression 5>4 is true, and is equivalent to −1. You can embed an expression within a calculation to make use of the 0 or −1. For example:

```
V=(J+1)*-(J<2)
```

If the variable J was equal to 3 at this point in the program, the resulting arithmetic would be:

```
V=(3+1)*-(3<2)
or
V=(4)*-(0)
or
V=0
```

If J equaled 1, the arithmetic would be:

```
V=(1+1)*-(1<2)
or
V=(2)*-(-1)
or
V=2
```

See you next month with more about ELFSwitches and hexadecimal.

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# Getting Started With A Disk Drive

## Part 2: First Steps

Charles Brannon, Program Editor

**After a brief discussion of why you should make backup copies of important disks — and why some disks cannot be copied — we'll show you exactly how to get started with your new 1541 disk drive.**

Last month, we discussed why it is so important to make backup copies of your disks. Since a disk can hold so much information — more than 170,000 characters — you have a lot to lose if something happens to the disk. You'll always want to make a working copy of an application program such as a word processor. You can then put the original disk (sometimes called the *system master*) in a safe place, secure in the knowledge that if anything goes wrong with the working copy, you still have your original disk.

This seems such an obvious, necessary procedure that many people rightly wonder why most software companies copy-protect their disks.

Software companies feel that they must copy-protect their disks to prevent illegal copies. They have reason to worry. They can lose considerable potential profit if people use copies of programs without paying for them.

In the past, the work of a craftsman was valuable because it was tangible and unique. It could not easily be copied by someone of lesser talent. But nowadays, computers are the equivalent of a "matter photocopier." How could you put a price on an automobile if you could make a copy of it one atom at a time, with energy as your only ingredient? Fantastic as it sounds, we are already at this stage with information. The so-called original program is no more valuable than its duplicate. The only difference between a blank disk and a $150 word processor is a phantom organization of magnetic fields on a three-dollar disk.

With software so easy to copy, it is hard to prevent piracy. The disk drive is designed to translate the patterns on a diskette into numbers that the computer can use. Copy protection allows this transfer, but also attempts to prevent you from reading the disk outside of the application. The methods used are as complex as the drive allows, but are usually quite effective in preventing a casual LOAD/SAVE or file copy. Unfortunately, sometimes the copy protection is so sensitive that even the original copy will not run if your disk drive is slightly out of alignment.

Companies must protect their software, but what about the individual who needs a backup copy? Many companies offer a replacement diskette if the original goes bad. Unfortunately, if the product becomes as indispensable to you as their ads claim it will, how can you tolerate the weeks it might take to replace the program?

Ideally, every computer could have a software-readable serial number. When you first used the program, it would check your serial number

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and offer to copy itself to a work disk. Anyone trying to use one of these copies on another computer would find that their serial number didn't match, and the program would not run. But mass-producing computers with individual serial numbers isn't very practical.

Perhaps the best solution is already in use. The software comes with a key that you must plug into your computer in some manner. On the VIC and 64, the key usually plugs into a joystick port, if unused, or into the cassette port. Other keys can be ROM chips that must be installed in expansion slots. The software will not run without the key installed, but you can make as many copies of the program as you want.

Selling software on cartridge is a similar, though more expensive approach to copy protection. Few people have the expertise to copy a cartridge.

The controversy is still raging, but your rights in the latest copyright law are clear. You have the right to a backup copy as long as you observe a few conditions: that the backup is part of an essential procedure in using the application and is used in no other way; that the copy is used solely for archival purposes; and that if you cease to own the right to use the program, you will destroy any archival copies.

If this is your first experience with a disk drive, you'll have to learn to treat it more carefully than the more rugged cassette recorder you're probably used to. Disk drives are delicate precision instruments.

Treat your drive very carefully when you bring it home (or anytime you move it). Do not subject it to jostling, bumps, or excessive vibrations. Any jar or shock can force your drive out of alignment, and it will have to be carefully readjusted by a service technician.

You should be sure to buy a box of blank disks, which should cost you about $30. Included with the drive are: a pencil-thick cable to attach the drive to your computer, a detachable power cord, a user's manual, and a demonstration disk. You may want to look at the demonstration disk and even run the disk performance test program, but the manual isn't very helpful on this for the novice. So before you do anything, read the rest of this article. The text is divided into levels of sophistication, so you can use your disk drive to whatever degree you want.

If you have no experience at all with disk drives, the first thing you'll want to learn is how to load programs.

Right away, you may buy software, such as games or a word processor. Properly documented software will have easy, step-by-step LOAD and RUN procedures. Usually, you just have to enter:

```
LOAD "*",8
```

The red disk drive light comes on, the drive spins, and if everything works OK, the screen says READY. Now type RUN.

The LOAD command you typed instructed the disk drive (an intelligent device) to search for and retrieve the first program on the disk. The use of the asterisk will be explained below.

Sometimes, you will need to give a specific filename to run the program, such as LOAD "BOOT",8 or LOAD "GAME",8. Also, you may not need to enter RUN, since some programs automatically RUN when they are loaded.

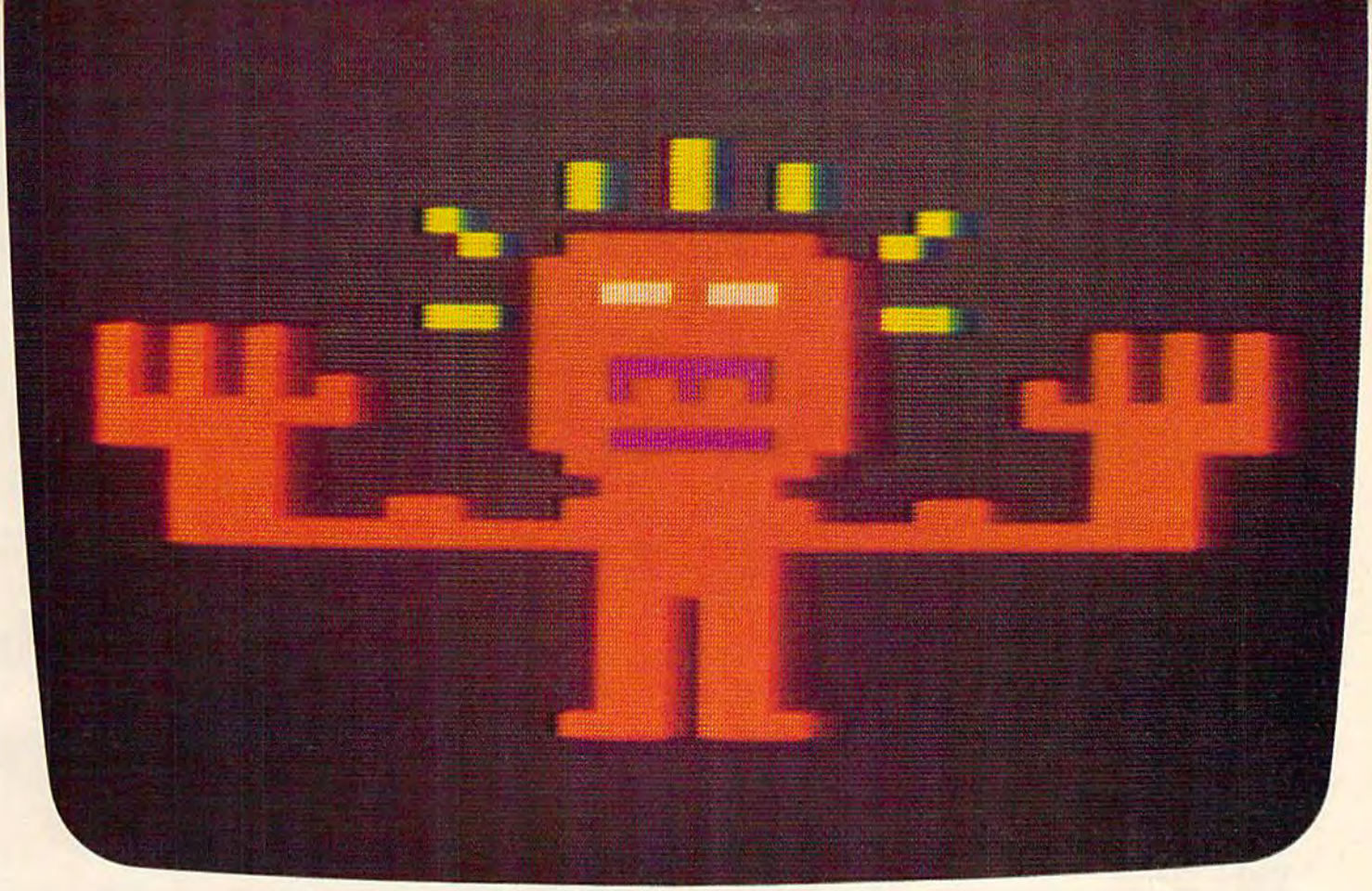
If you've followed the instructions explicitly, and the program still won't load, you need to check for errors. The red error light may be blinking. If you would like to check out the error, enter this one line program and RUN. The error message may seem cryptic, but it might help. We'll talk about the error messages later.

```
10 OPEN 15,8,15:INPUT #15,EN,EM$:PRINT
   EN;EM$:CLOSE15:END
```

If you get an error, try to correct it. Make sure that the disk drive is powered and properly connected. Check to see you have the disk inserted properly (see photo), that the right disk is inserted, that the door closes smoothly, etc.


*The proper way to insert a floppy diskette — holding it by the edge (face up with the notch on the left) and sliding it into the slot.*

If you fail despite your efforts, the diskette itself may be damaged, or it may be incompatible with your disk drive (every drive is slightly different in terms of speed and alignment). Most companies will replace your disk. However, don't return the flashlight just because the batteries are dead. Make sure that the error is not yours. You'll learn more about the disk system as you read this article, so you may get some insights.



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Loading programs is a one-way street. The real value of a disk drive is that it can hold volumes of *your* information, not just prepared material. The disk drive is a mass-storage device. Like RAM memory, you can read and write to it. The disk is slower than RAM, but is usually larger (170K versus 3.5K on a VIC!).

If you read last month's installment, you'll remember that the simplest access is at the sector level. You can read and write blocks of 254 characters. It's as difficult as it sounds, but fortunately, you should never have to use the disk at such a primitive level. Instead, your computer and disk drive work together as a team to let you create *files*.

A file is a hunk of information, not restricted to 254 characters. It's just a long sequence of numbers. Files can also hold characters, since characters can be represented by numbers, too. A file might be a program, a list, a letter you typed on a word processor, or just raw data. Every file has a name, so to access the file, you just give the disk drive its *file name*.

A filename can be almost any sequence of characters, including the alphabet, graphics characters, punctuation, etc. The filename can be up to 16 characters long. These are valid filenames: "PROOFREADER", "3D DEMO", "SUPERCHASE!", "DDOUBLE TTAKE". Some characters are reserved, such as the asterisk and the question mark. These are used as *wild cards*.

The question mark is used like the joker is in some card games. When searching for the filename on the disk, the disk drive compares the name you give it character by character with all the names on the disk. The question mark lets you allow for some ambiguity. If you are not sure about the filename, for example, you can substitute question marks for the characters you're not sure about. If you think the name might be "TRIX" or "TRIP", you can use the filename "TRI?". If you are searching for something like "HAPPY FACE" or "NAPPY-PACE" you can use "?APPY??ACE". In practice, the question mark isn't all that useful, as these contrived examples show.

Far more useful is the asterisk. It lets you leave off characters. For example, "BAS*" will match with "BASIC AID", "BASEBALL", "BASH", etc. The asterisk alone will match with anything, which is why you use it to load the first program on the disk, since the asterisk will match with the first thing it finds. Incidentally, the asterisk alone will also find the filename most recently accessed, not just the first file the disk finds. We'll talk about other variations on filenames later.

Before you can write to a disk for the first time, you must *format* it. Some application programs (such as word processors) let you do this from within the application, but you will usually do this from BASIC.

A blank disk straight out of the box is not ready for your disk drive. The disk drive does not know where to find the tracks and sectors, since the diskette is just a circular piece of magnetic-coated material. The disk drive must organize the disk into tracks and sectors by writing timing information all over it. This is in addition to whatever data you want to put on the disk. "Format" is the best description, but some people use the term NEW (as in wiping out a BASIC program), Header (like putting a title on a disk), or Initialize (prepare it for first use). Unfortunately, these terms also have other definitions, so they can be confusing. You should know what these people are talking about when they use the other terms, however.

To send commands to the disk, you have to open a *command channel*. Bear with us, because the procedures are very technical-looking. You can memorize what you need to know, but in future installments of this series, it will all become clear. To get ready, you need to enter:

```
OPEN 15,8,15
```

This tells the computer you will use the number 15 (the first number) to talk to the disk drive, *device number* 8. The last number, also 15, is for the disk's sake. It tells the disk that the things you send it are commands, not data. All the commands are sent with the PRINT# statement (pronounced "PRINT-file"). Unlike the other BASIC PRINT command, you cannot use the question mark as an abbreviation for PRINT# (?# does not work). Instead, use P-SHIFT-R to abbreviate PRINT#. (For more information on abbreviations, see this month's "Horizons: 64.")

The format statement looks like this:

```
PRINT#15, "N:DISK NAME, ID"
```

The N stands for NEW, which is the word Commodore uses for format. You can even spell it out:

```
PRINT#15, "NEW:DISK NAME, ID"
```

This command completely erases a disk as it formats, so use it with caution. The colon (:) separates the command from the *parameters* that the command needs to function. The disk name uses the same format as the filename, and can be anything you choose. You should organize your disks. Don't just randomly place any file on any disk. Have a disk for games, a disk for utilities, a disk for your BASIC programs, a disk for your word processor, and so on. This makes it so much easier to find the right disk, and you might as well start organizing when you first get started. The disk name should describe what the disk will store.

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The ID (identification) is a two-character code. It is not used like the disk name to organize your disks, but is primarily for the disk drive's sake. If every disk has a different ID code, the drive can detect if you've changed disks. This is very important for reliable operation. You can use unique IDs from 00-99 if you like, but you may want to pick them at random. *It is imperative that every disk have a unique ID number.* Ideally, none of your friend's disks should have the same ID numbers. In practice, just be careful. Don't be lax and call all your disks 01. We'll talk more about why the disks need to have unique IDs later, including how to read the ID from within your own programs.

There is an optional form of the NEW command that just lets you erase a disk. It doesn't format, it just wipes out a disk that was previously formatted. You can change the name if you want, but you can't change the ID without reformatting the disk. Just leave off the ID if you want to perform this erase function.

Now that the disk is ready to use, you may want to look at what's on it. Enter:

```
LOAD "$",8
```

When the computer comes back with READY, enter LIST. The *directory* (called a catalog on some systems) is a list of all the filenames. At the top of the list is the disk name and ID. To the left of each name is a number representing how many blocks of 254 characters the file uses. To get a rough estimate, divide the number by four to see how many kilobytes (K) the file uses. A 25-block program uses about 6K of disk space out of 170K.

To the right of each name is a three-character label, either PRG, SEQ, REL, or USR. These tell you what kind of file it is. You'll commonly see PRG (program) and SEQ (sequential or data) files. Again, we'll get into the distinctions when we talk about programming.

The last line of the directory tells you how many blocks are left on the disk. Divide by four to find how many kilobytes remain.

When you LIST the directory from a freshly NEWed disk, you'll see only the name and "664 BLOCKS FREE." If you divide it by four, you'll seem to have only 166K of storage. There is some overhead required by the disk drive. Naturally, the disk directory has to be stored somewhere. Other housekeeping information is also stored.

After you've formatted a disk, it's ready for you to store and retrieve programs and data. If you're ready to do this, enter a small program such as this:

```
10 PRINT "your name":GOTO 10
```

To copy the program from the computer to the disk, use the SAVE command. You may already be familiar with SAVE to tape. The only difference is that you add a comma and an eight to tell the computer that you want to SAVE to the disk drive (remember that the disk drive's device number is eight). Think of a filename. Remember to keep it under 16 characters and enter:

```
SAVE "0:file name",8
```

The "0:" is a new twist. It's a holdover from dual disk drives (two units in one case), where the first drive is numbered 0 and the second is numbered 1. You can leave out the "0:" and you won't get an error, but we've found it to be almost essential for reliable use. We can't go into detail here, but force yourself to remember the "0:" prefix and you won't be sorry.

Anyway, after you enter the SAVE command, the disk spins and the red light glows. This red LED is the busy light. Don't remove a disk while it is on or the computer won't get a chance to finish writing the file. If that happens, it never gets a chance to tie up loose ends, and the disk can be partially scrambled. This applies only to writing to a disk. There should be no problems if you remove a disk during a read or a LOAD.

After the red light goes out, the program is saved. If the light is blinking, something went wrong. You can use the short program we listed above to read the error, or just assume it's your mistake and try to figure out what you've done wrong.

