

COMPUTER'S GAZETTE

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



The Frantic Fisherman

Battle the darting sharks and stay out of the rain in this lively action game for the VIC and 64.



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What kind of counselor is your computer? "Therapy" might surprise you.

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Fingertip control of 52 BASIC keywords. For the VIC and 64.

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Defuse the ticking time bombs and avoid the guardian monsters in this dark dungeon maze. A challenging all-graphics adventure game for the VIC and 64.

Also In This Issue:

The Beginner's Corner

Machine Language For Beginners

Home

Telecommunications



Dear Susan,

I've discovered something very exciting that I want to share with you. I've always thought assembly language was too complicated for me to learn and I've been doing all my programming in Basic, or buying software that doesn't do quite what I want. You know, Basic is just too slow for a lot of tasks, and I can't find ready made software to do those specialized things I want to do.

Well, I just bought Panther's C64 Assembler and I found out that assembly language is easier than I thought, and it's also fun.

The C64 Assembler is very "friendly" and the documentation is clear and well written. One very nice feature of the manual is a section for the neophyte assembly language programmer that really helped me understand how to use the machine.

Now I'll be able to write those programs myself instead of waiting for some software manufacturer to guess what I'm looking for! My programs will do exactly what I want, and I'll have fun writing them.

The dealer even told me that Panther is looking for good programs in assembly language, and they're willing to publish and pay royalties for useful programs which meet their standards.

As you know, I don't have any experience yet, so I can't compare assemblers, but Jim's seen it and he's a professional assembly language programmer. He says it's the easiest-to-use and the fastest assembler he's seen for any microcomputer. In fact, he said he's going to buy a Commodore 64 just so he can use it.

Come on over to my place when you have time and I'll show off the assembler for you, or go to the dealer down the street to see it. The whole Commodore community is excited about the C64 Assembler.

I've got to sign off now. I'm anxious to get back to my assembler and finish the program I'm working on. This is fun!

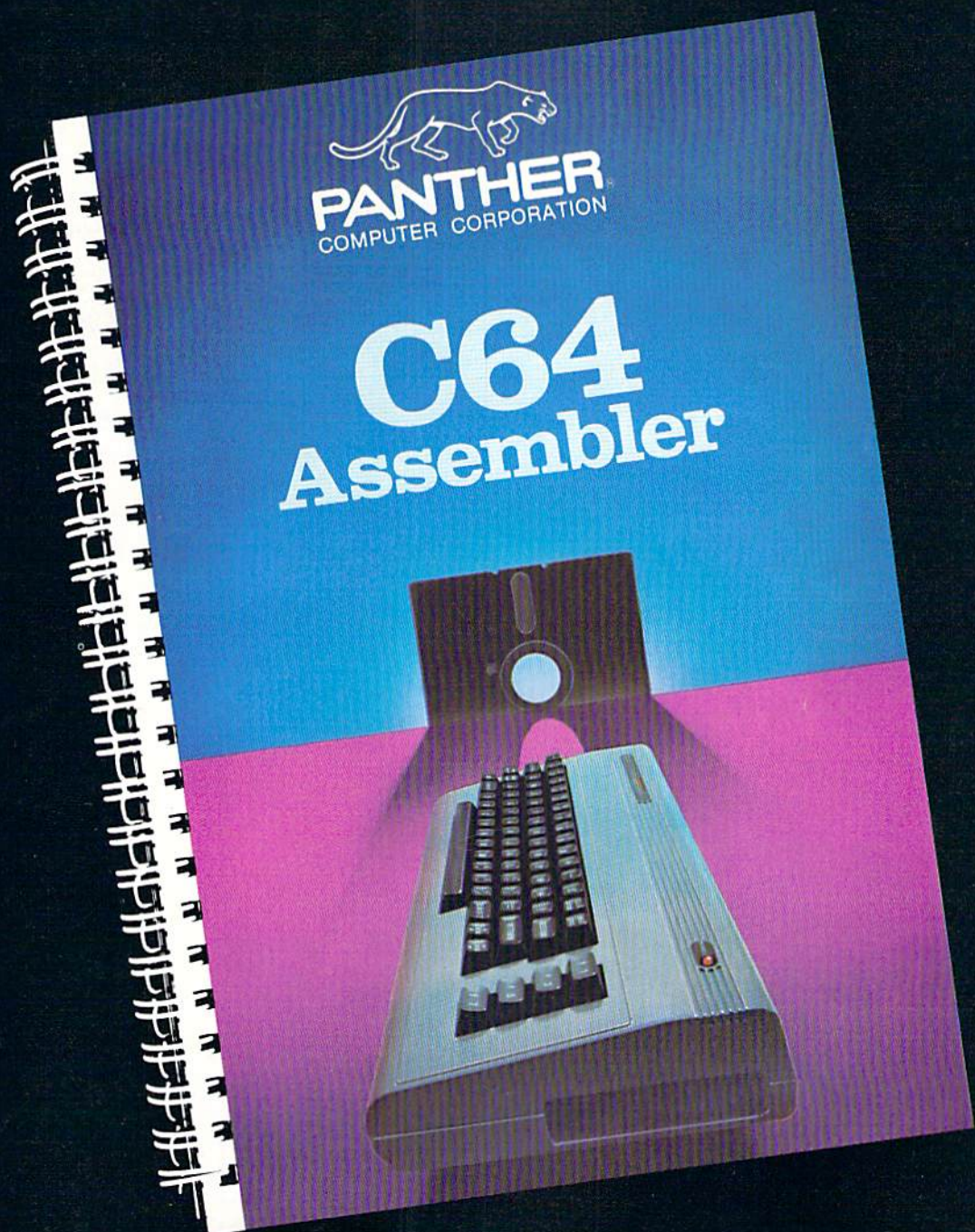
Let's get together soon.

Bob

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The Assembler for the Commodore 64.



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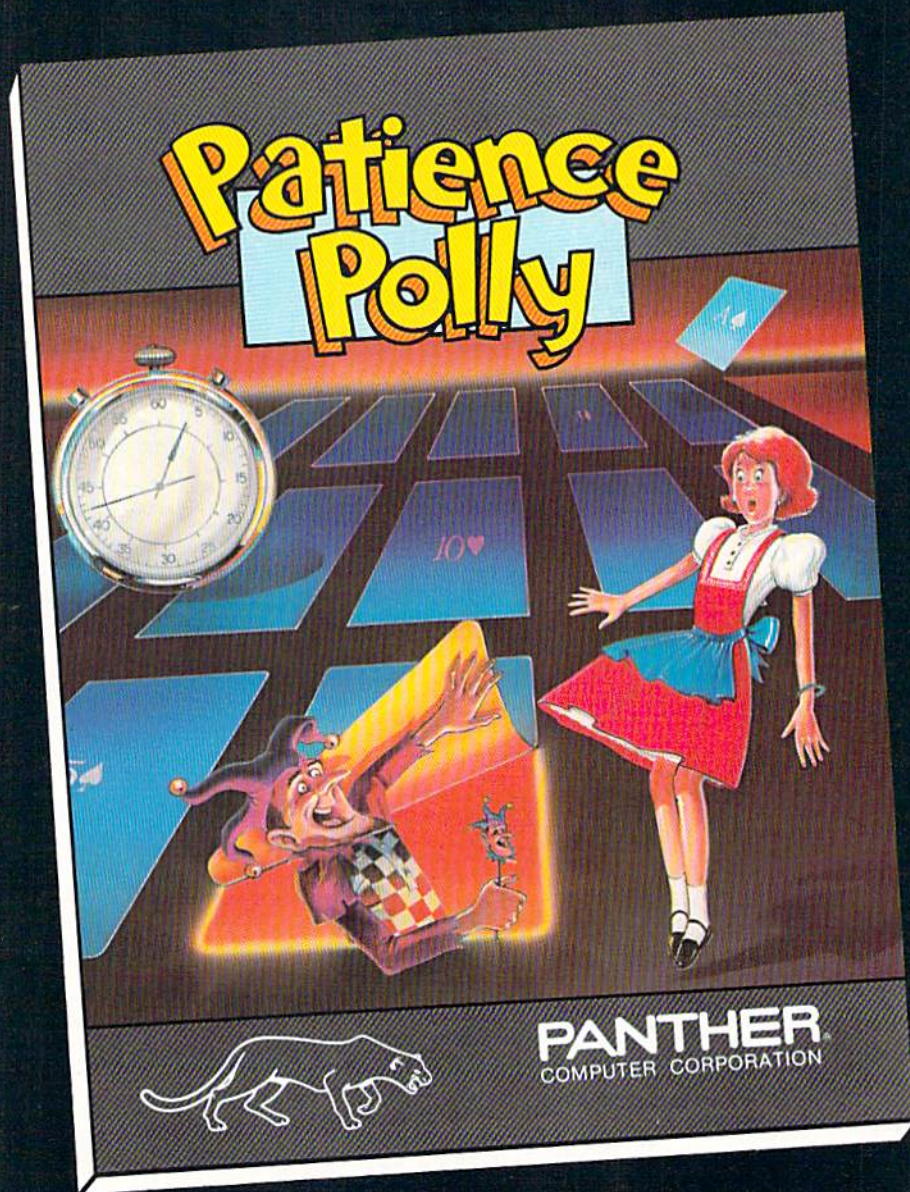
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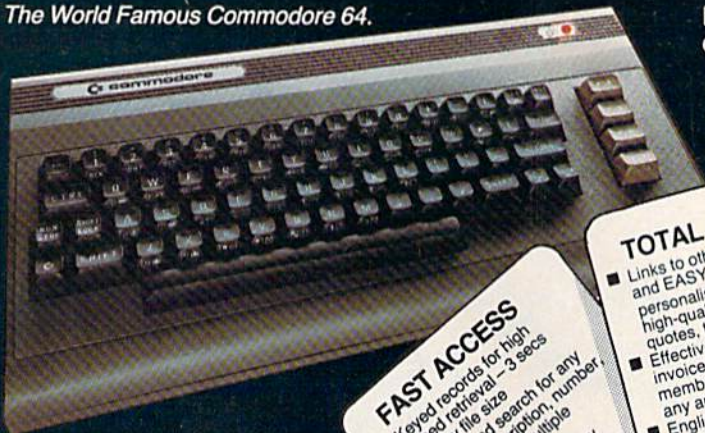
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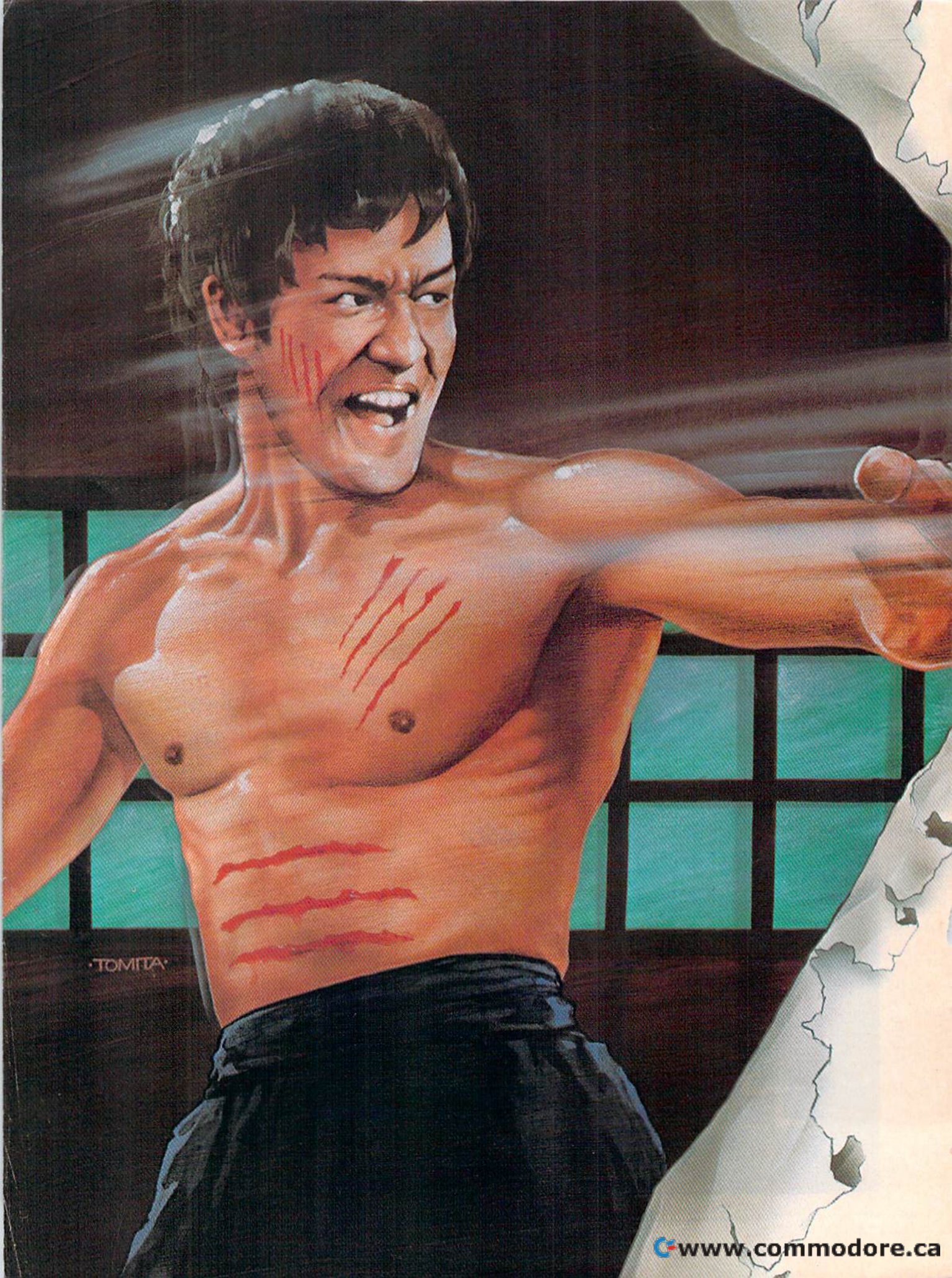