Even if you don't get an error, you may want to confirm the SAVE. VERIFY is most useful with tape to insure that the program is properly saved, since the tape recorder cannot detect a write error during a SAVE. To VERIFY a disk SAVE, just add the ",8":

```
VERIFY "file name",8
```

VERIFY works similar to LOAD, but instead of going into memory, VERIFY compares with memory. When completed, VERIFY displays either OK (good news) or ?VERIFY ERROR (bad news).

You don't have to use the "0:" prefix with LOAD or VERIFY. You can use the asterisk wild card as a shortcut. Just VERIFY "*",8 to check the program you've just SAVEd to disk.

Now enter NEW, and LOAD the program into memory:

```
LOAD "file name",8
```

You don't have to use the "0:" prefix. If the file is not on the disk, or if you used the wrong name, or if there is a disk error, the computer displays "?FILE NOT FOUND." You may have to press the RUN/STOP key to get READY to come back. Attempt to find the cause of the error and try again. If necessary, LOAD "$",8 and LIST the

directory to get the right filename.

That's all for this month. Next issue we'll show how to simplify disk use with the DOS WEDGE and cover the other disk commands such as DELETE and RENAME. Until then, study your manual and see if some of it now makes more sense.

# SIMPLE ANSWERS TO COMMON QUESTIONS

TOM R. HALFHILL, EDITOR

# Q A

*Each month, COMPUTE!'s Gazette for Commodore will tackle some questions commonly asked by new VIC-20/ Commodore 64 users and by people shopping for their first home computer.*

---

**Q.** ***How well do personal computers match up against "dedicated" word processors for writing?***

**A.** Personal computers—depending on the particular system—can hold up very well when compared to dedicated word processors, especially when you consider the vast difference in cost.

For the uninitiated, a so-called *dedicated* word processor is a desktop computer or computer terminal designed to be used solely as a word processor, not as a general-purpose computer. Usually these units are found in offices, not homes. A single workstation costs about $5,000 to $10,000, depending on the printer selected.

Although dedicated word processors may be regarded as the ideal writing tools, a personal computer-based word processing system comes very close to satisfying the needs of most writers—while costing less than half as much.

Consider a word processing system built around a Commodore 64. At this writing, the 64 is available locally for $198, the 1541 disk drive for $260, and good word processing software for under $75. To this basic cost of about $535, you need to add either a dot-matrix printer or letter-quality printer, plus a printer interface. A good dot-matrix printer can be had for less than $500, and inexpensive letter-quality printers are available for around $600. Depending on the interface and cable needed, add another $100 or so. This brings the total cost to less than $1300, even for a letter-quality system. (If you bought everything at once from a single computer dealer, you might be able to negotiate an even lower price, especially if you're paying cash.)

Now, what advantages would a dedicated unit offer over this kind of system?

For one thing, the dedicated unit would be easier to get up and running. All the components should be matched to work together perfectly. When assembling a personal computer system with components from various manufacturers, usually there are compatibility problems to be overcome. For instance, the word processing software might allow underlining, but perhaps not with the particular printer. Ditto for subscripts and superscripts. Or maybe the printer does not mate as well with the interface as it should. (By the way, these kinds of headaches should be sorted out as much as possible *before* you buy all the parts, not after.)

Chances are the dedicated unit also would be easier to use, once you learned it. That's because it would have numerous dedicated keys for various functions, matched with the software. For example, to delete a sentence, the dedicated unit might have a special key labeled "Delete Sentence," and so on. Personal computer systems generally require you to memorize keystroke sequences for the same thing, such as CTRL-D-S for "Delete Sentence."

The dedicated unit also would offer greater disk storage (probably two drives), an integral 80-column video screen instead of a 40-column display on a TV set, and more advanced word processing functions, such as automatic footnote spacing and indexing, and maybe a spelling checker.

Of course, to compensate, you could add to the personal computer system a second disk drive ($260), a video monitor ($100), and even an 80-column converter (recently advertised for $159). Again, though, you might encounter compatibility problems between the 80-column board, software, printer interface, and printer.

Still, when all things are considered, the personal computer-based word processor will cost only a fraction as much as a dedicated word processor, and will offer more than enough utility for all but the most critical writing needs. In addition, the personal computer, as a general-purpose machine, can be used for many other tasks as well. For the average home user, student, and free-lance writer on a budget, the personal computer system is almost always the better buy.

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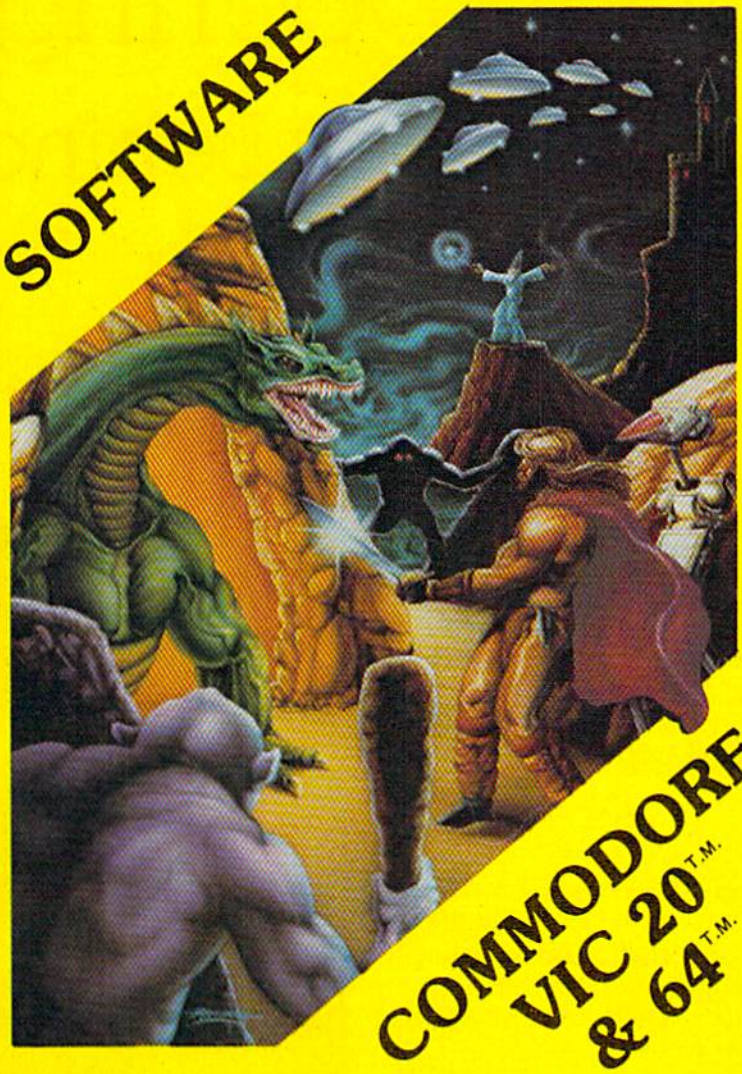
SOFTWARE



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# John Doering

## The Programmer Behind *Pipes*

Kathy Yakal, Editorial Assistant

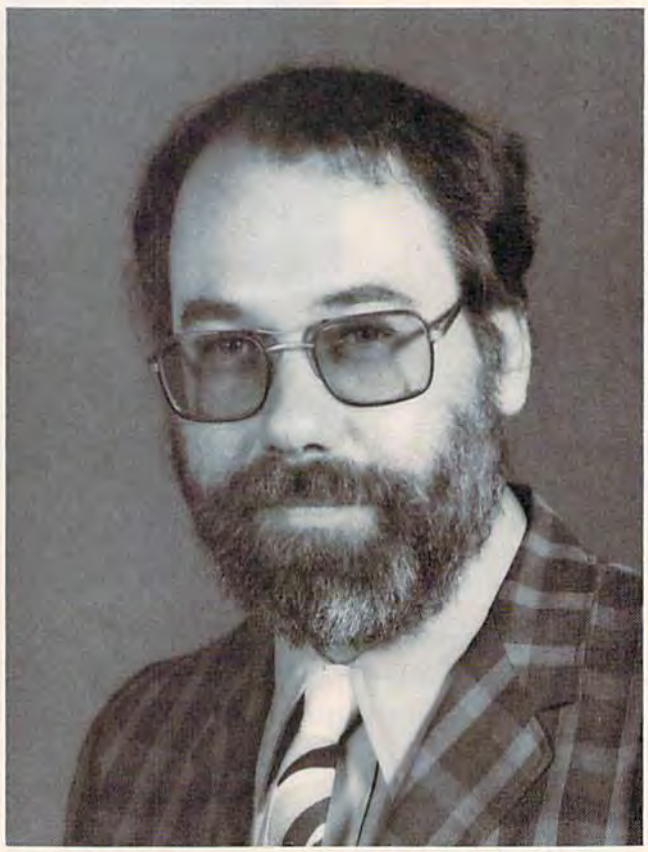
**It's not often that an independent software manufacturer has best-selling programs in different categories; most companies stick to a specialty, such as games, educational software, home applications, or business programs. This month's "Inside View" looks at one of the programmers at a company that has winners in every category: John Doering of Creative Software.**

You're a utility engineer. Your job is to gather the correct water pipes from the factory, then connect them between the town's water supply and some of its homes. And you must accomplish your task using as little money and as few pipes as possible.

This is the premise of *Pipes*, an educational game from Creative Software. *Pipes* has been well-received by its young audience, and it won the CES Showcase Award for the best educational software program of 1983 at the Consumer Electronics Show in Chicago last June.

### The Birth Of *Pipes*

John Doering, the programmer behind *Pipes*, has been an electronics hobbyist since he was young, though his field of study in college and graduate school was philosophy. His interest in microcompu-



*John C. Doering, vice-president, Research and Development at Creative Software, and the author of the award-winning educational program,* Pipes.

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Once people enter *Asylum,* they don't *want* to leave. And neither will you.

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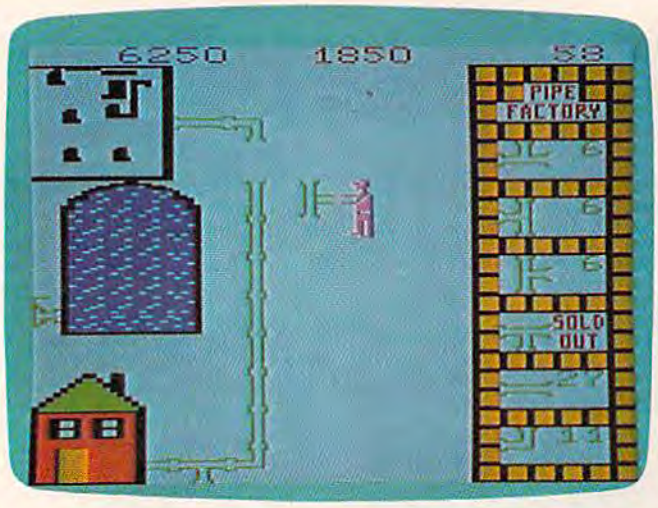



*In* Pipes, *Arlo the Plumber must select the correct pipes from the pipe factory and hook up several homes to the city's water system using a minimum of equipment and money. This educational program helps teach the concepts of planning, economics, and spatial relationships.*

ters was sparked when he bought a Commodore PET in 1977 and taught himself to program. At the time, he was working as an electrical engineer for a northern California company.

Then he met up with Paul Zuzello through a mutual friend. Zuzello shared his interest in programming and his appreciation for Commodore computers. So in June 1981, they formed Creative Software, of which Zuzello is now president.

Their first commercial programs were simple games and home applications for the PET. When the VIC-20 and Commodore 64 were introduced, they started creating programs for them, too. Creative Software also is starting a line of software for the Texas Instruments TI-99/4A, in addition to its Commodore products.

Doering got the idea for *Pipes* while wandering through a toy store. "I was trying to find out what kids were buying," he says. "Games where children have to put something together have always seemed very popular, like Erector sets and Tinker Toys."

When he finished programming his new game, Doering tested its appeal by bringing it to fourth, fifth and sixth graders at a local school. They liked it.

"Kids would crowd around while someone else was playing it and give suggestions," says Doering. "That was great help for me, because children are prone to giving lots of criticism when they don't like something."

Doering says the most difficult thing about programming *Pipes* was staying within the VIC-20's memory limitations. It barely fits into the unexpanded VIC. Doering expects the translation to the Commodore 64 to be much easier.

## Fun Or Fruitful?

It is sometimes difficult to distinguish between software designed to educate and software designed to entertain. Doering believes that *Pipes* contains elements of both, but is mainly educational.

"*Pipes* is gamelike. It's fun to play using a joystick and it has color, graphics, and sound," he says. "But it also stimulates you to think about what you're doing.

"It's what I call concept education. There are a number of ways to achieve the goal. It forces you to try different methods and techniques."

Concept education, according to Doering, combines games and education to construct an enjoyable learning experience. Doering and his colleagues at Creative Software divide educational software into three categories: home concept education; courseware (software used in classrooms and other formal educational settings); and drill and practice (software that gives you a traditional test of some sort). Though educational software has not taken off as fast as games and home applications have for home computers, Doering thinks it will become as competitive. "I think educational software will be more immune to faddism than games were."

Doering also says that programming has much to offer to programmers as well as users. "I get a lot of personal satisfaction from designing software. There's a challenge to be met, and that always intrigues me.

"But beyond that, it's gratifying to see that a piece of my work can give pleasure to some other human being. We get lots of letters from grateful customers, so I know that I'm making an active contribution to someone else's education or enjoyment."

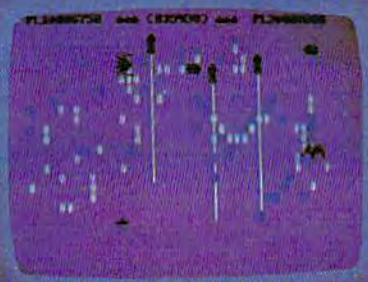
# NÜFEKOP passes the buck!

**Since we can't decide which of these exciting Commodore 64™ games is more fun, we're passing the buck . . . to YOU!**

## Exterminator 64

Exterminator for the 64 by Ken Grant is the "big brother" to the very popular version produced for the VIC 20™. Animation by use of interrupt-driven sprites, exceptional use of audio capabilities and the use of approximately four times as much memory (to add more of the bugs responsible for the original Exterminator's fame) has produced a program which, from the moment it comes on screen, clearly states that the Commodore 64 has come of age. **$24.95** (available in cartridge or disk)

## Widow's Revenge



This is another exceptional example of what the 64 can do. From the crawling of the web-slingers to the flapping wings of the egg-layers, author Doug Underwood has done an artist's quality job on animation. This program is similar in format to Exterminator . . . but, though of the same universe, worlds apart. **Widow's Revenge** is a one or two player game that you will find very hard to put away. **$24.95** (available in cartridge or disk)

**To be exact, we'll pass 6.4 bucks to you when you purchase both games. Mail us the warranty cards from both Exterminator 64 and Widow's Revenge and we'll send you 6.4 dollars! We also have two exciting new programs for the VIC 20™ . . .**

## Music Writer III by David Funte

This is an amazingly 'friendly', yet powerful program designed for a broad spectrum of usage. For the entertainment-seeker a more fine, fun way to enjoy your VIC 20™ than by typing in music could scarcely be found. For the music student, the speed of input, the powerful editing, the 500-note memory capacity (three products of pure machine code programming), the clear, pleasing graphic display and the 'save' features make this one a must. **$16.95**

## King's Ransom by Scott Elder

A demon's foul curse has condemned a king (who thought himself capable of striking a bargain with immortals) to an eternal half-existence in the five levels of the undead. The very gold coins the king had people put to death to possess now hold the only means of his escape. Help the reformed king collect these coins while jumping from moving level to moving level, carefully leaping over all obstacles encountered. Included is the short story, "The Thirteenth King." **$16.95**

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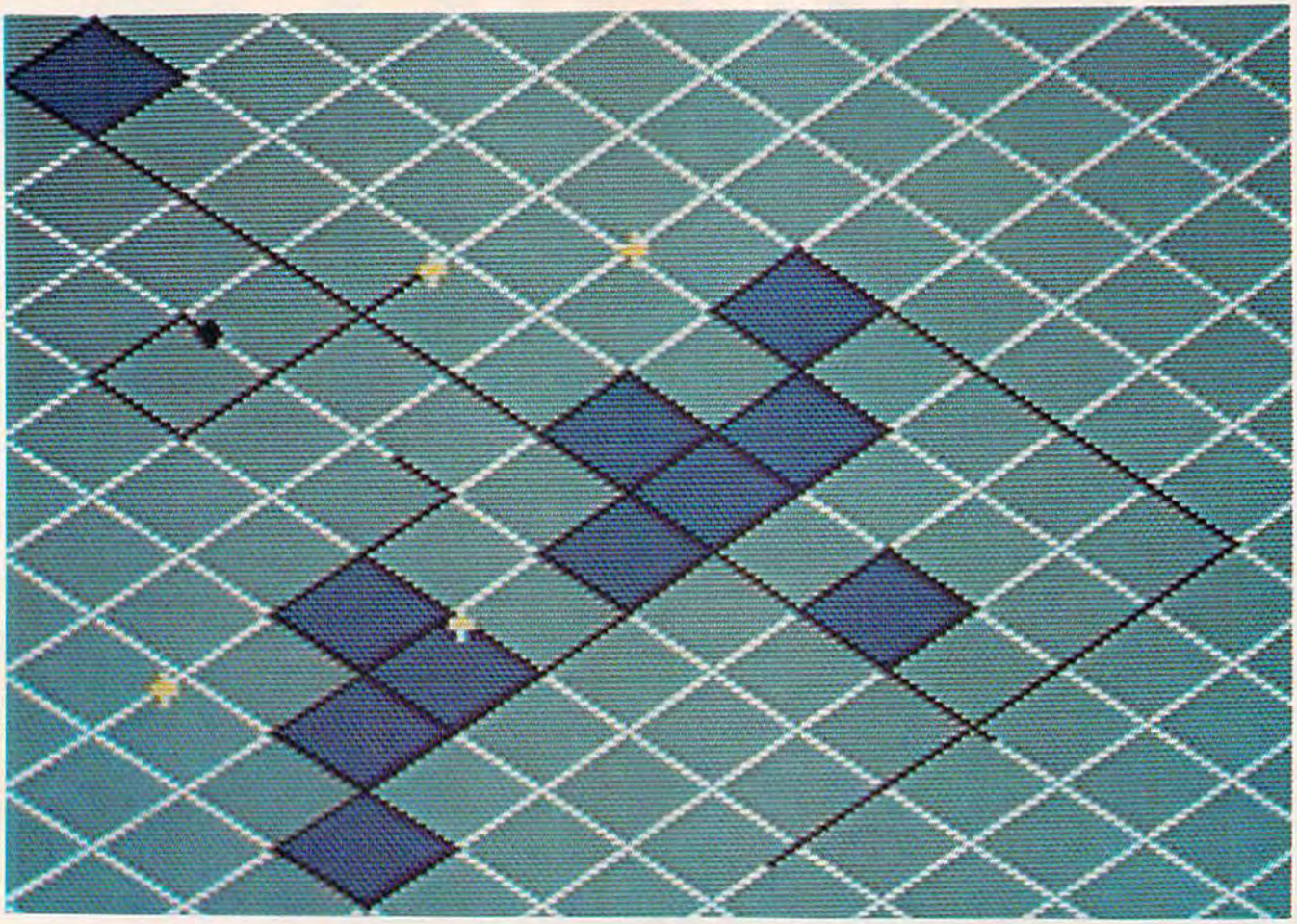

# SPIKE

## All-Machine-Language Game For Commodore 64

Eric Brandon

**COMPUTE!'s Gazette is proud to present its first game program written entirely in machine language. We feel that "Spike" is not only one of the best game programs ever published in a computer magazine, but that it also approaches commercial-quality software – a game for which you might expect to pay $30 or more. In addition, a new machine language entry program premiering this month, "MLX," virtually guarantees you can type in Spike without mistakes (details in article). Spike's author, Eric Brandon, is a Toronto college student who interned at COMPUTE! Publications during the summer.**

It is a dark and stormy night, and you are diligently typing games into your Commodore 64.

Suddenly, just outside, you see a dazzling flash of light and almost at once hear the deafening retort of thunder. The lights dim, flicker, and wink out. A wave of dizziness overcomes you.

When you regain consciousness, you cannot recognize your surroundings. "This isn't my computer room," you think. A thousand theories about your situation fly through your head, but none is even close to the terrible truth.

You are trapped inside the Power Grid.

To return to your own world, you must find and encircle your Commodore 64 computer. It is

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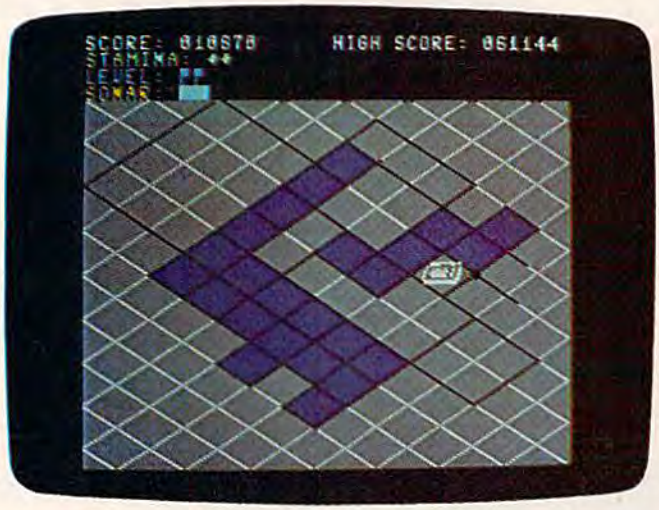



*After filling in nearby squares, the player has found and uncovered the hidden Commodore 64.*

not visible from where you are. but you know it is hidden inside one of the many grid nodes. Fortunately, you are carrying your pocket sonar, which always tells you how far from the 64 you are. The shorter the line displayed by your sonar, the closer you are to escaping.

You soon discover that the Grid is a dangerous place to be. Deadly power spikes travel up and down the wires. Touching one of the spikes results in a terrible shock. These shocks, though powerful, are very short, so you can endure up to four collisions with the spikes and still stand a chance to make it home.

Unfortunately, should you successfully reach your 64, you will find that the magnetic disturbance which trapped you on the Grid in the first place is worse than ever. You end up on the Grid again, but now it is coursed by even more power spikes.

Is there no escape?

## Playing Spike

The recommended way to travel on the Power Grid is with a joystick in port two. The joystick may seem a bit awkward at first: since the Grid is tilted 45 degrees, the four cardinal directions (up, down, left, right) are likewise tilted.

When Spike first starts, you will have to make some decisions. You must decide the speed of the game and whether you want the Easy or Hard option. Pressing the RETURN key or the joystick button automatically chooses the Hard option and a speed of 5. If you want some other option, press the number of the speed you want (1 to 9) and the E key for an Easy game.

Another handy feature of Spike is the pause option. Pressing a SHIFT key pauses the action. Pressing SHIFT/LOCK freezes the game until SHIFT/LOCK is released.

You start each game with five lives. An indicator at the top of the screen, labeled STAMINA, keeps track of your remaining lives, not counting the one currently in play.

Another indicator, SONAR, shows your proximity to your invisible goal, the hidden Commodore 64 computer. The shorter the line, the closer you are to the 64.

The LEVEL indicator displays flags to show how many times you've found the 64 and advanced to a more difficult power grid.

When you start a new game, the Grid is patrolled by two power spikes. Another spike joins them on each succeeding level, up to a maximum of seven spikes.

To develop a winning strategy, it's vital to understand how the scoring works. The screen is divided into 112 grid nodes (diamond-shaped blocks). Your goal, the Commodore 64, is hidden in one of them, leaving 111 empty nodes. You gain survival points for traversing the Grid — ten points for each new side of a node you cross. If you box in a node by leaving your trail along all four of its sides, the node is colored blue. You'll want to box in as few nodes as possible, because it costs you bonus points later.

When you find the Commodore 64 by locating it with your sonar and encircling its node, you win bonus points and advance to the next level. The bonus is figured by multiplying the number of unboxed nodes times the bonus value for the current level. The bonus value starts at 40 for level one and increases by five for each additional level. For instance, if you find the 64 on level three after boxing in 11 nodes, you would win 5000 bonus points (100 unboxed nodes × bonus value of 50 = 5000). This would be added to the survival points you gained while searching the Grid.

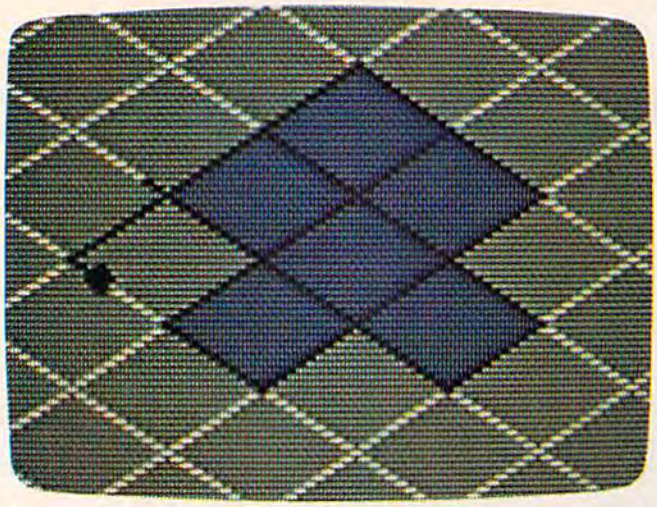

*Close-up of a player pursued by a "spike" on the Power Grid, plus the game indicators: "Stamina" shows the number of lives remaining; "Level," the number of screens cleared; and "Sonar," the player's proximity to the hidden computer.*

# HAVE YOU FLOWN YOUR C-64 TODAY?


Imagine yourself at the controls of a small, single-engine plane, 10,000 feet in the air, on your approach to the runway and safety. You're running low on fuel, but your instruments show that you're on the glide path, and lined up with the runway. It's a beautiful, sunny day, and you can see the airport in the distance, across the grassy fields. But the crosswind is tricky, and it will take all your skill to land safely. You're coming down now, and the runway is getting closer. A bit left, OK, now lower the power, fine, now put down the flaps. Pull the nose up a bit more, you're a little low. Watch the power! Don't stall. OK. Here comes the runway. You hear the squeal of tires on pavement, your pulse quickens, you're down, but watch it, you're pulling right! Brakes, brakes! Left more! You've stopped safely! Good job. The first real-time flight simulator for C-64 is now available from MMG Micro Software. There are four levels of difficulty, landings in clear or foggy weather, landings with or without instruments, and with or without the real-time view from the cockpit. **Final Flight!** requires a Commodore 64, 1 joy stick, and is offered on tape or disk for the same suggested retail price of $29.95

MMG

**Final Flight!** is available at your local dealer or direct from **MMG Micro Software**. Just send check or money order to P.O. Box 131, Marlboro, N.J. 07746 or for Mastercard, Visa, and C.O.D. deliveries call **(201) 431-3472**. Please add $3.00 for postage and handling. New Jersey residents add 6% sales tax. Also available for ATARI computers.



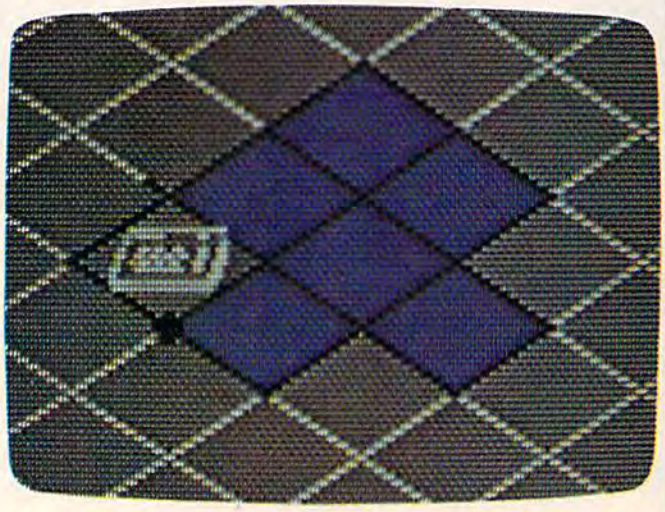
Before: *Using Sonar to zero in on the invisible computer, a player encircles a suspected node on the Power Grid....*

A HIGH SCORE indicator keeps track of the best game played during the current sitting.

## Typing Spike

Unavoidably, Spike is a long program – more than 4K of pure machine language. Normally, it is very difficult to type in such a program without making a mistake. Also, in the past, a machine language monitor was necessary to enter such a program from a published listing in a magazine.

However, to make the typing as easy and as foolproof as possible, another landmark program debuts in COMPUTE!'s Gazette this month—"MLX." MLX, a machine language entry program, was written by Program Editor Charles Brannon to greatly simplify the task of typing ML programs from listings. It includes an instant checksum feature which does not let you continue until you've typed a line correctly. It also automatically types commas and lets you break up the job into several sittings.



After: *The node is encircled and the hidden computer revealed.*

Please read the directions for using MLX elsewhere in this issue. And be sure to save MLX, because it will be needed for future all-machine-language programs in COMPUTE!'s Gazette.

Here is the information you'll need to enter Spike with MLX:

**Starting address — 32768**
**Ending address — 37295**

Once Spike is saved on disk or tape, a special procedure is required to load the program.

For disk, enter:

```
LOAD"SPIKE",8,1
```

For tape, enter:

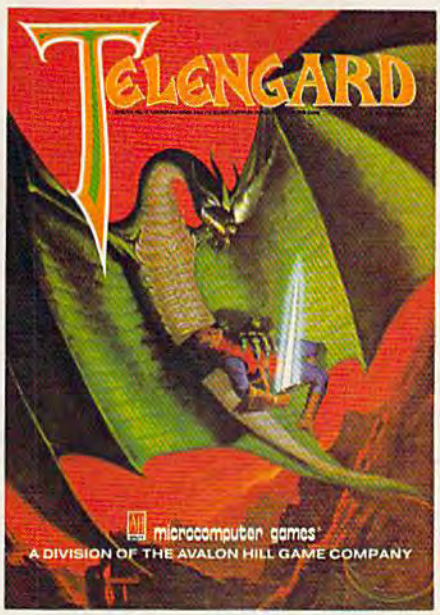
```
LOAD" ",1,1
```

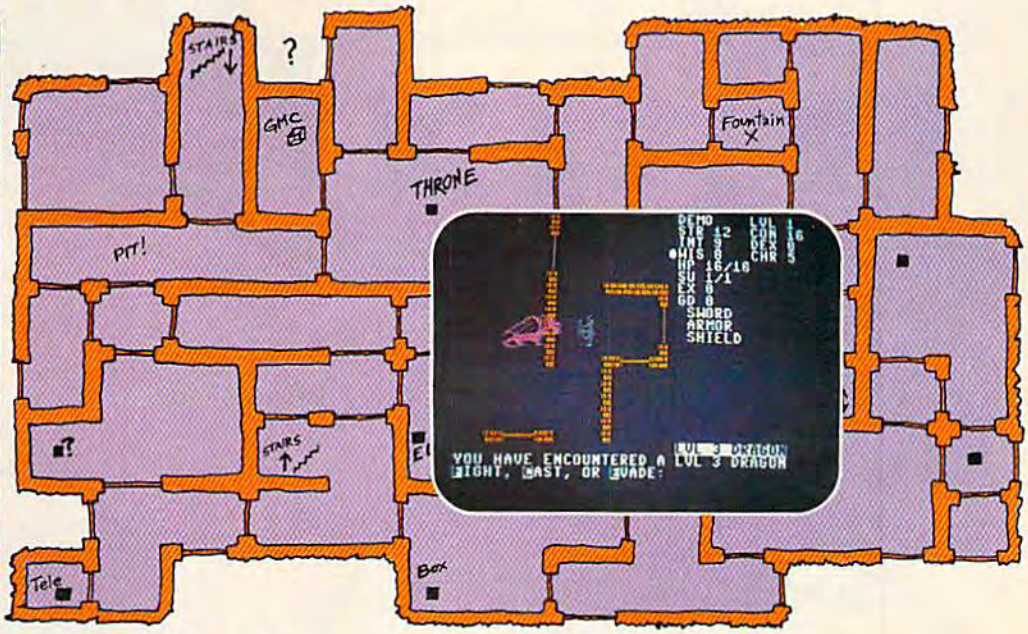
When the program is loaded, run it by entering SYS 32768.

We think you'll agree that Spike is well worth the extra effort.

*See program listing on page 213.*

# Be Amazed!

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Each labyrinthine level holds hundreds of dark chambers and tomb-like corridors for the mighty adventurer to explore. It goes without saying that a shifting collection of hideous monsters with unpredictable behavior patterns can make life in the TELENGARD maze quite interesting—and frequently quite short!

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**AND FOR THOSE WHO DON'T DIG UNDERGROUND GAMES . . .** There's **B-1 NUCLEAR BOMBER,** a nail-biting solitaire simulation of a manned B-1 on a mission over the Soviet Union. Your plane is equipped with six Phoenix Missiles, a one megaton warhead and orders to retaliate! Cassette for Commodore 64, Atari Home Computers (32K), TI99/4 & 4A (16K), VIC-20 (16K), Timex/Sinclair 1000 (16K), and TRS-80 Mods. I/III (16K) are available for an explosive $16.00. Diskette versions for Apple (48K), TRS-80 (32K), Atari (24K) and IBM (48K) just $21.00.