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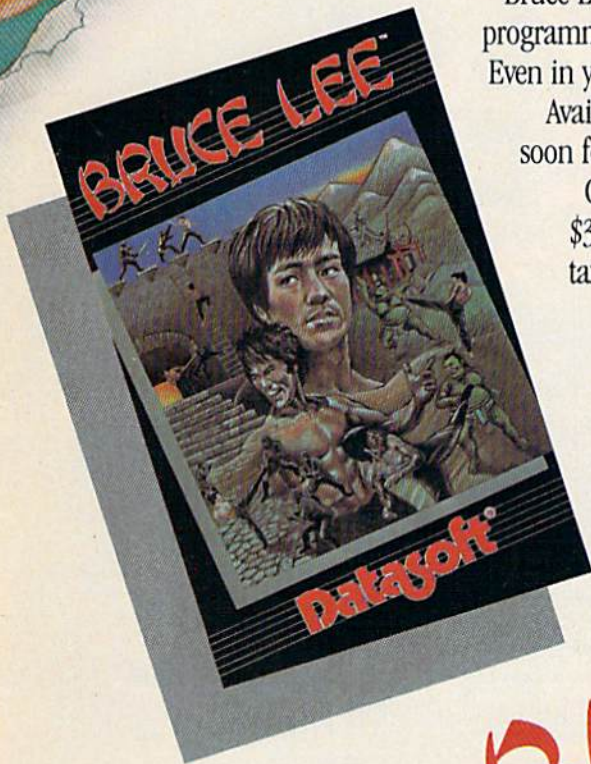
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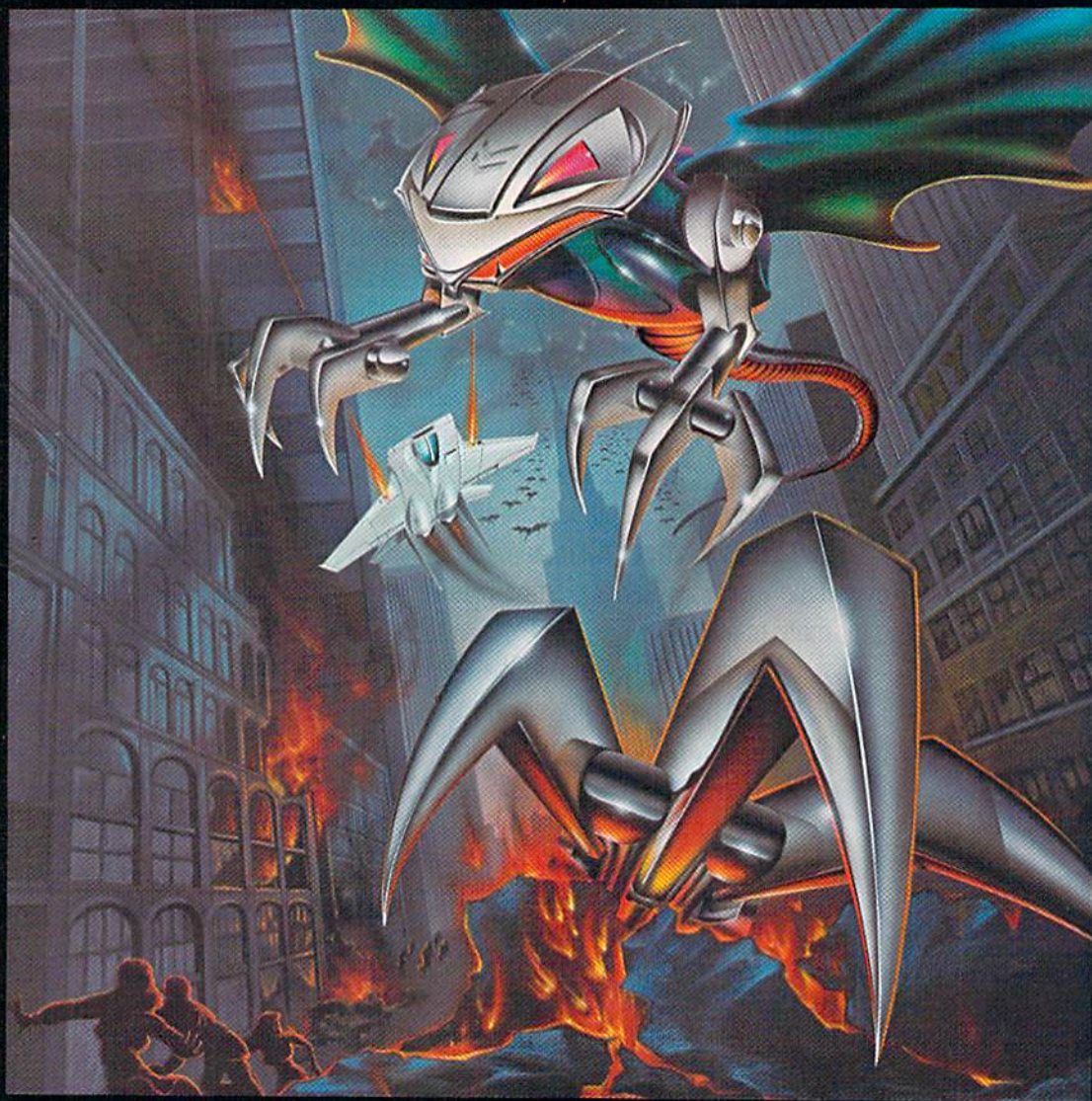
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It was as peaceful a day as New York ever gets, when suddenly the sky went dark and a monstrous droning noise filled the air. Hordes of grotesque aliens were swooping down from all sides, biting into the Big Apple as if they hadn't eaten for days. They were laying eggs, too. Horrible slimy things that got down into the subway tunnels and began clawing their way up. If anyone was going to save the city, it would have to be me. I leapt into my rocket and began blasting away. I thought I stood a fighting chance, but fuel's running low... another wave of invaders on the horizon... signing off...

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THE EDITOR'S

notes

A Word of Thanks to you readers and authors ... with this issue the GAZETTE is 12 issues old, and is one of the most phenomenal growth stories in the consumer publications industry. We've achieved a paid circulation in excess of 300,000, making the GAZETTE one of the half-dozen largest magazines in the entire industry. Our parent publication COMPUTE! was the fastest growing computer magazine in the Audit Bureau of Circulation numbers comparing the six months ending December 1982 with the six months ending December 1983. The next closest competitor grew by 106 percent compared with COMPUTE!'s 247 + percent. Looks like next year, we'll have two of our own publications competing with each other. Now that's a nice problem to have.

Our newly launched GAZETTE DISK is doing nicely too, thanks to you; we appreciate your continued support. You'll notice the disk is still unprotected. While we've touched on this issue in recent editorials, this time we're starting your additional feedback. The letter that follows is representative of many of the letters we've received on the topic of protection:

Dear Mr. Lock:

I read your April 1984 editorial with great interest. As a retailer in software, I believe the presence of copy-protected software directly affects the saleability of my stock. Customers tend to shy away from heavily protected software. They feel (and rightly so) that once they lay their money down, they should be able to make backup copies should disaster strike their original. (Or more commonly, make and use backups and keep their original in a safe place.) Various service schemes by software makers

who have backup-restricted products don't appease the customers much. If a disk crashes, why should they have to wait a few weeks for a new copy to arrive in the mail?

In trying to answer the question of whether or not to protect, we should first address the question of why people steal software. Here, we begin to deal with motives and human nature. For the software pirate, the motive is greed. A low overhead means high profits. For this kind of person, there is no viable software-protect remedy. No matter how sophisticated the software-protect features are, ways can be found to defeat them. Also, development costs of these features are tacked on to the cost of the software, thereby raising customer prices. The higher the price of software, the more likely people will find a way to pirate. The disparity between true value and customer cost gives the pirate room to operate. Carried to the extreme, one can think that the development cost of software-protect features exceeds the cost of the product it's protecting. Would you be willing to pay the premium on a homeowner's insurance policy if it exceeded the cost of the house?

Another motivation for software piracy, less malign, is software copied and given in the spirit of friendship. A user group operates to raise the computer literacy of its members. One of the finer things in life is our ability to learn, and learning about a subject we're interested in satisfies a need. On the other hand, teaching what we know gives us a better feeling about ourselves. Successful teachers can tell you firsthand how great the ego feels after a class. When teachers and learners combine as they do in a user group, it's magic. When the teacher gives something to the learner that doesn't cost anything, as in copied software, this magic reaches higher plateaus. Sharing can never be overrated when it comes to building friendships.

We all like extending favors that cost us nothing. However, when others pay the cost, the favor becomes less than altruistic. Here again, with the abundant availability of backup protection-override software, high cost software with backup protection is readily defeated. Nothing is gained by the software seller. I feel that by and

large, people are basically good. Any businessman has to have this attitude if he is to succeed. In areas of commerce, distrust only slows things up and ends in costing both parties much in the long run. The only thing needed is a little caution, not total distrust.

In matters concerning professional software pirates, there is legal recourse. Though irritating, I think their impact is small. By giving them more motivation (high software costs) to steal, software houses who use copy protection only hurt themselves. I also feel that software pirated for reasons of friendship would be less prevalent at lower costs. People would be more likely to expand their libraries with money out of their own pockets. Also, a little public education concerning copyright laws would go a long way.

In closing, I feel that you would do better serving the public and yourselves by offering quality products at the lowest possible cost. You've indicated that you're opposed to excessive software copy protection. The fact that you allow a software company that sells a backup override program (Microware) to advertise in your magazine seems to support this. If you are soliciting votes, then I vote that you keep your software inexpensive and backup unlimited.

By the way, keep up your high magazine standards. It must do *your* egos good knowing you're doing such a great teaching job.

Sincerely yours,
Ron Bosse

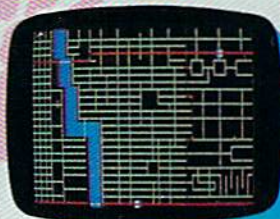
Until next issue, enjoy your GAZETTE.



Editor In Chief



London Blitz



The streets of London are threatened with deadly V-1 rockets. You, as a member of Her Majesty's Royal Bomb Squad, must disarm each one before its timed fuse detonates. A variety of bombs with infinite defusing combinations make for endless nail-biting excitement.