**NUKEWAR:** Defend your country by massive espionage efforts, or by building jet fighter bombers, missiles, submarines and ABM's. Your cold and calculating computer will choose its own strategy! Cassette for Commodore 64, VIC-20 (16K), TRS-80 Mods. I/III (16K) and Atari Home Computers just $16.00.

**FOOTBALL STRATEGY:** Animated action on a scrolling field. A head-to-head challenge or solitaire as you select the best offensive or defensive plays in response to your opponent. Commodore 64, Atari Home Computers (32K) and TRS-80 Models I/III/IV (16K) cassette for $16.00. Atari (32K), IBM (64K) and TRS-80 Models I/III/IV (32K) diskettes available at $21.00.

**T.G.I.F.:** Thank Goodness It's Friday! Avalon Hill's new party game for one to four players recreating an often-not-so-typical week in the lives of the working class. Half the fun is just making it from Monday to Sunday. Commodore 64, Atari Home Computers (40K) cassette for a meager $20.00. Atari diskette (48K) for $25.00.

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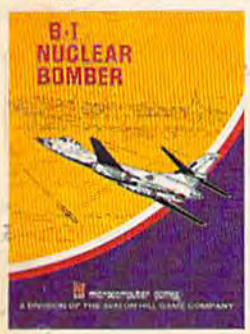
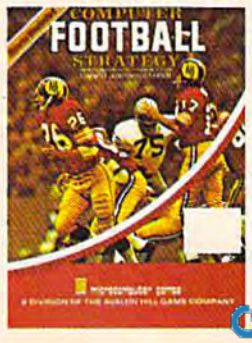


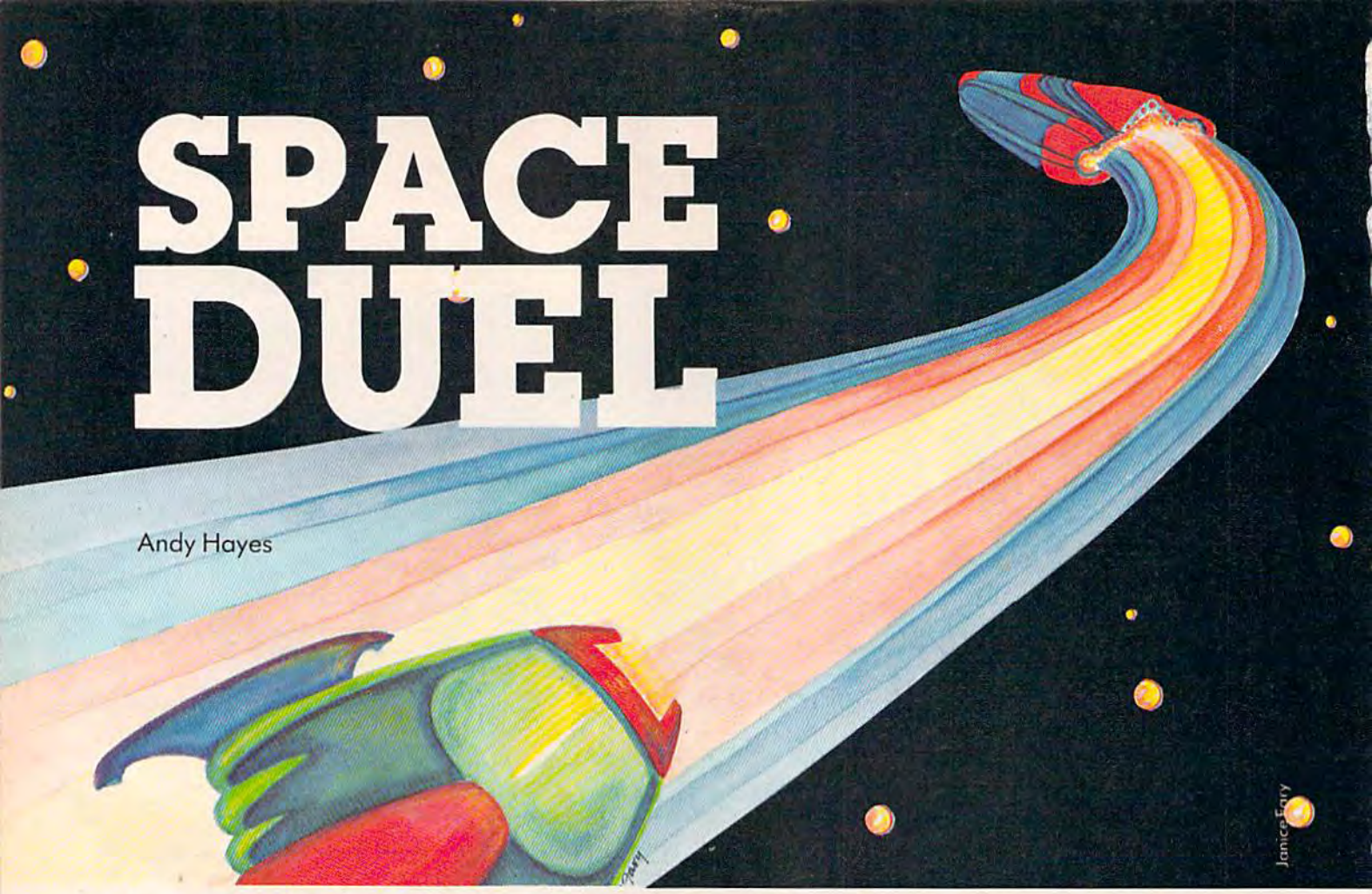


AH QUALITY




# SPACE DUEL

Andy Hayes




**"Space Duel" is a two-player fast-action game for the unexpanded VIC-20 and Commodore 64. It requires a pair of paddle controllers. The Commodore 64 version, by Assistant Programming Supervisor Gregg Peele, is written entirely in machine language.**

One of the problems encountered when programming games for the VIC-20 is the lack of a second joystick controller port (the Commodore 64 comes equipped with two). Since only one joystick can be plugged in, most games tend to be written for one player only.

But there's no denying the fun of two-player computer games. In a one-player game, your opponent is almost always the computer, which puts you at a great disadvantage whenever reaction time or logical thinking is being tested. Eventually the computer always wins. A two-player game, however, pits you against another human being, someone who shares all the same human frailties. Not only do you have a better chance to win, the game also lets more than one person play with the computer at a time.

There are only three ways to program simultaneous-action, two-player games for the VIC: a second joystick port can be added by building an interface to the user port (not a project for beginners); one or both players can use the keyboard for control (which tends to be clumsy); or the game can be written to take advantage of the paddle controllers.

Paddle controllers come in pairs, wired to a single joystick plug. Essentially they are potentiometers (variable resistors). Atari paddles or Commodore paddles will work with the VIC and Commodore 64, although the Commodore paddles are preferred because their range is better matched to the Commodore computers. However, the Atari paddles are more widely available, and many people who started out with the Atari 2600 VCS game machine may already have a pair of Atari paddles on hand. Either kind will work fine with "Space Duel."

## Hi-Res Animation

Space Duel gives each player a spaceship at opposing sides of the screen. Players can move their spaceships up and down by rotating the paddle controller. (With the Commodore 64 version, the paddles should be plugged into port one.)

Try rotating the paddle knobs slowly while watching the spaceships closely. You'll notice that unlike most games for the VIC and 64, the objects do not move in rough increments of one character space. Instead, they scroll smoothly up and down the screen, one pixel at a time. This kind of high-resolution animation would be far too slow if programmed in BASIC. The VIC ver-

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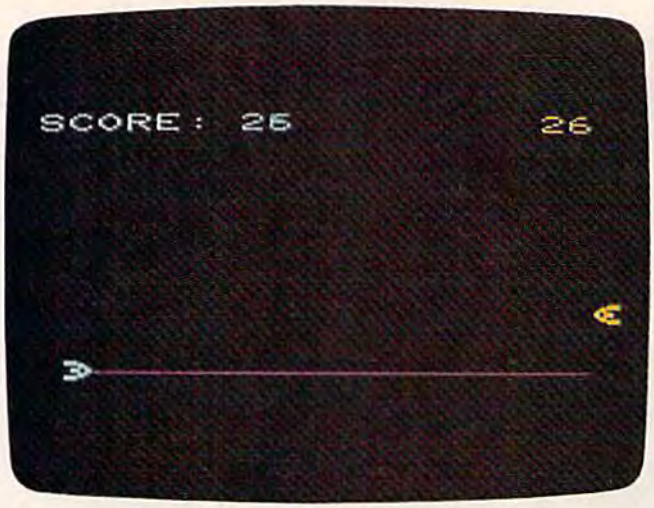
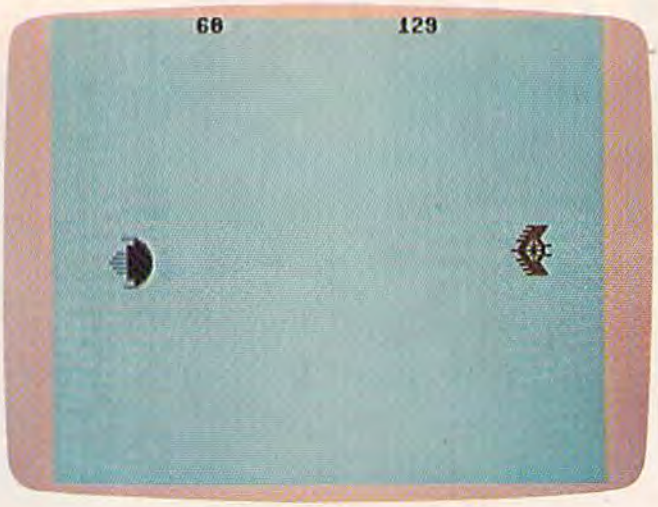



*With the score tied, player one fires his laser but misses his opponent's ship. (VIC version).*




*Both players jockey for position before firing their lasers. (64 version).*

sion of Space Duel uses a machine language subroutine to attain this fine movement. The 64 version is written entirely in machine language and uses sprites.

Rotating the paddle knob quickly, though, reveals another kind of movement – extremely fast jumps. Because a paddle controller returns an absolute value to the computer (instead of the directional value of a joystick), it's possible to leap from one screen position to another with a flick of the wrist. You'll find both kinds of movement handy in Space Duel: rapid jumps to avoid enemy shots, and fine adjustments to carefully aim your own shots.

## Dueling Spaceships

The object of Space Duel is simple: shoot the enemy spaceship more than it shoots you. To fire your laser, press the paddle fire button. Instantly, a red laser burst zips across the screen (at machine language speed) toward your target. A direct hit triggers an explosive sound effect and flashing screen colors.

Meanwhile, of course, you have to dodge laser bursts fired at your own spacecraft. Space Duel can get so fast that only the quickest players can keep track of what's going on.

Each hit on the enemy ship is worth ten points. However, to prevent reckless shooting, each laser shot also costs you one point. Therefore, a hit really nets you only nine points. Each player's score is updated in the top corners of the screen.

The game ends when one player scores at least 80 points (500 points in the 64 version). To play again, press one of the fire buttons or respond to the screen prompt.

Hint: In the VIC version, if the paddles don't seem to work right when you first run the program, try pressing RUN/STOP-RESTORE and restarting. This resets the computer and clears out certain memory garbage which can interfere with the controllers. Also be sure not to leave any buttons on the Datassette recorder pressed down, because this interferes with the left paddle.

To type in the machine language 64 version, you must use "MLX," a special machine language-entry utility (see article elsewhere in this issue). The information you need to enter the 64 version of Space Duel with MLX is: starting address 49152, ending address 50393. To start the game, enter SYS 49152.

*See program listings on page 207.*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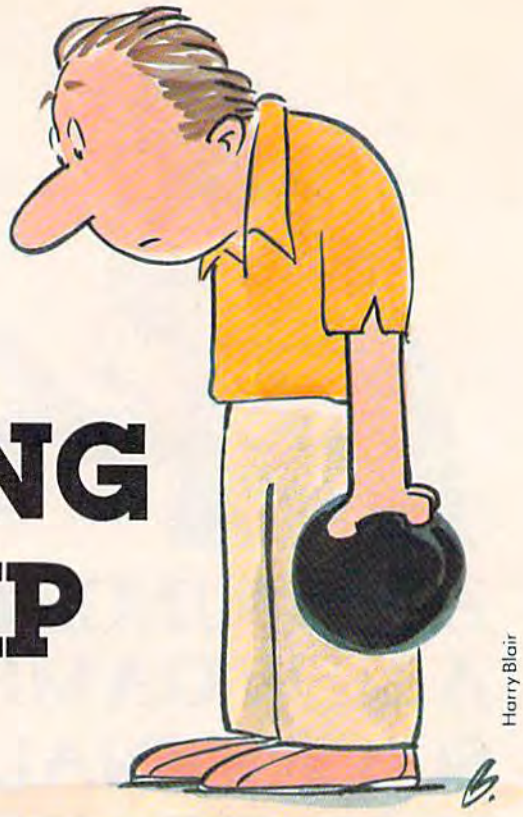
# BOWLING CHAMP



Harry Blair

Joseph Ganci

**"Bowling Champ," for one to three players, was originally written for the unexpanded VIC-20. We've included a version for the Commodore 64.**

Some games like *Space Invaders* or *Adventure* create their own fantasy worlds, while others are simulations of reality. "Bowling Champ" is one of the latter.

It's not easy to take a game with countless physical variables, such as bowling, and reduce it to numbers so it can be re-created by a computer – especially a small computer. Compromises must be made. But Bowling Champ is a reasonable simulation of a game of ten pins, given the limitations imposed by the unexpanded VIC-20's 3.5K of free memory. The elements of skill and luck have been preserved, and the scoring is authentic.

## Up To Three Players

When you first run Bowling Champ, it asks for the number of players. One, two, or three people can play.

Next you type in the players' names. To fit the names on the screen, the program truncates them to five characters (six on the Commodore 64).

Now you're ready for the first frame. The bowling ball rapidly moves up and down across the alley until you press the space bar. This rolls the ball down the alley and knocks over the pins, unless you've thrown a gutter ball. The trick is to time your release so the ball rolls down the center of the alley to score a strike.

In case you're unfamiliar with how a game of ten pins is scored, here's a brief summary:

A game consists of ten frames or turns. Each player gets one or two balls per frame. If you roll a strike – knocking down all ten pins with the first ball – you don't get a second ball, but the current ball's score is ten plus the total of your next two throws.

If some pins are left standing after your first ball, you get a second ball. If you knock down all the remaining pins, it counts as a spare, and the current ball's score is ten plus your next throw.

If any pins remain after your second ball (no strike or spare), the number of pins knocked down in that frame is added to your previous score.

Rolling a spare in the tenth (last) frame gains you one extra ball; rolling a strike in the tenth frame gains two extra balls.

Therefore, a perfect game – ten strikes during regular play plus two strikes with the extra bowling balls—scores 300 points. Needless to say, this doesn't happen very often, either in real bowling or in Bowling Champ.

## Programming The Game

Bowling Champ was my first real attempt to write a good game in BASIC for my VIC-20. At first I thought it would be fairly simple to simulate a game

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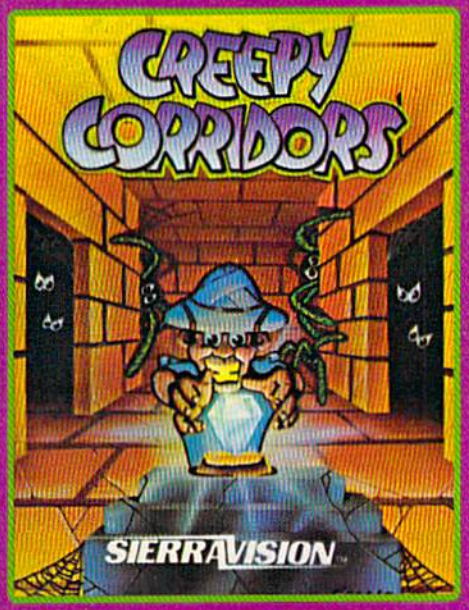



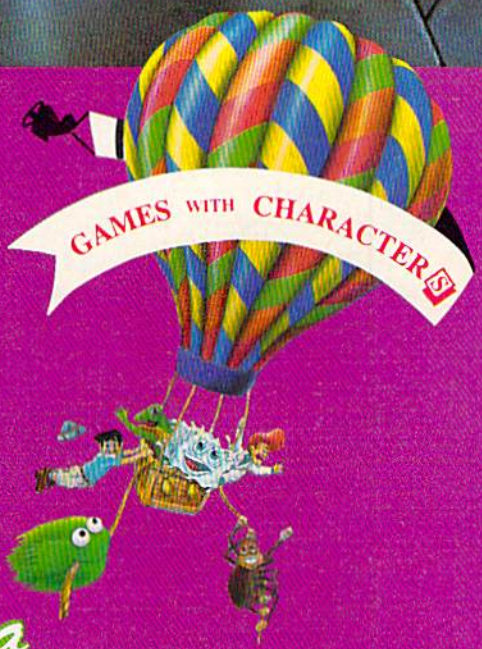


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*Up to three people can play "Bowling Champ" (VIC version).*


*"Bowling Champ" (64 version).*

like bowling, but I found myself quickly running out of memory as I tried to tell the VIC how to keep track of strikes and spares, how to calculate scores in bowling, and how to keep track of everything at the same time.

Another problem I found was the VIC's small screen size. I wanted to keep a constant log on the screen of each ball thrown, just as you would see on a regular bowling score sheet. But alas, with only 22 characters horizontally across the screen, I just wasn't able to record 20 ball scores with a box around each one. That's when I found a useful application for the REVERSE function (reverse video). At first I thought of it as just a way to pretty things up, but then I realized I could use it to reverse every other ball score on the screen so that each one could be easily distinguished from the one next to it.

With that problem solved, I attacked the next: how to keep track of strikes and spares and tally the scores correctly. At first I thought of just using a flag, a number that would tell the computer when to add extra points. But that got quite confusing and memory-consuming as I tried to keep track of each player's strikes and spares.

It took awhile, but finally the concept of screen memory clicked for me. If the screen locations were also memory locations, then I could tell if a strike or spare had been thrown simply by checking the correct spot on the screen where the symbol for a strike/spare had been recorded. This made things a lot easier and saved a lot of memory.

In short, the program counts the number of pins knocked down, checks for a strike or spare, and records the corresponding symbol on the score sheet. The program then checks to see if the last ball thrown was a spare or a strike; if either, calculations are performed according to standard bowling scoring rules. If a strike or spare is thrown in the tenth frame, the player is allowed to throw one or two extra balls. Every rule of scoring for regular bowling is followed. The only difference is that the computer does not wait until the end of a frame to update the score — it updates it after every ball.

Some new players find the ball moves too fast for them to aim. To slow it down, insert a delay loop (such as FOR X=1 TO 100:NEXT) at the beginning of line 440.

## Program Outline

Here is a breakdown of both the VIC and 64 versions of the program:

| | |
|---|---|
| 10–110 | Initialization; title is printed. |
| 112–113 | How many players? Up to three can play. |
| 118–123 | Players' names are typed in and are cut off after the first five letters (six letters on the 64) to fit the screen. |
| 128–156 | Screen setup. |
| 160–225 | Main part of the program. This includes: |
| 166 | Change the screen and border colors for each player. |
| 174–194 | Check to see if a spare has been thrown in the tenth frame and, if so, let the player throw one more ball. |
| 195–214 | Check to see if a strike has been thrown in the tenth frame and, if so, let the player throw two more balls. |
| 882–896 | Final scores and an option to repeat the game are printed. |

The program contains the following subroutines:

| | |
|---|---|
| 430–460 | Bowling ball moves up and down until a key is pressed. |
| 550–612 | Roll the ball toward the pins, knock them down, and count to see how many have been knocked down. |
| 1000–1100 | Keep score on the screen with the proper symbol — the number of pins knocked down, the spare symbol, or the strike symbol. |
| 1200–1300 | Tally current score. |

The VIC version takes up most of the memory, so don't add anything extra until you've typed it in as is. Consider the quotes at the ends of PRINT statements optional where they are not included.

*See program listings on page 204.*

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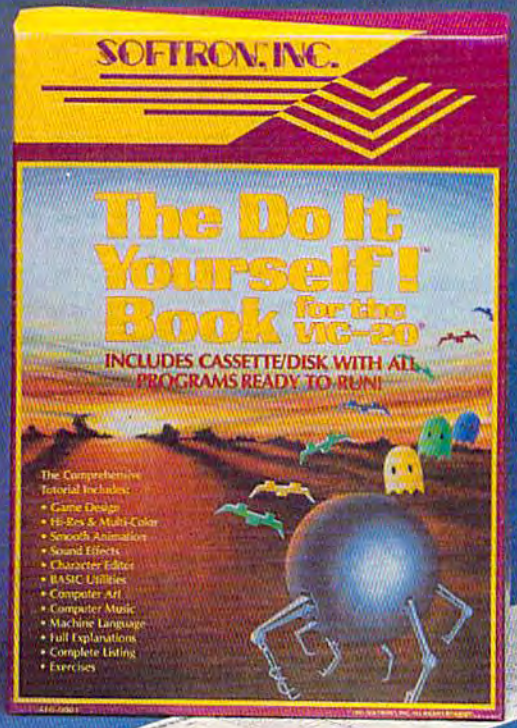



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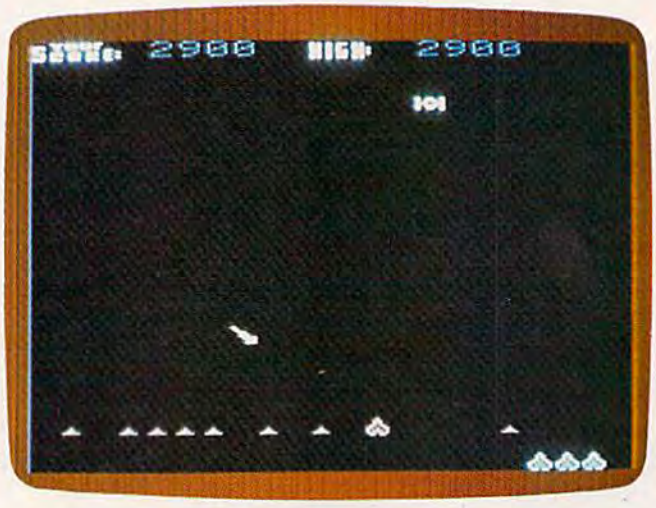
# Saucer Shooter
## For VIC-20

Ron Watts

**"Saucer Shooter" is an action game for the unexpanded VIC-20 which makes exceptional use of custom characters and sound effects. Unplug (or disable) any memory expanders before using the program. It requires one joystick.**




*Surrounded by piles of atomic waste, the player's base is under attack by the hovering saucer.*

"Saucer Shooter" is not only a fun game, it's also a good demonstration of what can be achieved with user-defined graphics (custom characters).

The custom character technique lets programmers redesign the standard VIC characters into any shapes desired. In Saucer Shooter, standard characters are customized to make an enemy saucer, a defending gun turret, flying shots, piles of atomic waste, explosions, and even 44-column screen characters. (For more information on this technique, see "Introduction To Custom Characters On The VIC And 64" and "How To Make Custom Characters On The VIC" in last month's COMPUTE!'s Gazette.)

### A Hostile Saucer

After you type RUN, the title screen comes up and a short tune plays. Press the joystick fire button to start the game. The screen clears, there's a short pause as the program makes a few preparations, and the game begins.

The object is to defend yourself against the hostile saucer orbiting overhead. Your joystick controls a gun turret which moves across the bottom of the screen. The playing field is what is sometimes referred to as a "wraparound universe — if you move off the edge of the screen, you reappear on the other side.

Shots fired by the enemy saucer obey the same rule. Keep this in mind, because a shot that seems to be flying a whole screen away from you might wrap around and catch you by surprise.

Every orbit or so the saucer fires another shot at your turret. You can shoot back by pressing the joystick fire button. Hitting one of the saucer's shots in midair scores 100 points. A direct hit on the saucer scores 500 points. Both the current score and the high score for the session are printed at the top of the screen. *(Editor's Note: During testing of the game, our high score was 19,900.)*

You start the game with four turrets and an unlimited supply of bullets. However, only one bullet can be in flight at a time. Pressing the fire button cancels the previous shot and fires a new one. Since the program is written in BASIC, this was necessary to keep the action going at a fast pace.

There's an important reason for blasting as many enemy shots in midair as possible: when

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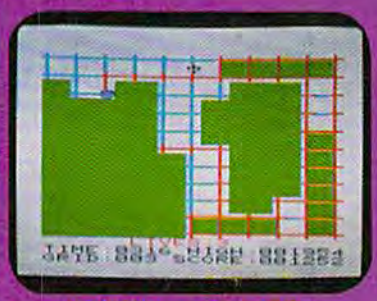

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they miss your turret and hit the ground, they leave behind a small pile of atomic waste. If your turret collides with a pile, it blows up. As the game progresses, your territory gradually becomes littered with these piles of hazardous debris. There's not much you can do about them. Soon your maneuvering room is restricted, and you're at the mercy of the orbiting saucer.

## Programmer's Notes

Lines 100 through 140 move the saucer from one side of the screen to the other. Lines 200 through 260 move the bullet and detect hits. Lines 300 through 360 read the joystick and move the turret, and line 400 reads the fire button.

I included the routine at line 410, because it's something I always look for in a game — it lets you move the turret twice as fast as the saucer. That way, you can outrun the blasts and track the saucer as if you were shooting skeets.

The remainder of the 400-series lines initialize new bullets, and lines 500 through 560 move shots fired by the saucer.

*See program listing on page 233.*

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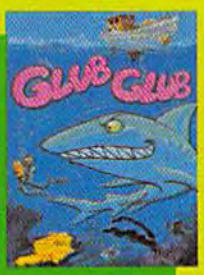
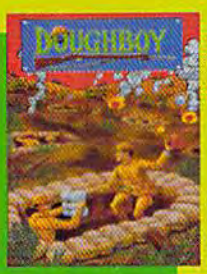



**GLUB GLUB**
The map was right! Under the boat the unmistakable glitter of gold. A king's ransom! But those dark forms can only be...sharks! Can you conquer your fear and avoid those dark marauders?

**DOUGHBOY**
The bugle call has sounded. It's time to hit the trenches for a fun-filled contest of bravery and tactics. Your mission: Recover the supplies that are scattered across the playfield while avoiding enemy troops.





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# REVIEWS

## VIC/64 Rabbit

Roland L. Ryan

If you feel left out when other people talk about the speed of their disk drives, perhaps a product from Eastern House Software coupled with that slow Datassette can be of some help to those of us on a tight budget. Or maybe some disk drive owners will want to dust off the Datassette to use as a backup to the disk drive that just so seldom—but at the wrong time—goes out.

Just what is the Rabbit? The CBM Rabbit from Eastern House Software is a cartridge that speeds up the transfer of data to and from the Commodore Datassette recorder. The stored program uses about one-fifth the length of tape used in the normal Commodore mode. What can this mean to you? The Rabbit allows much faster loading and saving of programs. For example, a 16K program will load in about one minute (compared to about 45 seconds for the 1540/1541 disk drive).

### Three Ways To SAVE

Installation is simple. First plug the Rabbit cartridge into the user port and insert the trailing wire above the third connector on the cassette interface (cassette motor line). After turning on the computer, the Rabbit is linked (switched on) by a SYS 9*4096 command which provides the Rabbit a link with your computer's BASIC language. The Eastern House Software logo appears on the screen and informs you that the Rabbit is linked. Ordinary link-up of the Rabbit does not eliminate the use of the Datassette in the normal Commodore LOAD, SAVE, and VERIFY modes. Instead, the Rabbit adds its own load (*L), save (*S, *SS, and *SL) and verify (*V) commands to those of the Commodore. The Rabbit commands are an asterisk followed by the first letter of the Commodore command, which makes them easy to remember.

With the Rabbit installed, a program which takes four minutes to load from a cassette tape in the Commodore mode can be saved onto a new tape in less than one minute using the Rabbit SAVE (*SL) command. The three Rabbit SAVE commands all work in the same way, except that *SL gives a longer leader tone at the beginning of the save operation to make sure that the leader at the beginning of the cassette tape has passed by the record head before the program is saved. The *S and *SS commands give progressively shorter leader tones and can be used to save programs in the middle of the cassette.

The Rabbit commands *L, *S, and *V are used like the corresponding operations with the Commodore commands LOAD, SAVE, and VERIFY, except the wait is much shorter. The *V (verify) command does not compare the information on the tape with that in the computer's memory, but checks to see if the information on the tape can be read by the computer. This means the Rabbit will *V (verify) a taped program with nothing in the computer's memory.

At the end of a load (*L) or verity (*V) operation, the screen will display the length of the program, the starting address, the ending address, and the name of the program in reverse video. The length of the program and the addresses are in hexadecimal (hex) notation.

A list, or directory, of the programs on a tape may be seen by simply asking the computer to load a program that is not on the tape. By typing *L "*" followed by RETURN and stopping the Datassette at the end of the tape, a list of the programs or data files on the cassette will be displayed.

### Additional Features

The Rabbit contains some math functions which will convert the hex notation used in the program lengths and addresses to everyday decimal numbers (*H) or convert decimal numbers to hex (*D). Example:

```
*H 0801 (RETURN)  = 02049
*D 2049 (RETURN)  = 0801
*H A1B1 (RETURN) = 41394
```

Hex address $0801 is the beginning address of all normal BASIC programs (on the Commodore 64) and will be listed each time the program is loaded. To LOAD a program or a machine language subroutine at a different address, you can use the command *L "Program Name",xxxx, where xxxx is the hex notation starting address of the program. The length and addresses are displayed on the screen at the end of the loading operation.

The Rabbit can also append a program to one already in the computer's memory provided there is no duplication of line numbers in the two programs. Appending is done by simply typing *A "PROGRAM NAME". The Rabbit will search the tape and append the new program to the one in the computer's memory. This procedure could be handy for those of us who like to

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# Well, almost.



Continental Software
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work on long programs or develop games using sprites or graphics routines.

The Rabbit can test your computer's memory for storage retention (test 1) and for proper chip select operation (test 2) with the command *T followed by the test number, starting address, and ending address of the memory to be tested. Any errors will be displayed in reverse video.

The Rabbit also has other useful commands:
*E Execute–LOADs (*L) and RUNs the program.
*G xxxx—go to the machine language program at hex address xxxx.
* —go to to CBM monitor (a monitor must be in memory).
*Z —toggle lowercase versus graphics character set.
*K—(Kill the Rabbit) removes the link to BASIC.

When using programs already recorded in the Rabbit mode, the usual LOAD, SAVE, and VERIFY commands can be used in place of the Rabbit commands. This is done with a system command that disables the Commodore mode and replaces the Rabbit commands with those of the Commodore.

## Data Files, Too

Another added feature of the Rabbit is its ability to use the Rabbit mode to generate data files. This feature means that waiting times for writes and reads of data transferred to and from the Datassette will be much shorter.

The Rabbit generates short and long data files. The short files use the cassette buffer memory and hold only 192 bytes of information before a pause to allow the computer to transfer the data to the Datassette is necessary. The long data files use 1K (1024) bytes of the computer's BASIC memory, which, of course, decreases available memory by 1024 bytes.

The Rabbit does not speed up the loading of programs already saved in the Commodore mode. These programs must be loaded as usual with the Commodore LOAD command and then resaved with the Rabbit commands. (Remember to use the *SL command for the first program on a new tape.) The Rabbit copy may then be used whenever you wish to load the program quickly.

## Rabbit + Quickfind = Fast Tapes

If you are thinking about sitting down and resaving all your present program files in the Rabbit mode, why not go one step further—use the "Quickfind" program from the premier issue (July 1983) of COMPUTE!'s Gazette to make the resulting tape into a super job. Quickfind was adapted for the Commodore 64 and VIC-20 by Harvey Herman, Gazette associate editor. It allows you to rapidly locate any program on a cassette. Quickfind can be typed in, saved (*SL) onto a work tape, and then run. The only change that must be made to use the Rabbit with Quickfind is to change LOAD in line 335 to *E.

Following the instructions in the Quickfind article, LOAD each program into memory from the Commodore mode tape and SAVE (*S) them onto the Quickfind tape. When you are finished, rewind the tape and Execute (*E) the Quickfind program. The menu of programs on the tape will be displayed on the screen. Choose the desired program by number, press RETURN, and follow the instructions on the screen to PRESS FAST FORWARD ON CASSETTE. When the Datassette motor stops, the screen prompt will say PRESS STOP ON CASSETTE. Then the screen will say *E "Program Selected". Press RETURN and the PLAY button on the Datassette. It takes only about two minutes from the *E (Execute) "Quickfind" to the running of your selected program, even if the program is at the end of a C-30 cassette holding nine or ten programs of 16K bytes or less.

## Rabbit Is Reliable

In my usage the Rabbit worked well, and I recommend it. There were no SAVE (*S) errors and very few LOAD (*L) errors with the Rabbit. Most of the few errors were caused by placing the Datassette too near the television set which I used as a monitor. (TV sets emit strong magnetic fields.)