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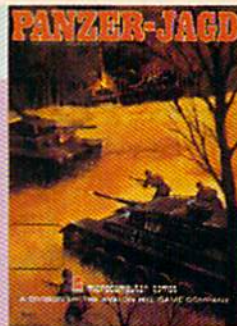


Legionnaire



The beat of barbarian war drums echoes through the valleys of Gaul; the crack legions of Imperial Rome are on the move. Outnumbered two-to-one by multitudes of heathen infantry and cavalry, you, as Caesar, must select your terrain and tactics carefully or face annihilation. Beautifully detailed scrolling map lets you examine the entire battlefield in this realtime game of ancient warfare.

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Panzer-Jagd



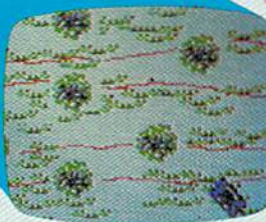
The endless Russian steppe trembles again with the rumble of invading panzers, and this time you are in command! Your units include platoons of Panthers and PzKw III's with infantry support, all maneuvering over an ever-changing battlefield map. Off-map artillery support is also available to help you combat the hordes of Russian units.

Not just an arcade shoot'em up, Panzer-Jagd requires careful tactical planning and, above all, a determination to win. Hi-res graphics and sound effects.

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GAZETTE FEEDBACK

EDITORS AND READERS

Do you have a question or a problem? Have you discovered something that could help other VIC-20 and Commodore 64 users? Do you have a comment about something you've read in COMPUTE!'s GAZETTE? We want to hear from you. Write to Gazette Feedback, COMPUTE!'s GAZETTE, P.O. Box 5406, Greensboro, NC 27403.

Mysterious Numbers

I'm curious about lines like: `SYS 12*4096 + 12*256` and `BB = PEEK(44) + 27` in your magazine. Why don't you just write: `SYS 52224` or `BB = 35`? Wouldn't this be quicker than having the computer perform the mathematical functions first?

Joel A. Brondes

In the first example, you're right. It would have been easier (and quicker) to simply write `SYS 52224`. The reason the line was written with the formula was simply programmer preference. He might have been thinking in terms of blocks (4096) and pages (256) of memory, and this computation method was easier for him than computing the actual `SYS` address. In hexadecimal the number translates to `$CC00`.

In the second example, the `BB = 35` statement might not work. In this case, memory location 44 indicates the start of BASIC program memory. But the start of BASIC can be changed by `POKE`ing values into byte 44. In this case, if the start of BASIC were changed, the value in `BB` would also change.

PEEKing Joysticks On The 64

I am a VIC-20 owner and am considering switching to the Commodore 64. I went to a store to compare the two, and found that the 64 had two joystick control ports. Can two joysticks be plugged in, or just one and a light pen? If two can be plugged in, does a program read both ports or just port 1? If it reads them both, then two players can play at the same time, but how does this work?

Todd Wolfe

Yes, joysticks can be used in both ports. You can check the joystick positions by `PEEK`ing two memory locations. Each time you push the joystick in one direction or press the fire button, various values are placed in these locations. The values indicate which operation was performed with the joystick, paddles, or light pen. The location to `PEEK` for port 2 is 56320, and port 1 is

56321. Plug a couple of joysticks into ports 1 and 2 and run this short BASIC program. While the program is running, push the joystick and firebutton and watch the values in these memory locations change.

```
10 A=56320:B=56321
20 PRINTA;PEEK(A),B;PEEK(B):GOTO20
```

Each operation performed on the joystick sets a bit (a byte is composed of eight bits) in the memory locations. The normal bit values are one, but when joystick activity is detected, the bit is set to zero. The bits are arranged as follows:

Bits	Operation
3-0	joystick direction
3-2	paddle fire buttons
4	joystick fire button
7-6	read paddles on port 1 or 2

Reading individual bits is done by `PEEK`ing with an `AND`. To `PEEK` bit 0, you would `AND` with 1; to check bit 1, `AND` with 2; the number used for the `AND` doubles with each succeeding bit, up to a value of 128 for bit 7

Here's another short demo program. Run this program with a joystick plugged into port 2. Run it a few times, changing the value of `B` to 1,2,4,8, and 16 to see how the individual bits are detected. When you push the joystick, the corresponding bit will change to a zero, and the zero will be displayed on the screen.

```
10 A=56320:B=1
20 PRINTPEEK(A)ANDB:GOTO20
```

As for a program being able to read both joysticks at the same time, it's up to the programmer. There are many two-player games available. Some game programs might use both the joystick ports plus the keyboard. It depends on the individual application.

Double-Sided Floppies

I have a tip for your readers and a question for you. Some programmers like to cut a new write notch on their single-sided diskettes so they can use the reverse side. However, there's no need to spend your money on a special tool to cut the notches. As long as you measure accurately, a half-circle cut with an ordinary paper punch will suffice.

Now my question: Since I have been using the backs of my floppy disks for additional storage, I have come across a most annoying problem.

About ten percent will fail to format correctly, and will give me the message:



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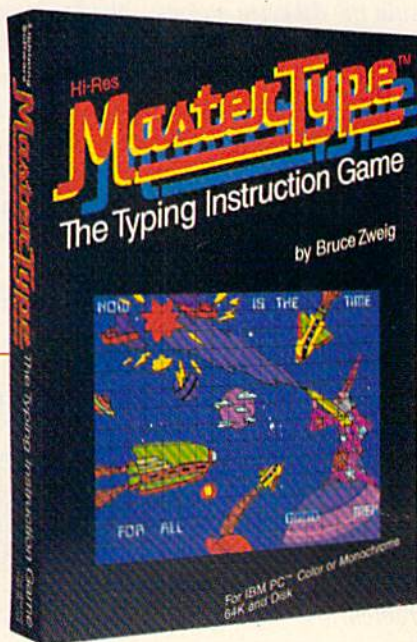
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This never happens when formatting the front side of the disk. What is the problem?

Philip A. Grimes

Thanks for the tip. However, here's a strong caution which is also an answer to your formatting problem.

When most diskettes are first manufactured, they are intended to be double-sided. The magnetic coating on both sides is subjected to rigorous tests. If both sides pass the certification tests, it is sold as a double-sided diskette. If one side fails, but the other tests OK, it is sold as a single-sided disk. When you use the reverse side of a single-sided floppy, it may have already been tested and proven to be faulty—thus a probable cause of your formatting problem.

Another strong point to consider when using the reverse side: dust contamination. Manufacturers put a special lining inside the diskette jackets. The lining acts like a broom, sweeping the dust off the magnetic surface. Because the diskette always spins in the same direction, the dust has a tendency to be swept into one corner of the jacket. When you turn the diskette over and use the reverse side, the diskette spins in the opposite direction. This can spin the dust out of the corner, and back onto the delicate magnetic coating, possibly causing irreparable damage.

Using commercially available double-sided disks doesn't necessarily solve the problem. Double-sided diskettes are meant to be used on double-sided disk drives. These drives have two read/write heads, one on the top and one on the bottom. This means that the diskettes don't have to be turned over; they always spin in just one direction. When you use double-sided floppies in the 1541 and 1540, you still have to reverse the diskette to reach the second side. So even though the diskette was tested safe on both sides, you still face the dust contamination problem.

GAZETTE Double-Talk?

I'm an avid reader of your magazine, but your March issue leaves me puzzled.

In the Feedback column you reiterate advice to avoid using the SAVE@0: (SAVE with replace) command with the 1541 disk drives. Yet, you feature a utility on page 120 which is based on just that function.

What gives? As they say, it appears that you're talking out of both sides of your mouth.

John Premack

An interesting point. We still maintain that you should avoid the SAVE with replace command to be on the safe side.

However, in our judgment, the article and program were worth publication on their own merit. The author chose to use this command in his program. It is possible to remove the "@0:" (SAVE-with-replace) from the program, but you would have to change the program name each time.

Cleaning Disk Drive Heads

I recently purchased a head cleaning kit for my Commodore 1541 disk drive. The instructions included with the cleaning kit state that I must insert the cleaning disk into the drive and then start the drive to engage the head for 30 to 60 seconds. Does the head engage when you first turn on the drive (the red light turns on for about 5 seconds). How do I engage the heads so that the disk drive is properly cleaned?