The Rabbit documentation is well-written, with examples and a short demonstration program on Rabbit data file capability. The program shows how both short and long data files work.

In a telephone interview with Carl Moser, who wrote the Rabbit program for Eastern House, Moser stated that the Rabbit mode should be more reliable than even the normal Commodore mode. His reason is that the Rabbit checks both the leading and trailing edges of a tone to decide if it is a one or zero (files are stored on tape as a series of tones). The improved routines used by the Rabbit were worked out with recording studio equipment to give increased reliability at the faster speeds.

My only disappointment

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with the Rabbit was that it would not make a Rabbit mode backup of protected commercial programs I already own (of course, neither will a disk drive). Moser stated that an updated version of the Rabbit which would make a backup copy of almost all programs was in preparation and should be available by the time this appears. The owners of the earlier 2.0 and 2.1 versions of the Rabbit may have them upgraded by Eastern House. A charge will be made for labor and the additional ROM needed for the upgrade.

My early 2.0 version of the Rabbit, of which only a small number were produced, had a few bugs. Eastern House was already aware of them. Execute (*E) and LOAD to a different address (*L "Program Name", xxxx) would not work. Moser says an upgrade of the 2.0 version to the 2.1 would be made by Eastern House for a handling fee (for more information contact Eastern House).

## Low Cost, High Speed

In my opinion, the Rabbit's only drawback compared to a disk drive is that it still uses tape — meaning that the first programs or files on a cassette must be passed over to load or read the programs or files stored after them. Using the Quickfind program should help alleviate this problem.

The Rabbit allows the storage of up to 300K bytes of data files or programs on both sides of a C-30 tape. The 30-minute tape is the longest length recommended by Commodore for use in the Datassette. The Rabbit and Datassette combination may also be a very good backup to the disk drive, since it stores a large amount of data at relatively low cost. The Rabbit, which lists for $39.95, combined with your Datassette is the beginning of a low-cost mass storage system. Cassette tapes are inexpensive and easy to mail or store.

Does the Rabbit plus a Datassette equal a poor man's disk drive? Yes, I think so!

VIC/64 Rabbit
*Eastern House Software*
*3239 Linda Drive*
*Winston-Salem, NC 27106*
*$39.95*

# *Busicalc* For VIC And 64

Richard Devore

If you do or need to do financial projections for home or business, *Busicalc* may serve your purpose much better than pencil and paper. Besides, you didn't buy your computer just to play games, did you?

*Busicalc* is a spreadsheet program for the Commodore 64, VIC-20, and PET/CBM computers (this reviewer examined the 64 version). It allows you to set up sales projections, budgets, bowling team averages, or any other figures in row and column format. It is particularly useful if you have variables for a "what-if" analysis. By typing in the changes and recalculating, the program shows what effect the changes will have on your end result. Each time the figures are changed, a hard copy may be made on a printer for later reference.

Changes may also be saved on disk. But be sure to have a formatted disk handy, because *Busicalc* does not allow you to format a disk once the program is loaded. Not having a formatted disk would leave you, at best, with a printout—which means the work would have to be redone once you left the program to format the disk.

## Easy To Learn

The *Busicalc 64* package comes with a program disk, 36-page manual, and a licensing agreement. The agreement is pretty much standard—you never actually "own" the copy-protected program, but you are allowed to use it on one computer at a time. A backup copy may be obtained when the warranty registration card is returned with $10, a reasonable fee.

For the most part, the manual is complete and includes several tutorials on using the program. These progress from a simple sales projection of four rows and four columns to a 27-row by 9-column spreadsheet which starts with sales and computes the commission, net sale, costs of goods, and gross profits. The final example sets up a personal budget. This tutorial includes the normal income and expense items. After setting up the budget, you are shown how to work with it, something that is immediately practical.

Following each tutorial, you are taken step by step through the program's commands and functions. There are a few errors in the documentation, but they are eas-

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ily recognized and compensated for. I was amazed at how quickly I could learn the program from the tutorials, and I feel they are well done.

*Busicalc 64* does not make use of the 64's sound or color capabilities. On the 64, the maximum sheet size is 33 columns by 33 rows with an eight-character column width, or any row and column format that does not exceed 1100 eight-character blocks of information.

Formulas may be put into any block, addressing information in any other block. However, since the program performs all calculations from the top left of the sheet to the bottom by columns, working from left to right, if a value for a formula being worked is positioned beyond the formula (i.e., the formula is in column C and the value is in column E), the anwer will be wrong. This can be circumvented, but it is both inconvenient and apt to be overlooked.

Although the manual states that you may use formulas of up to 38 characters, brackets are not allowed. This slows things down greatly. For example, you cannot take a figure in column A, multiply it by a number, add that to a figure multiplied by a number in column B, and place the answer in column C. Instead, it would be necessary to add two columns to the sheet. These would hold the answers from each multiplication so you could add the figures in each of the two new columns by the formula and place this answer in what originally was column C.

## Numerous Commands

I found *Busicalc* to be a simple-to-use spreadsheet program because of the control functions. They are accessed by the slash ( / ) key and appear at the top of your screen. The control functions are:

- *Jump*—Move directly from one block to another without scrolling.
- *Save*—Store all or any portion of the sheet to disk or tape.
- *Load*—Bring a saved file onto your worksheet from either a disk or tape.
- *Replicate*—This function, along with the math formulas, gives the program its power and makes it a lot quicker than pencil and paper. It allows you to copy any section of your worksheet to any other section of the sheet, making it unnecessary to type in the same information over and over.
- *Insert*—Squeeze in a row or column that you may find necessary after setting up the worksheet.
- *Delete*—The reverse of Insert, lets you remove an unneeded row or column.
- *Print*—Make a copy of the worksheet on paper.
- *Auto*—Keep the program from performing individual calculations until you finish your input, thus saving time while typing. May be toggled on or off as desired while control functions are being displayed.
- *Walk*—Select the direction the cursor will move upon pressing the RETURN key as you finish an entry. The selections are: up, down, right, left, and cancel.
- *Format*—Specify the spacing between adjacent columns. This is done by selecting the width of each column before the worksheet is printed. You may even choose not to print a column by setting its width to 0.
- *Memory*—Keep track of memory usage by showing available memory at the top of the screen. It also does a "garbage collection" each time it is used, thus helping to conserve memory.

I found *Busicalc* to be a useful program for real-world applications. It is also easy to learn. Although it does not have the calculation power of some other spreadsheet programs, it also costs less than the more powerful products.

Busicalc
*Skyles Electric Works*
*231E South Whisman Road*
*Mountain View, CA 94041*
*Commodore 64 tape/disk $69*
*VIC-20 disk $59*
*VIC-20 tape $49*

# Ski-er 64

Eric Brandon

It's 102 degrees outside, but suddenly you find yourself transported to a ski resort in the Swiss Alps. This bit of magic is *Ski-er 64*, by Abacus Software, a fun and realistic downhill skiing game.

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*Hurtling down the Alps in* Ski-er 64.

*Weaving around obstacles on the slalom slope in* Ski-er 64.

can try the Alps. This involves skiing down the slope as fast as you can, without hitting any of the numerous trees on the course. A very nice three-dimensional effect is achieved by the game and it looks very realistic, especially on the Alps run. If you successfully navigate through this forest, you once again pass through a finish gate to freeze your time. To make it fair, three separate "best" times are kept by the game, one for each type of run.

## Program Controls

The control is very precise once you're used to it. You can use either a joystick or the keyboard. With the joystick, turning right or left is achieved by tapping the stick in either direction. Holding it too long (more than about half a second) in either direction will turn you horizontally and stop your motion. When you are in this position, you can either turn back or ski some more, or you can push yourself forward with your poles. When you're going downhill, pushing forward speeds you up (you can go incredibly fast for a while before you're hit by a tree), and pulling back on the stick slows you down.

With the keyboard you have identical control, except that you use the cursor keys to turn, and the SHIFT and Commodore keys to control your speed.

Just to keep things interesting, programmer Jeff Hanson added three skill levels to each run. You choose these levels by pressing either f1, f3, or f5 before starting. The levels determine how far down from the top of the screen your skier will be, and consequently how much warning he has of objects appearing from the bottom. The first novice level is enough to keep me busy, and I can't imagine anyone would ever be bored with level three, the most difficult.

A short manual is included with the game, but all the instructions you need are right on the screen.

Ski-er 64
*Abacus Software*
*P. O. Box 7211*
*Grand Rapids, MI 49510*
*$17.95 disk*
*$14.95 tape*

# *Mini Jini* For VIC And 64

Gregg Peele, Assistant Programming Supervisor

Do you remember why you first decided to purchase your own home computer system? Maybe you had dreams of totally automating the more tedious aspects of your life. All your records could be kept on disk—making record-keeping as simple as typing in the information and hitting a few keys to process the data. Keeping and organizing records is an important application for home computers and is accomplished through the use of a data base manager program. Such a program makes managing records easy with built-in commands for most data base functions.

## Using A Data Base Manager

Data base management systems must be capable of performing three basic tasks: defining and organizing a file of records, storing data in the file, and manipulating the file.

First, users must be able to create defined files with specific record descriptions. Just like a filing cabinet, a computer file has records grouped together because of a common denominator. Individual records are further subdivided into categories called *fields*, which are determined by the creator of the file. A typical file record in an address file might look like this:

File Name Address File

Record #1

Field Description

| | |
|---|---|
| Last Name ... | Doe |
| First Name ... | John |
| Address ..... | 112 Mystery Place |
| City ..... | Detroit |
| State ..... | Michigan |
| Zip ..... | 57776 |
| Account status | Paid |

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The first stage in using a data base file includes defining the name of the file, and the fields which categorize components of records. The definitions of the fields within records should be chosen carefully because they will be the means of sorting data.

The second stage in using a data base is the process of entering the data for each record. Most data base management programs prompt you with the field name that you have already defined, allowing you to fill in the slot with the appropriate data.

The third stage in your use of a data base management system is the actual manipulation of fields within records to produce reports, summations, or new interpretations of the information. For example, the address file mentioned previously could be sorted by the "Account status" field. We would then be able to print out all the names and addresses of only those people who have an outstanding balance. Similarly, fields can be alphabetized, added, subtracted, averaged, or multiplied by either a constant or another field within the record.

## Data Base On A Cartridge

All these features and more are included in *Mini Jini*, a data base manager program for Commodore 64 and VIC-20 microcomputers. Available in cartridge form, *Mini Jini* starts automatically upon power-up—revealing a main menu. This menu contains options to create, review, alphabetize, find, fix, print, save, or load records from disk or tape. An option called "Mathpack" allows you to perform calculations on fields using either other fields or constants. The results of these calculations may be stored in other fields.


*The menu of options in the Commodore 64 version of* Mini Jini.

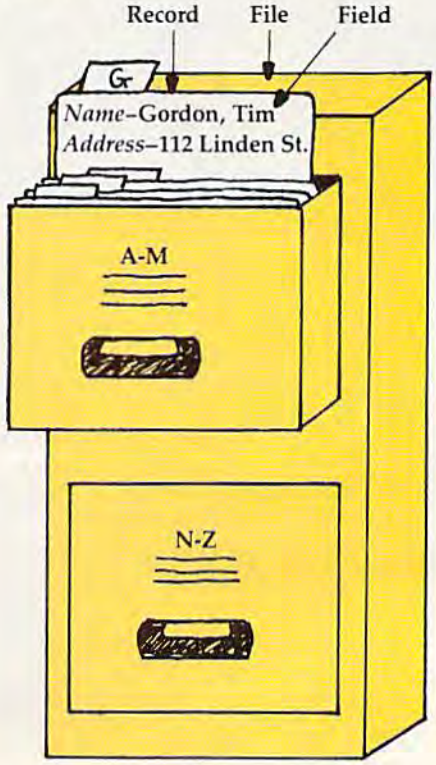
Creating file descriptions and entering data is very easy with *Mini Jini*. All points of data entry are carefully designed to be idiot-proof. Even if you make a mistake, you may return to the menu and fix your error. The documentation is also user-friendly. Designed to be used by computer novices, the manual contains clear, concise instructions and examples for every function. There is even a disk menu with prompts for viewing the disk directory and initializing and scratching files.

For an extra fee of $14.95 for disk or $9.95 for tape, a series of 79 predefined files is available. Although not a necessity, these predefined files may be helpful in designing your own data base. File descriptions include mailing lists, files for amateur radio operators, recipe files, and files for stocks and bonds.

One important consideration when purchasing data base software is the number of records your system can hold with its present memory capacity. *Mini Jini* allows you to store up to 350 characters per record on the VIC and 750 characters per record on the 64. Unexpanded VICs may store up to 50 45-character records. In comparison, the Commodore 64 has a capacity of 500 45-character records (with four fields or less) or 250 100-character records (with six to ten fields). A fully expanded VIC-20 can store as many records as a Commodore 64 (ten times the capacity of an unexpanded VIC). Files produced with *Mini Jini* are compatible with the *WordPro*, *Papermate*, and *BusyWriter* word processors.

If you have a printer, you can print records by moving to the Print menu. From this menu, you may print all the data (including record numbers) by pressing P. Pressing R prints all the records in a report-style format, and pressing L prints your records in labels format. The manual provides a clear guide to the peculiarities of

## The Parts Of A Data Base



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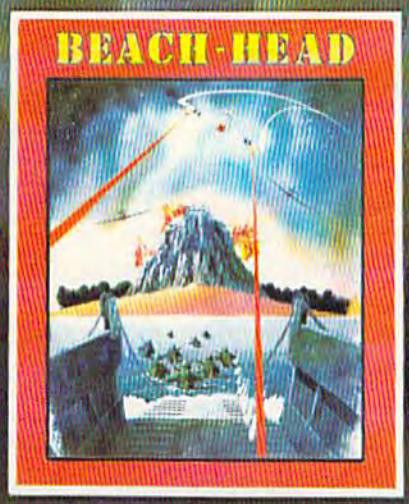


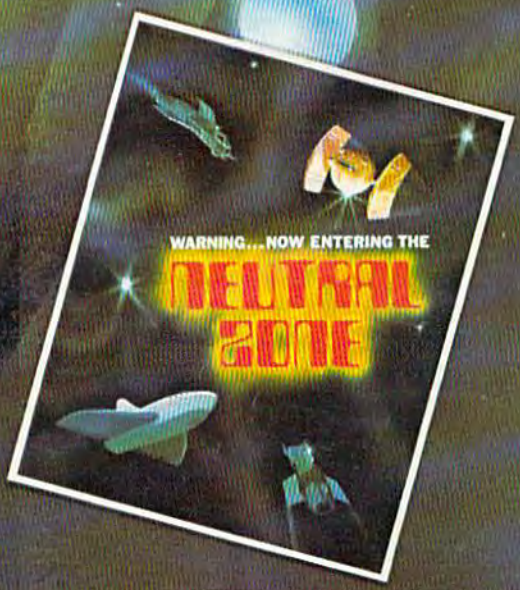


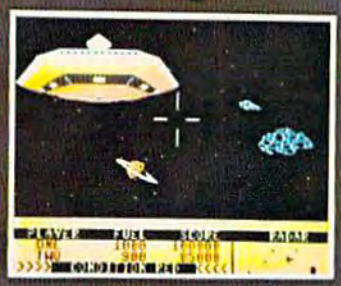

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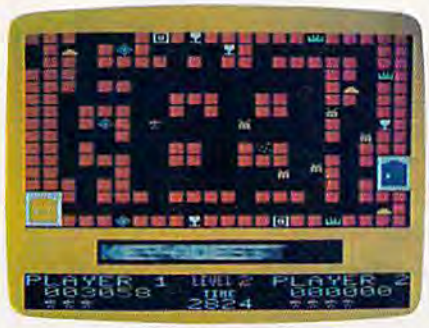
# *Key Quest* For VIC-20

Tony Roberts, Assistant Managing Editor

Deftly mixed color, special effects, and pace provide the potion from which a well-worn idea can gather the strength to rise again.

*Key Quest*, a product of Micro-Ware Distributing is a maze game and a chase game. It has treasures and monsters and keys that unlock doors leading to mazes more difficult than those that went before.




*In quest of treasure, your hero (left-center) prepares to defend himself against an approaching yellow Gorb.*

But in its blend of common ingredients, Micro-Ware has endowed *Key Quest* with an uncommon visual appeal and a liquid-like play challenging enough for a broad range of game players.

## A Rainbow Of Colors

From the start, *Key Quest* is a treat for the eyes. The title screen slides in from the right, the unconventional horizontal scrolling commanding immediate attention. (The effect is used throughout the program for level changes and to reset the board when the inevitable collision with a monster occurs.)