Jerry A. Coy

Don't depend on the brief spin when the drive is first turned on to do the cleaning. After inserting the cleaning diskette, you can make the drive spin any number of different ways.

Try loading the directory (LOAD "\$",8), initializing the diskette (OPEN 15,8,15,"I"), or using the format command (OPEN 15,8,15:PRINT#15,"NO:TEXT,T1":CLOSE 15). Any command that forces the drive to either read or write can be used when cleaning.

Colliding Sprites

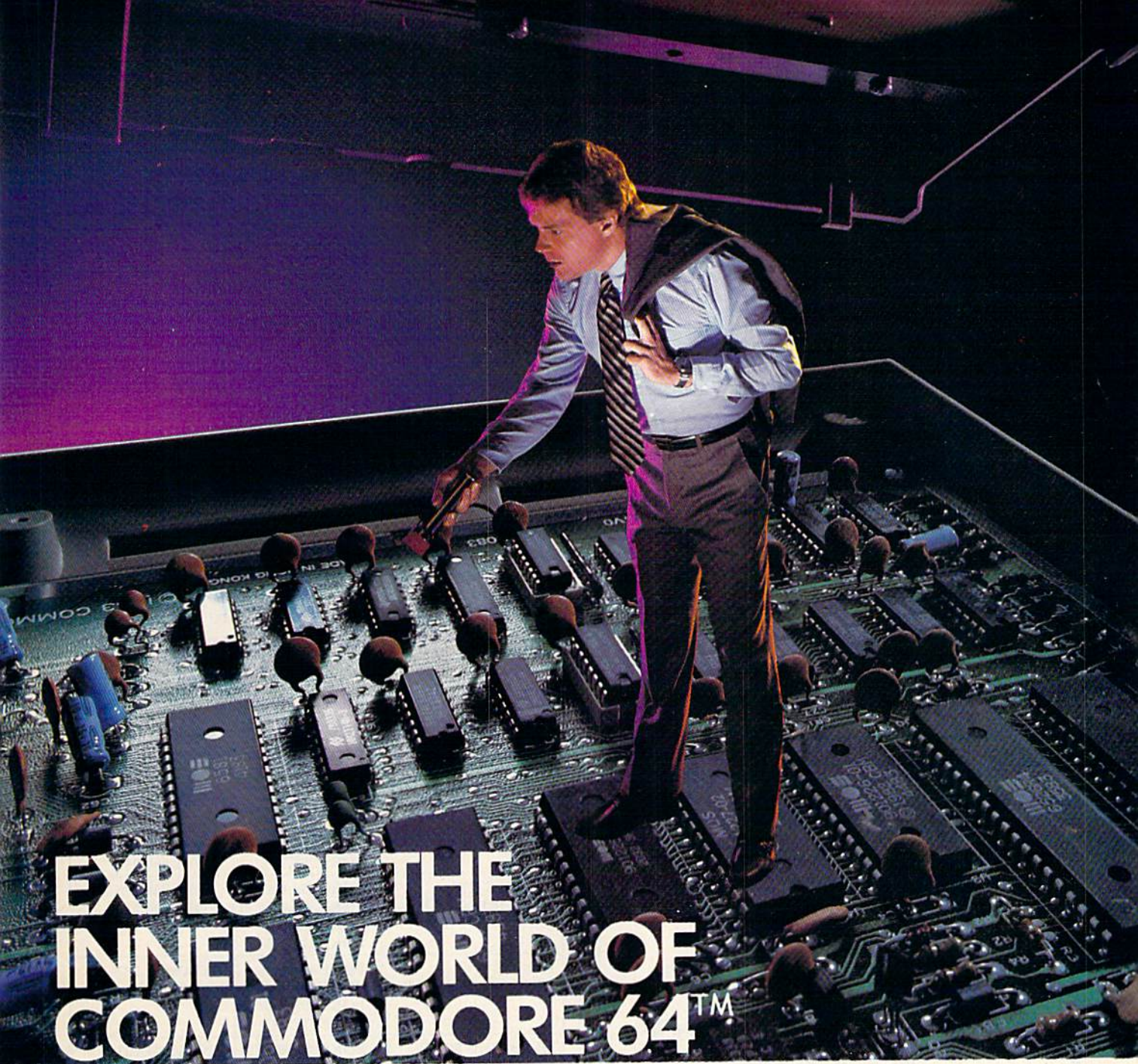
I am trying to write a machine language game using sprites and am having trouble with the collision register (\$D01E). I've found out that if I read the register a second time in machine language, all I get is a zero, not any current collisions as I do when I PEEK the register in BASIC.

It is a great waste of time to return to BASIC just to PEEK the collision register. Certainly there must be a way to get the computer to reset this register in machine language. How do I overcome this?

Sean D. Wagle

The problem you describe occurs because a small amount of time is required for the collision registers to reset after they are read. Any time you read these registers, whether from BASIC or machine language, they are automatically set to zero afterwards. Since it takes a brief moment for these registers to reset themselves, reading them over and over at machine language speeds will produce some zero readings even though collisions are still occurring. The best way to deal with this problem is to add a delay so that the collision registers are read at longer time intervals. Store the results of the read in a separate storage location, then use this storage location to check for either sprite-to-sprite or sprite-to-background collisions.

The collision registers are two memory locations \$D01E (decimal 53278) and \$D01F (decimal 53279). The eight sprites (0-7) register collisions by setting the corresponding bits (0-7) in each of these registers. The first location (\$D01E) signals collisions between sprites by setting to 1 the appropriate bit for each sprite involved in the collision. Since sprite-to-sprite collisions must always involve at least two sprites, two or more bits in this register turn on for any contact between sprites.



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The second location (\$D01F) signals contact between a sprite and a nonzero portion of the background. Like the first register, bits are turned on for each sprite which "touches" a nonzero part of the background.

Collisions occur only when solid portions of the sprite occupy the same spot on the screen as another solid portion of a sprite or background.

Renaming Disks

I have many programs now collected on disk. I find that my disk names and numbering system have become a Mulligan Stew. I would like to retile and number them in a proper and orderly manner.

Do you know of a way to retile and number them so that the contents of the programs are not harmed in any way?

James R. Maloney

While it is simple to rename a program on disk, it is more complicated to rename the actual disk. If done incorrectly, it may ruin the disk directory. If you want to rename a disk, it is best to format a new disk with the desired name and ID number, then copy all the programs from the old disk to the new.

Changing the names of the programs on your

diskettes is easy, however, and can be done with one command. Here's the format:

```
OPEN 15,8,15: PRINT#15,"R0:newname=oldname":
CLOSE 15
```

where R0: means rename, newname is the new name you wish to give to the program, and oldname is the current name.

If you wish to rename more than one program, enter and RUN this program (for both the VIC and 64).

```
10 CLOSE15:OPEN15,8,15
20 PRINT"{CLR}{DOWN} RENAMING PROGRAMS"
30 PRINT"ENTER OLD NAME:":INPUTO$
40 PRINT"ENTER NEW NAME:":INPUTN$
50 PRINT#15,"R0:":N$;"=";O$
60 PRINT"{DOWN} PRESS {RVS}F1{OFF} TO REPEAT"
70 GETA$:IFA$=""THEN70
80 IFA$<>"{F1}"THENEND
90 GOTO20
```

Useful POKES

Here is a data table showing some useful POKES. We use it here at our school, 100 Mile Junior Secondary, British Columbia. I am sure there are others who could benefit from this compilation.

Dave Schneider

Function	VIC	64
"Cold" Start	SYS 64802	SYS 64738
Uppercase/Graphics Lowercase/Uppercase	POKE 36869,240 POKE 36869,242	POKE 53272,21 POKE 53272,23
Disable STOP	POKE 808,127: POKE 788,194	POKE 788,52: POKE 808,239
Enable STOP	POKE 808,112: POKE 788,191	POKE 788,49: POKE 808,237
Disable STOP, RESTORE, and LIST	POKE 808,100: POKE 802,0: POKE 803,0: POKE 818,165	POKE 808,225 or POKE 808,234
Enable STOP, RESTORE, and LIST	POKE 808,112: POKE 802,243: POKE 803,243: POKE 818,133	POKE 808,237
Disable RESTORE	POKE 792,90	POKE 793,203
Disable SAVE	POKE 818,73	POKE 819,245: POKE 818,32
Enable SAVE	POKE 818,113	POKE 818,245: POKE 818,237
Disable Repeat	POKE 650,0	POKE 650,0
Enable Repeat	POKE 650,128	POKE 650,128
Disable LIST Enable LIST	POKE 775,200 POKE 775,199	POKE 775,200 POKE 775,167
Clear Keyboard Buffer	POKE 198,0	POKE 198,0
Disable Keyboard Enable Keyboard	POKE 649,0 POKE 649,10	POKE 649,0 POKE 649,10
Restore Keyboard	POKE 650,0	POKE 649,10: POKE 808,237

Thank you. We're sure our readers will find the table helpful. When using the POKES to disable LIST, note that RUN/STOP-RESTORE will not reset the computer. ☺

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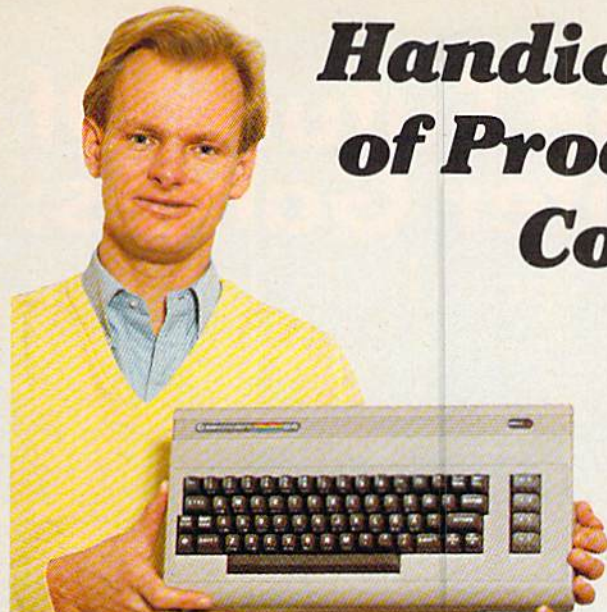
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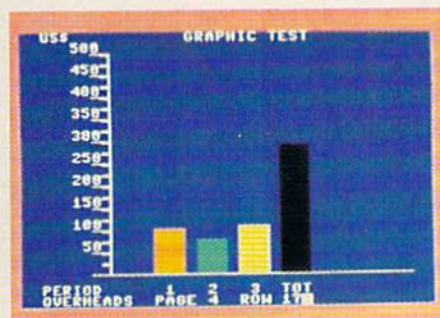




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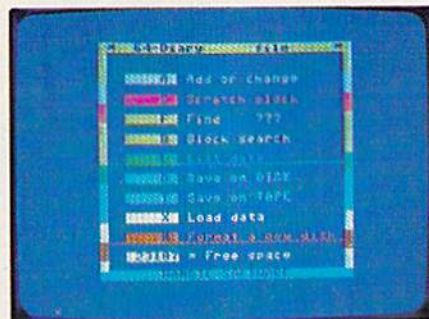
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SALES C	10	10	10	10	10
TOTAL S	460	460	460	460	460
SALARIES	95	95	100	105	110
RENT	50	50	50	50	50
ADMIN	20	20	20	20	20
MARKETS	20	20	20	20	20
CALL DIR	215	215	215	215	215
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NET PRO	NR	NR	NR	NR	NR
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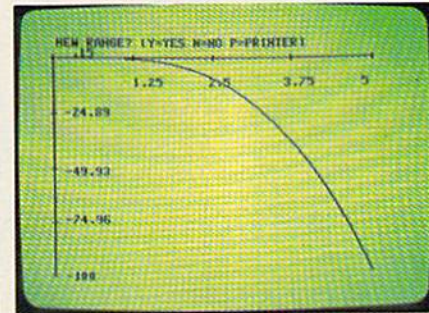
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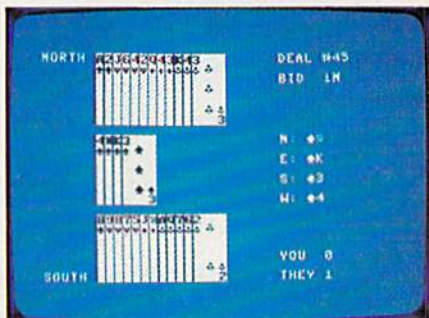
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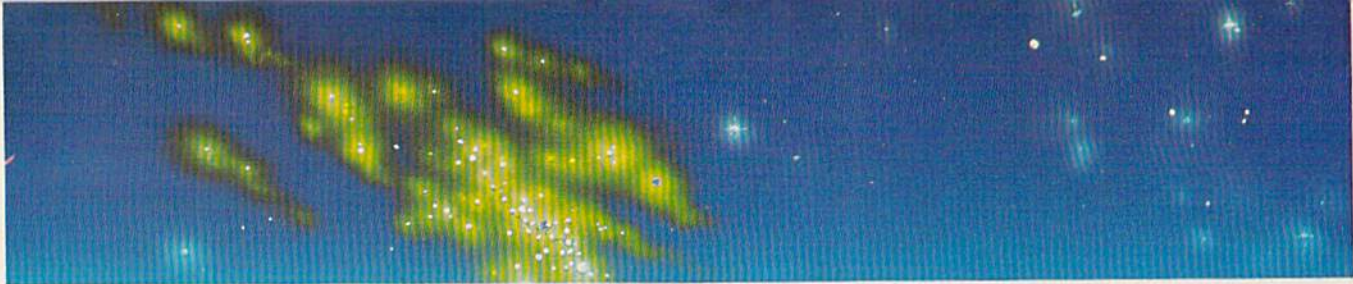
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“**S**even *Cities of Gold* is an attempt with the computer medium to do for the sixteenth century and the Spanish conquistadors what *Shogun* did for sixteenth-century Japan,” says David Grady, publications manager for Electronic Arts.

The fact that Grady can say that with a straight face is due in no small sense to his company’s remarkable track record in producing some of the most innovative and well-conceived computer games on the market.

And the new game he’s referring to, *Seven Cities of Gold*, is a good example of several trends in game software we’ll see in the future—more depth of play, greater background research, sophisticated humor, and increased emphasis on human qualities.

Like James Clavell’s book, *Shogun*, *Seven Cities* is an attempt to recreate a past world full of rich detail. But in this world, *you* decide how almost every phase of the plot will be carried out.

“It’s like writing a historical novel,” continues Grady. “And when that is what you set out to do, you’ve got to make it work like a historical novel. You’ve got to immerse yourself in the period, and think about what you can do with the medium to give people the kinds of emotions that you’re discovering existed in the period as you do your research.”

A brief description of the game only hints at its depth: As a sixteenth-century Spaniard, you lead an expedition to discover the new world, first outfitting your ship, getting the king’s blessing, and then sailing off to—who knows where? There are thousands of miles of ocean in which to get lost and the prospect of a mutinous crew. There are natives who may be hostile, friendly, or just wary. And there is the entire new world for you to explore, settle, and—as in history—to plunder. But beware. The new world holds penalties for too rapacious an attitude.

The game, created for Electronic Arts by Ozark Softscape (which also developed *M.U.L.E.*) is expected to be available for the Commodore 64 and Atari machines by the time you read this, and for IBM and Apple computers later this year.

“As you get computers which have more memory available and more speed, programmers are going to take advantage [of these] to do more richly complex things,” says Grady. “And building models of things that work in the world is one of the neat things you can do with a computer.”

There is a focused attention among computer game producers today, much like the concentration that would come with the prospect of being hanged at dawn. Why? Millions of dollars can be won or lost by software developers and the dealers who sell the software. And all of that potential profit or loss hinges on correctly anticipating what games the public will want a year or two from now.

What will the consumer buy tomorrow? “It’s like trying to aim at a moving target,” says Kenneth Williams, president of Sierra On-Line, one of the industry’s most successful software manufacturers. His comment was made during a special seminar on computer games at last February’s Softcon, the international conference and trade fair for the software industry.