The walls of the maze are built of brick, rich and red, on a black background. The treasures—gold bars, sapphires, emerald crowns, and silver chalices—almost glow from their protected recesses in the maze walls. The player is represented by a figure clad in regal purple, and the monsters stand out in gold. The entire playfield and the scoreboard below it contrast against an orange-yellow background.

There's color everywhere, but it's neither blaring nor boring. It is well-blended and a pleasure to look at. *Key Quest*'s only visual blemish may be the large block-lettered title that continually floats back and forth in a box above the scoreboard.

## The Scenario

Many years ago, a master wizard traveled the land collecting treasure wherever he found it. Below his fortress, he built a dungeon in which to protect his riches. To guard his wealth, he created the Gorbs—powerful monsters that regenerate very quickly. The Gorbs, however, proved to be too powerful for the wizard himself, and the first time he sought to examine his treasure, he was eliminated by his own sentries.

Upon the wizard's demise, the king of the land put out a call for adventurers to reclaim the riches that had been pillaged from the realm and its subjects. Plugging the game cartridge into your VIC-20 indicates your willingness to accept the challenge to restore the treasure. Armed with either a joystick or the keyboard, you delve into the underworld.

Hidden on each level of the dungeon is a key that opens the way to the next level. The key's location will be revealed to you once you have collected 12 of the treasures scattered about the maze. Once the key is visible, you must pick it up and make your way to the door. The Gorbs, which continuously emerge from the swirling cloud that marks their lair, serve to complicate the whole process.

## Your Defense Is A Limited Offense

The fire button of your joystick will give you some help in fighting the Gorbs, but it is not universally effective. It fires only right or

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left. If the Gorbs are above or below you, you'll have to run until you're in a more advantageous position.

Each of the treasures is hidden in an alcove along the walls of the dungeon. The master wizard, in a stroke of genius, protected these areas so the Gorbs would not disturb the treasure. In these nooks you'll find both safety and the most effective position from which to attack the monsters. A word of caution is in order here. If you point your joystick out of the alcove and fire, you begin moving in that direction and, in all probability, will be involved in a fatal collision with a Gorb.

Face into the alcove and fire, and you turn around and are able to defend your position without having to step into the hall. Shooting from an alcove gives you your best advantage against the Gorbs because your shots either hit a Gorb or a wall very quickly, giving you another shot. If you take aim at a Gorb that is down a long hallway, you have to wait until your bullet is spent before you're able to fire again.

The Gorbs are dangerous creatures. Touching one is always fatal, and a near miss is often just as tragic. In some cases, nothing happens if you briefly occupy a space adjacent to a Gorb, but at other times, the Gorb seems to fire a weapon of its own at you.

For safety, give the monsters a wide berth. The crafty Gorbs make a habit of hiding behind each other, disguising their numbers. Be watchful or you'll walk right into a Gorb you didn't realize was there.

At times, your best strategy is to stay hidden in an alcove for a while and shoot as many Gorbs as possible. This will give you a little maneuvering room when you return to treasure hunting.

## Building Your Score

High point totals are based on how quickly you discover the hidden keys and move on to new levels of the dungeon.

You pick up points as you pick up treasure. Each of the four treasures has a value ranging from 25 to 100, and each Gorb you shoot is worth 50 points. It's not worth the effort to try to pick up 100-point gold bars as opposed to 25-point emerald crowns. Your best score comes as you accomplish your mission with time left on the clock.

As you enter each level, a time clock begins ticking backwards from 3000. When you leave a level, 100 points will be added to your score for each 100 units left on the clock.

*Key Quest* has four screens, and after you make your way through those the first time, the screens repeat, but with more and faster Gorbs in your way. A secret passage on each screen allows your player to be transported to the opposite side of the screen. Be certain the exit isn't surrounded by Gorbs.

*Key Quest* is an exciting and alluring game. It allows the player to develop patterns, but it doesn't become routine because there's more than one path to success. The game plays well and takes your joystick through a comprehensive workout.

Key Quest
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# Budget Planner

Charles B. Silbergleith

**This home budget program allows you to keep track of various household expenses and calculate totals quickly and easily. The same program works on either a Commodore 64 or VIC-20 (at least 8K memory expansion required).**

In the dark days prior to automation, I would plan my budget by writing all my month's expenses on a sheet of paper, adding items, and adjusting amounts as I received a bill.

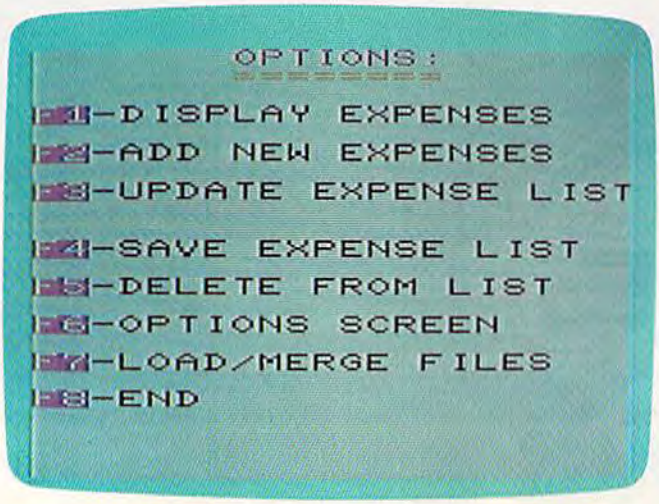
This process worked very well except for the number of revisions necessary for revolving credit accounts such as credit cards. Every time one of the item amounts changed, the grand total changed and needed to be recalculated. That was messy.

I decided to write a program which allowed me to make a list of my monthly expenses, to change amounts, and which provided a grand total of all items. I also wanted the program to save this list to tape and recall it.

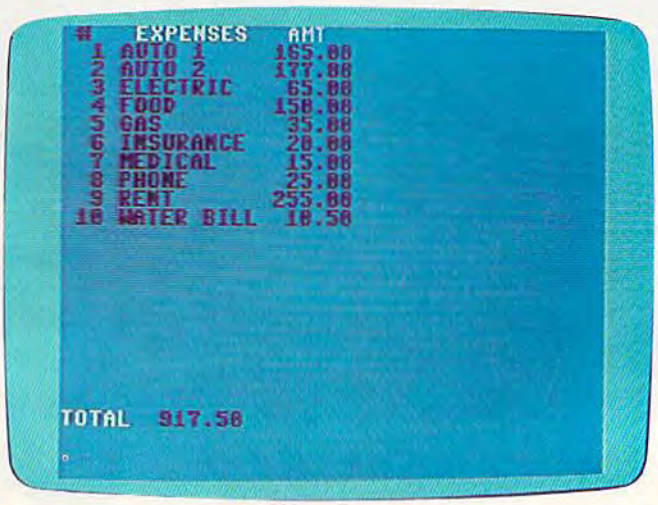
What was produced was a program that allowed me to maintain a list of expense items, add new items, change amounts, delete items, and it would quickly sort and sum all the amounts. This was useful in seeing whether new expenses could be incurred (could I really afford that new disk drive or not?), or whether bill consolidation would help.

## Program Operation

First here are some basic characteristics of the program before I discuss how to use it. The list allows




*The main menu in "Budget Planner" (VIC version).*




*A typical expense list made with "Budget Planner" (64 version).*

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for entries of ten characters (maximum) per item and amounts of up to 9999.99. The list will be sorted, a total calculated over all item amounts, and the options menu displayed at the end of an add, update, or delete modification to the list. The sort is done by item name. You will be repeatedly prompted for the next add, update, or delete to the list until you type *END to one of the prompts for input. In fact, any function will terminate whenever you respond with an *END to a prompt.

Since the program was written for a VIC-20 (and converted for the Commodore 64 also), it uses the special function keys f1 through f8. Described below are the functions:

f1 **Display Expense List.** This function displays the list and a total of all item amounts at the bottom of the screen. Pressing f1 will display the next 20 items, and the cursor up and down keys scroll the list vertically. All function keys are available.

f2 **Add New Expense To The List.** This allows you to add a new item to the list. The program will not check for duplicates. However, it's simple enough to change or delete an item if you mistakenly duplicate one. Names are up to ten characters, and amounts should not be larger than + or − 9999.99. These restrictions are used to prevent the screen display from overlapping, wrapping around, or otherwise messing up on the 22-column VIC. Type *END to return to the menu screen.

f3 **Expense List Update.** The screen lists a number next to each item. This number is the item's index. Use this number for the ITEM # prompt. The item will be displayed and a new name or amount may be entered replacing the old data. Pressing the RETURN key without data when prompted for an ITEM NAME or AMT will leave the current data intact. Again, type *END to return to the menu.

f4 **Save The List On Tape.** The program asks for a FILE NAME. This should be any name that follows normal Commodore file naming conventions. This is the filename SAVEd on tape. Remember it.

f5 **Delete Items From The List.** The START AT and END AT prompts allow a block of items to be deleted by putting the starting and ending index numbers in the appropriate places. Leaving out the ending index will delete only the starting index number's item. Type *END when prompted for the starting index number to return to the main menu.

f6 **Display The Option Menu.** Function keys and their associated functions are displayed. See program lines 6030-6100 for details.

f7 **Load Or Merge A List.** A previously saved list can be loaded into memory or a list on tape can be merged with a list in memory. For the merge, an item on tape is compared to the items in memory, and if the item names match, their amounts are averaged together and replace the previous amount. If the item doesn't match, the item is added to the list.

f8 **End Of Program.** This function allows you to first save the list before actually ending the program—handy if you've forgotten to save the list before.

## Technical Notes

The program is written using the modular concept of structured programming. This means that the program is written in order to isolate its various tasks. Common routines are separate from the routines that use them and are accessed by GOSUB statements.

The main routine (lines 200-299) calls various subfunctions at the user's request. A request to display the list (f1) calls a subroutine at lines 1000-1999; update (f3) calls lines 3000-3999, etc. Notice that each function key corresponds to a range of 1000 line numbers—f1 is lines 1000-1999; f2 is lines 2000-2999; f3 is lines 3000-3999, etc. This makes it easier to remember where things are in the program.

In addition, two utilities are included as separate modules for use by any function. These are the bubble sort, lines 500-599, and an accumulator, lines 300-399.

GOTO statements are kept to a minimum and are used only for branching within subroutines. While certain advocates of structured programming insist on GOTO-less code, I find it sometimes more cumbersome to eliminate all of them than to use a few. Again, the word to remember is *few*.

One last note. The variable SZ (line 20) controls the number of items that can be listed. Naturally, the more items on the list, the more memory is required. Since the computer will consume more memory as needed when the program runs, it is possible to make this variable too large and run out of room while working with the program. As an exercise, I suggest you add a function which will display the amount of memory left. Use the ? key to invoke it. I think you'll find it fairly easy to do given the way the program is organized.

*See program listing on page 220.*

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# The Note Name Game

Jeff Behrens

**"The Note Name Game" is an educational program which makes learning the notes of the musical scale easy and fun. Originally written for the unexpanded VIC-20, we've added a version for the Commodore 64.**

Musical notation is like anything else—it's easy once you learn it, but learning it is not always easy.

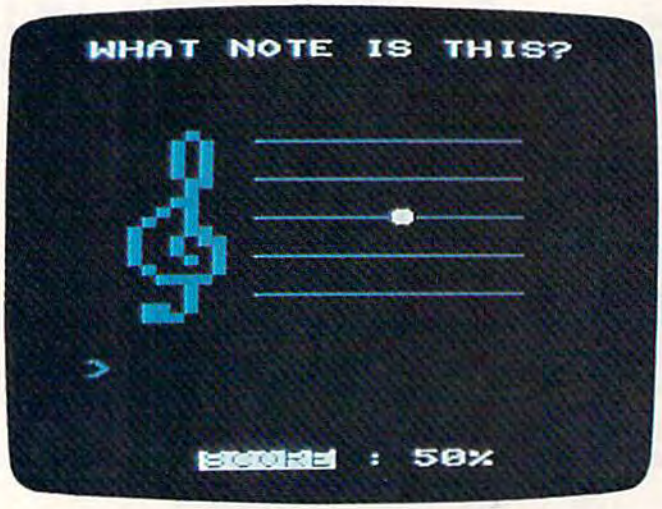
Sight-reading of notes is vital for anyone who wants to play a musical instrument, because instant note recognition is a must. That's the idea behind "The Note Name Game." My daughters, who are taking piano lessons, love playing it. Although it does not teach everything about musical notation, it does allow students to practice quick recognition of notes in the treble and bass clefs.

## Treble Or Bass?

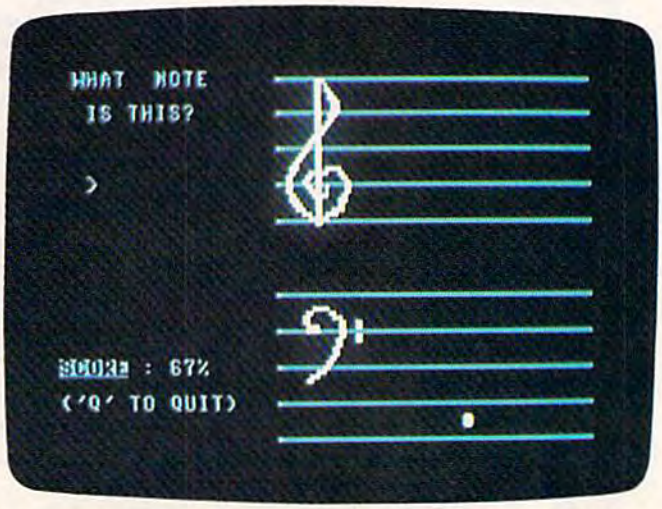
The program begins by asking whether you want to practice notes on the treble clef (enter a T), the bass clef (B), or a mixture of both (M). The program then selects a note at random and places it on the appropriate clef.

Next, the program asks for the letter name of the note displayed. If your response is correct, you are told so, and the next note is displayed. If your response is wrong, the correct answer is highlighted on the screen and the next note is shown. The program constantly updates your score and displays it on the screen.

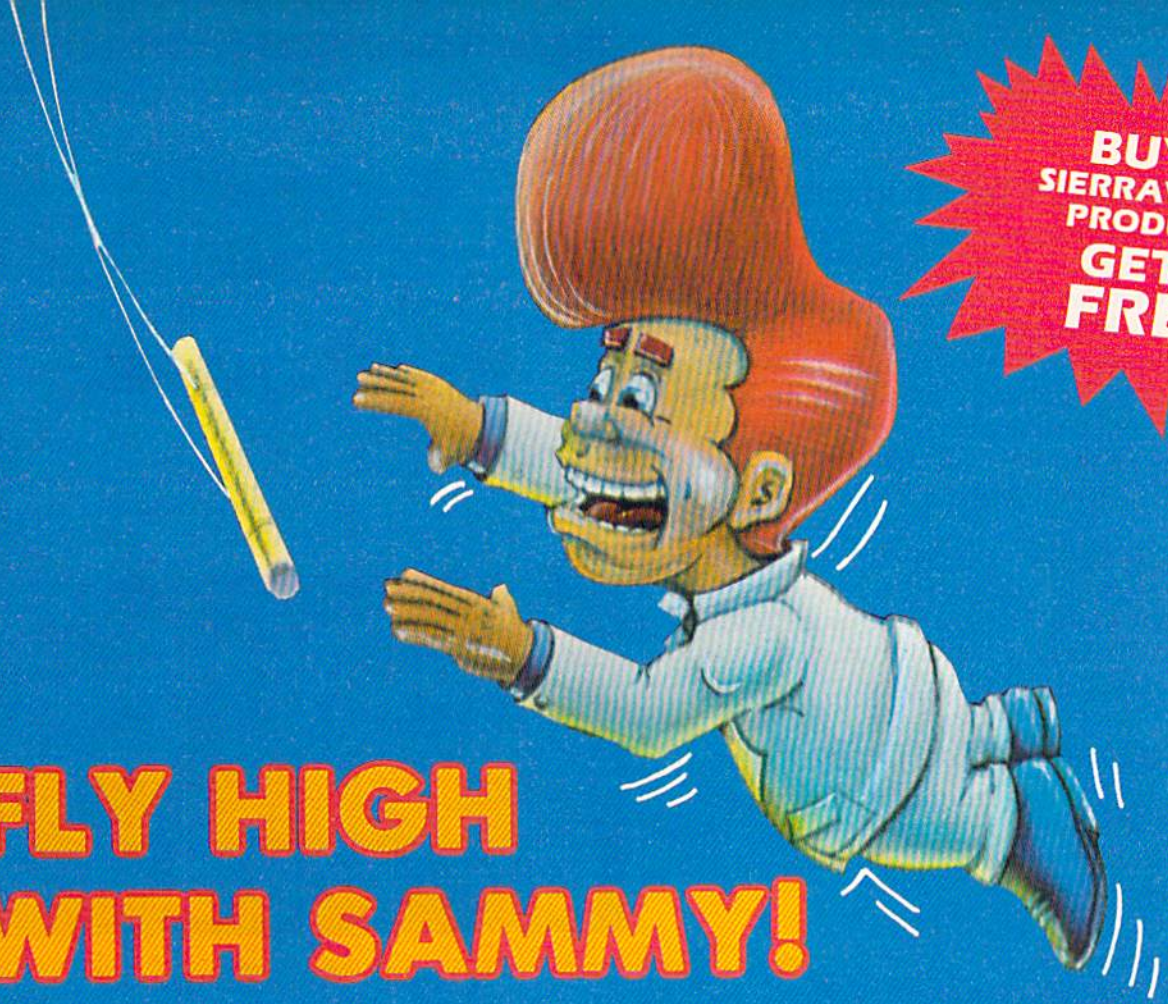
Notes are shown in sets of ten. If you wish to quit before finishing a set, type Q instead of the