Words of warning came from writer and game designer Roe Adams III, another participant in the seminar: “People are becoming more finicky about software. Game designers will have to bring people into the game.

“The software companies that will succeed are the ones which put human values in their software,” he added.

That prescription will be important for the games of the future, whether they are fast-action, arcade-style games or the increasingly popular text adventures.

In *B.C.’s Quest For Tires* (\$34.95), Sierra On-Line features Johnny Hart’s internationally popular cartoon strip, *B.C.*, to add humor and a human touch to a colorful, fast-action contest.

As software manufacturers reach for a larger audience, they are using familiar names, faces, and situations to help consumers identify with their games. HesWare’s *Minnesota Fats’ Pool Challenge*, Bröderbund’s *Choplifter* (remember the Iranian rescue mission?), and Datasoft’s *The Dallas Quest* (J.R. Ewing and the rest of the family) are examples.

The growing popularity of adventure games holds another key to the future of computer software—more sophisticated use of natural language. Early adventure games allowed the player only a limited number of commands—usually two-word orders such as “Get lantern” or “Kill dragon.” The newer games, and those still on the drawing boards, use far greater vocabularies and more powerful *parsers*, which are used to interpret your commands. Full sentences can now be interpreted by game software.

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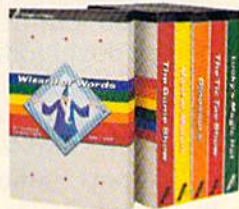
Look for enough variety to hold your child's attention over time. Some games are appealing in the short run, but are quickly mastered. Supplementary materials such as disks of added lessons can continue your child's interest and enjoyment.

The ability to modify a program is another form of extendability. Authoring systems can let you create lessons on your own topic areas for any age level and allow children to create and save original work, giving a sense of completion and pride vital to learning."

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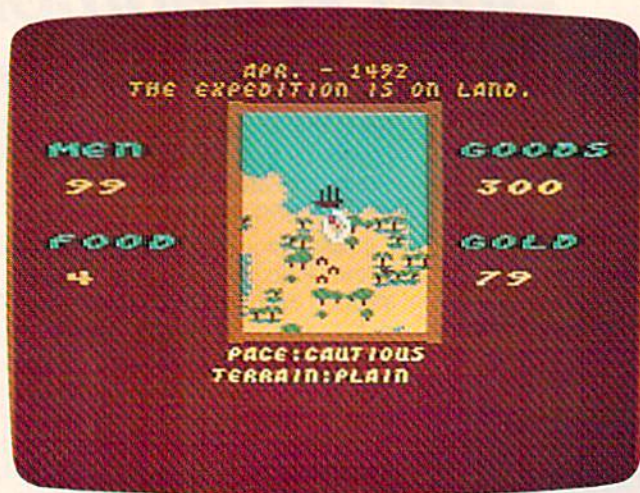
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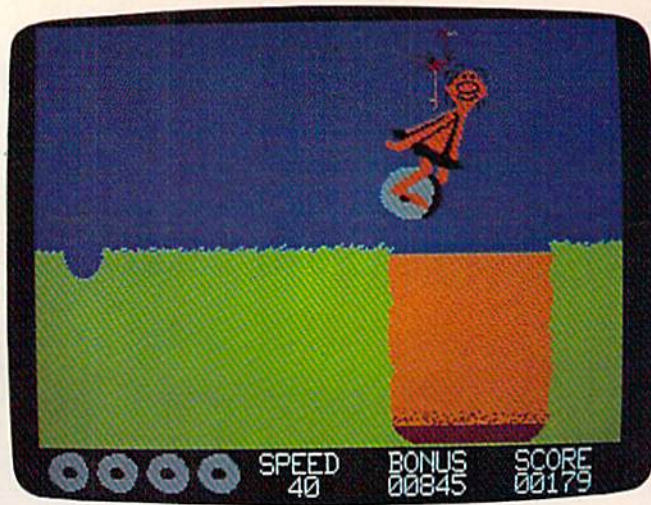
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Geoff Zawolkow
Vice President, Product Development
Advanced Ideas



The expedition has landed on an uncharted island in Electronic Arts' *Seven Cities of Gold*.



B.C.'s Quest For Tires by Sierra On-Line features a popular cartoon character.

the use of graphics in text adventure games. "We have to lay out an adventure game like we're doing ten different games in order to get people to play it over and over again," says Williams.

King's Quest (IBM PC, \$49.95) a new adventure game from Sierra On-Line, was almost two years in the making, he says. Using the keyboard and an optional joystick, you guide Sir Grahame through a series of adventures, using full sentences. There is more than one ending to the game, and a player is given points for the cleverness of a particular solution.

But, with *King's Quest*, colorful three-dimensional graphics accompany the text. Characters are animated to a greater degree than in past adventure games. They run, talk, and swim, for example. The ultimate goal for the future, Williams says, is realtime animation. You type in a command for your character to open a door and walk to another room. The door will then be seen to open, a creaking sound will be heard, and your character will walk through.

Infocom, Inc., a software company that is already something of a legend in its own time, avoids adding graphics to the complex and captivating text adventure games it produces. A variety of different games, such as the *Zork* trilogy, the murder mystery *Deadline*, and the science fiction adventure *Suspended*, has gained Infocom a fiercely loyal following. The *Zork* games sparked a *Zork* User Group (ZUG) which boasted more than 20,000 members. ZUG has since disbanded, but interest in *Zork* remains strong.

A new game, *Sorcerer* (\$49.95), is a sequel to the company's popular *Enchanter*, and a part of Infocom's interactive fiction series in the mystic arts. *Sorcerer* can understand a vocabulary of more than 1,000 words, which allows you a much more natural dialogue with your computer. As a neophyte wizard, you depend on spells, potions, and other

magic powers to find treasure and solve puzzles.

"Ultimately, the nicest thing would be to talk to your computer and say, 'OK, now I'm going to interrogate this suspect about where he was when the murder was committed,' something like that," says Marc Blank, a vice president at Infocom and one of the guiding lights in the company's success.