*Learning to recognize treble clef notes with "The Note Name Game," VIC-20 version.*




*A bass clef note in the Commodore 64 version of "The Note Name Game."*



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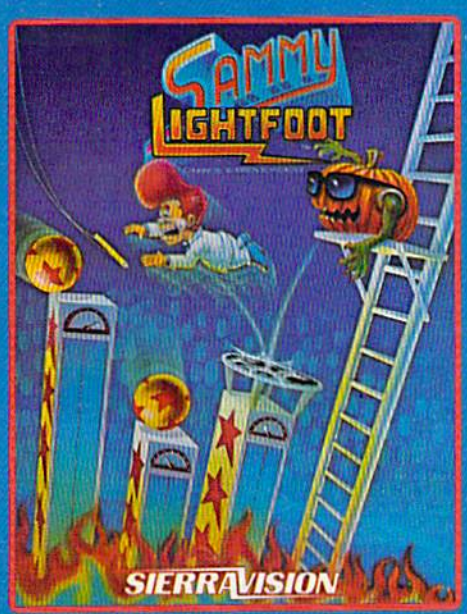


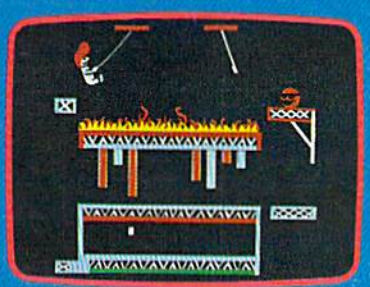

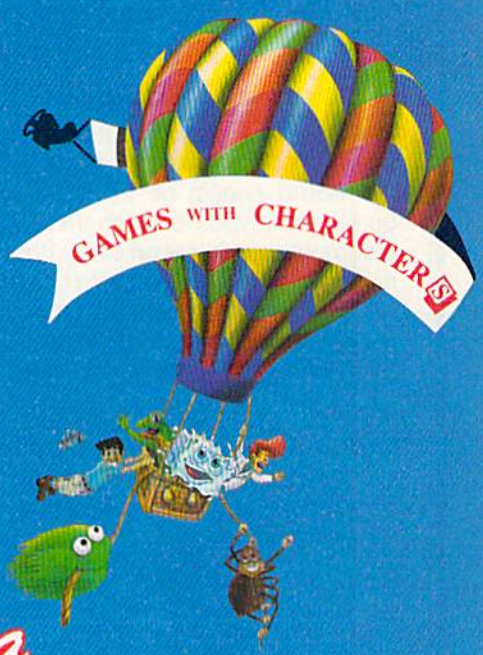


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answer. Whether you finish or not, the score is printed and you are asked if you want to play again.

## Customizing The Program

Depending on personal preference, there are some changes you might want to make. With the VIC-20, I find the TV picture is sharpest when the screen and border are black and the cursor blue. You may, of course, specify any screen/border combination by substituting the appropriate number for the 8 in the POKE statement on line 25 of the VIC version (see your manual for possible combinations). Similar modifications are just as easy with the Commodore 64 version.

The variables R and W, respectively, are the number of right and wrong answers and are initialized to zero on line 5. The string variable N$(1,25) is a string array containing the note names and the POKE values for the sound registers.

## Tape Copies — VIC Only

If you don't want to type the program, I'll make a copy of the VIC version for you. Please send a blank cassette, a self-addressed stamped mailer, and $3 to:

*Jeff Behrens*
*1510 N.E. 57th Terrace*
*Gladstone, MO 64118*

*See program listings on page 238.*

# New VIC-20* Releases!

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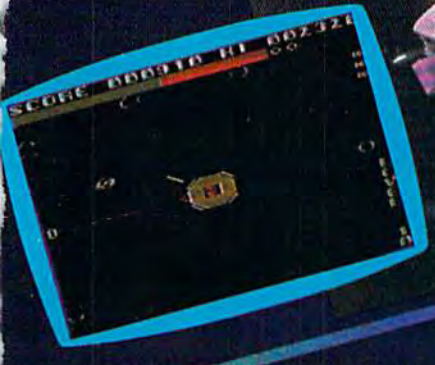

Calling all future fighter pilots. Captain Fargo needs you! If you can defend your ship against the attack of enemy star-cruisers, control of the sky is yours. But beware! Creatures of the night will come at you from all sides . . . firing at you with light missles and white-heat vapor rays. You can take only a few hits or you'll be destroyed. Only a steady eye and rapid-fire reactions can save you and your ship. The challenge is yours. Defeat is agony.

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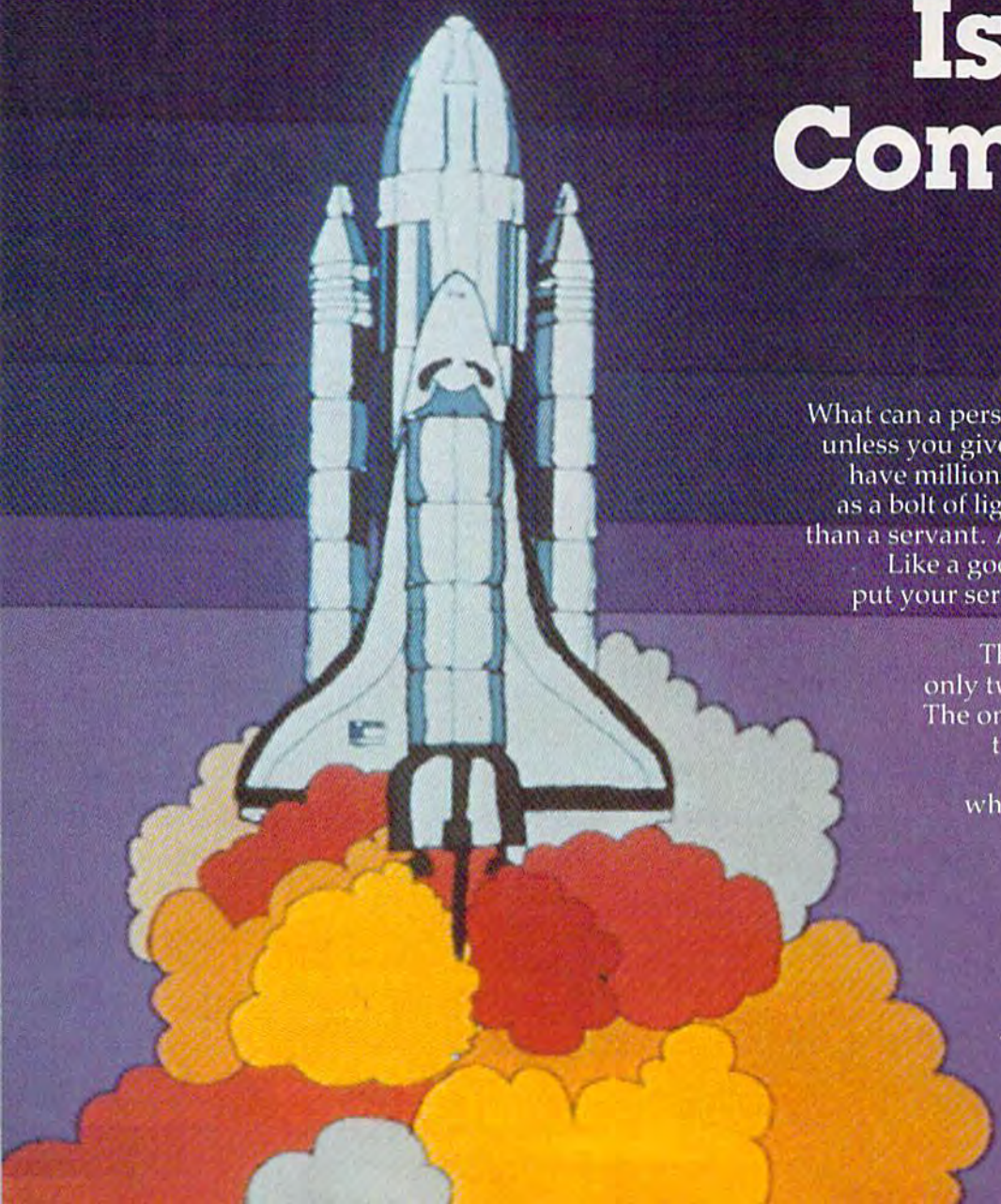
COMPUTING

# for kids

FRED D'IGNAZIO,
ASSOCIATE EDITOR

# Your Wish Is My Command



What can a personal computer do? Nothing—unless you give it orders. The computer may have millions of transistors and be as swift as a bolt of lightning. But it is nothing more than a servant. And you are its king or queen. Like a good king or queen, you want to put your servant to work. But how do you give it orders?

The first computers understood only two numbers—ones and zeros. The ones and zeros that humans fed the old computers represented the pulses of electricity that whizzed through the computers. The ones represented the big

*An artist taught a large computer to draw this picture of the space shuttle blasting off. (Courtesy Digital Graphics Systems.)*

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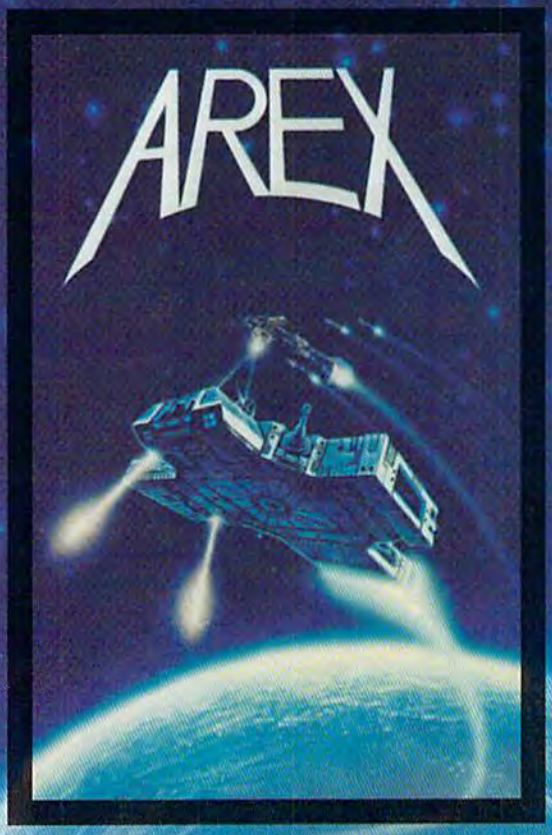


*by William Muk*
*CoCo version by Roger Schrag*
*Apple version by Gordon Eastman*
*Atari and Commodore 64 version by John Anderson*

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*by George Schwenk*
*TRS-80 version by Dave Simmons*
*CoCo version by Roger Schrag*

"Yas, after purchasing diamond mines in South Africa, oil wells in Saudi, and rare beer cans in Walla Walla, Washington, I had begun to wonder what other trendy commodities remained to be added to my swelling portfolio. Then a snip of a ticket girl dared to tell me (ME, Hartley J. Wormsflather III!) that my flight was overbooked. To avoid future misunderstandings, I bought the airline."

"I think I'm on to something profitable here." Hartley J. Wormsflather III

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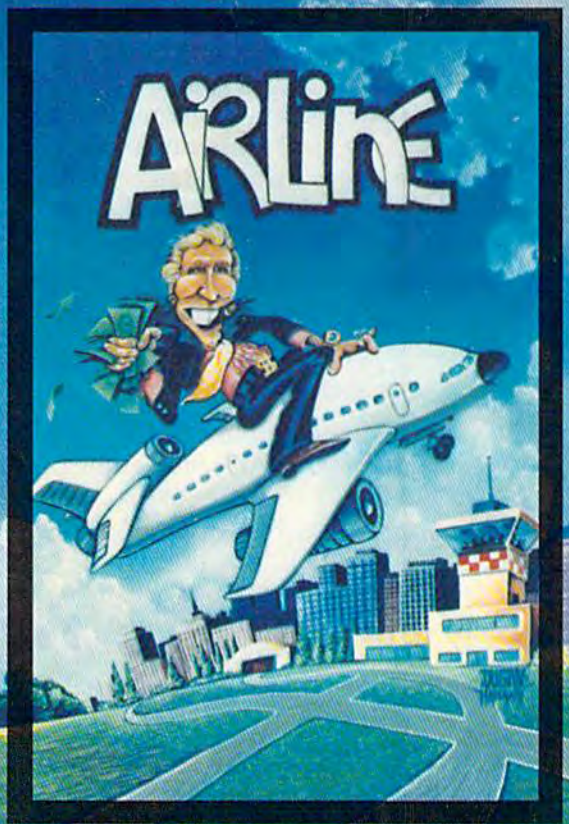


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pulses. The zeros represented the little pulses. Dozens of ones and zeros, strung together like pearls on a necklace, represented only a single computer command — like ADD 1 PLUS 1.

Today's personal computers can almost understand English. You feed them commands by pressing buttons on a keyboard wired to a chip. If you took off the top of the keyboard you would see dozens of little chips inside. The chips might be lined up on green plastic cards the size of graham crackers, or hidden inside black plastic cartridges.

Let's say you type the command PRINT "HI" into the computer. First, the computer translates your command into tiny pulses of electricity. Next, it obeys the command. Then it translates the answer back into English and prints it out on the TV screen. "HI" says the computer.

## Writing Simple Programs

Now let's imagine that you want to do your math homework on a computer. As part of your homework, you have to multiply pairs of numbers. Your computer is great at multiplication. But you have to teach it how. You have to give it orders.

You think about what you want the computer to do. First, you want it to accept two numbers. Then you want it to multiply those two numbers. Last, you want it to print the answer so you can use it in your homework.

You sit down at the computer keyboard. You have to teach the computer with a language the computer understands. Your computer talks BASIC, like most other small computers.

You type in your commands one at a time. You make sure that you begin each command with a line number. This helps the computer keep the commands separate when it obeys them.

Here are the commands:

```
10 INPUT N1
20 INPUT N2
30 LET ANSWER = N1*N2
40 PRINT "THE ANSWER IS ";ANSWER
50 GOTO 10
```

All the commands work together to do one job—help you with your homework. When commands work together to do one job they have a special name. They are called a *program*.

When you type in the program, it is stored in the computer's memory chip. To get the computer to obey your program, you have to get the memory chip to send it to the brain chip. To do that is simple. You just type RUN.

When you type RUN, the computer obeys the commands very quickly, but only one command at a time.

First, it obeys the command on line 10. The command on line 10 tells the computer to print a question mark on the TV screen and accept any number you type on the keyboard. Let's say you type 47. The computer stores the 47 in a little memory cubbyhole you've called N1.

Second, the computer obeys the command on line 20. This is just like the command on line 10. Except now you have the computer accept a number and put it into a cubbyhole you've called N2. You type in 82. The computer puts the 82 into the cubbyhole called N2.

Third, the computer obeys the command on line 30. Line 30 is where the computer performs its multiplication. The "times" sign in the computer's language looks like an asterisk (*). The computer takes the first number (the one stored in N1) and the second number (stored in N2) and multiplies them together.

*Brandon Rigney programs his home computer to solve complicated problems like how many light bulbs should be installed in an office building. Sometimes Brandon turns his computer on before going to school, and the computer is still solving the problem when Brandon goes to bed that night. (Courtesy Brandon Rigney III.)*

Now the computer has an answer. Where does the computer put the answer? You guessed it: into the memory cubbyhole you've called ANSWER.

Next, the computer obeys line 40 and prints the answer on the TV screen. It looks like this:

```
THE ANSWER IS 3854
```

What does the computer do next? It looks at line 50. Line 50 tells the computer to "go to" line 10. The computer jumps back to line 10 in your program and asks you for two new numbers. You type in the numbers. It multiplies the numbers together, then prints the answer.

Then what does the computer do? It looks at line 50 and jumps back to line 10 and asks you for *two more numbers*. It will keep multiplying two