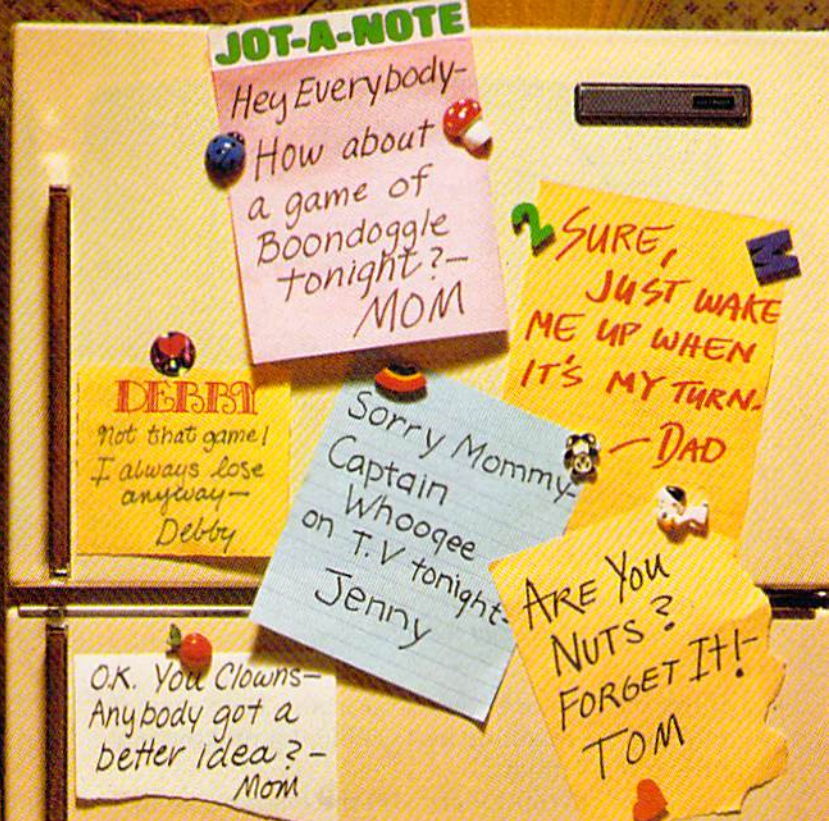
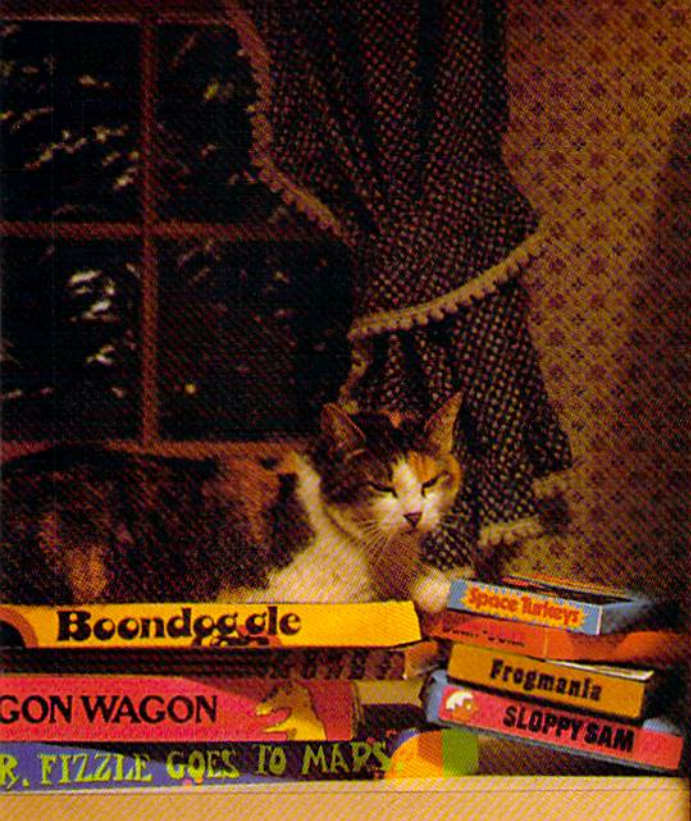
"We've always felt that sound and graphics are pretty much irrelevant, and in a way detract attention from other parts of the story. Those things are really bells and whistles," he says. "We've spent our time working on the plot and the writing, the puzzles, and the parsing—things that are much more relevant."

Text adventure games also allow great leeway in the use of humor, another part of computer programming that game developers will continue to explore in future games.

Tell Sirius's *Blade of Blackpool* that you wish to do harm to an innocent bystander, for instance, and the game's response is likely to be "My, we're feeling violent today!" Type in the word "Sneeze" in Infocom's *Planetfall*. "Gesundheit" flashes on the screen of your computer. Humor and an understanding of human foibles are facets of adventure games that the best programmers bring to their craft.

"All of us like to laugh a lot," says Electronic Arts' Grady. "We like to play. And humor just naturally flows from that situation. So we quite naturally found ourselves wanting to publish games that would make people laugh."

Infocom's Blank agrees, "Inevitably, if you're giving the player a lot of open-ended possibilities, some of them are just inherently humorous or absurd. And we all have the sense of which things we should consider when we're writing the games, and which things we shouldn't bother. I



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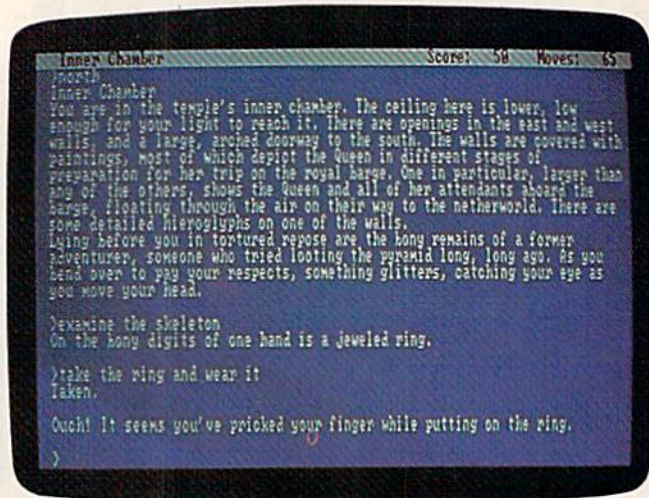
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Graphics and text are combined in Sierra On-Line's adventure, King's Quest, for the IBM PC.



A typical screen from the all-text adventure, Infidel, by Infocom.

think the humor is very important. It's a way of making the machine less visible, by making it a little more human."

How revolutionary will the changes be in future games, as humor and human touches are added to other improvements in programming and computer capabilities? "My guess is it's going to be more evolutionary, with some reasonably large steps every once in a while. But I don't expect anything revolutionary," says Blank.

"On each game, what we're really working on is to add something new. And then every year or so to come out with something that's different, that puts all that together with other things to create a product that's more than the sum of all these improvements," he adds.

The popular success last year of a new video disk arcade game called *Dragon's Lair*, leads its creator, Don Bluth, to believe that laser-driven video disks are the wave of the future. And that includes home computers as well, he says.

Bluth, a former Walt Disney animator who now heads Don Bluth Animations, is producer and designer of a similar video game, *Space Ace*, which made its debut earlier this year.

Like *Dragon's Lair*, the new game features colorful motion-picture style animation, a cast of zany characters, stereophonic sound, and a fast-paced multiple-decision scenario for the user.

Slightly more than 25 minutes of classical animation have been programmed onto the pitted surface of a video disk, which is about the size of a record album. A laser reads the pits. "Pioneer has come up with a new machine which is a very, very fine player," says Bluth. "It has a random access which is much faster. It can randomly access several things consecutively up to about five feet of film, and you will see no search (the half-second

blank-screen delay caused when the laser jumps from one part of a disk to another).

"It still uses one laser, but it's done with a mirror action. The laser is refracted and instantaneously thrown across the disk. So the only time you will see a tiny search is when you have failed to make a correct move and you access to a death scene. But if you're playing successfully, you'll see no search time," he says.

Space Ace cost about \$1.8 million to develop, says Bluth. And a sequel to *Dragon's Lair*, called *Dragon's Lair II—Time Warp* is being created at a cost of about \$2.3 million.

"The laser disk is a very delicate instrument, and when it's used properly, the game will be exciting to look at and to play," says Bluth. "When those two elements work in tandem, I believe you will make obsolete the traditional arcade game because we'll leave the arena of big dots and enter the arena of motion picture entertainment. If *Space Ace* works very well, then we'll know that *Dragon's Lair* was not a fluke, and that the laser disk future is very bright."

Coleco has reportedly purchased the rights to both games for possible introduction into the home through its Adam computer system, although no details about the plans have yet been announced.

"The laser disk industry will start to blossom," says Bluth. "And when that begins to happen, the price will come down. Sitting there in everyone's living room, with all the other players that they'll have, will be a laser disk player."

A unique enterprise started this spring in Orange County, California, which—if successful—will bring a television-based games service to the nation. Called The Games Network, this system offers 20 different computer games



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Classic animation produced by a laser disk is a feature of Don Bluth's new Space Ace arcade game.

which can be downloaded from your television screen into a specially leased 64K microcomputer (not a stand-alone) named The Window. The Network will offer a variety of educational, arcade, and adventure games. Five new games will be added and five old games dropped each month by The Network.

For a suggested one-time installation fee of \$30 and a monthly suggested user fee of \$15.95, you can play any of the games night or day, seven days a week at no extra charge. Downloading to personal computers would present the problem of software piracy, which is not a possibility with The Window, says Randy Wise, director of subscriber services for The Games Network.

"We're a programming service similar to HBO or Showtime, except that we need special hardware to run," he says. "There is no up-front cost to the cable operator. We put in the head-end hardware, and release the hardware to the cable operator to put into the subscriber's home. All of the payments for that are based on subscriber fees, so we've made it as easy for the cable operators to get into The Games Network as it is for subscribers."

A test of the system over a year ago in Fullerton, California, resulted in a very good response, says Wise.

"There are some interesting concepts here which no one has had a chance to explore yet. People can look at a program and get used to it on The Games Network. If it's something they like, then they're more likely to want to go out and buy it," he says.

The Games Network plans to coordinate its

offerings with software companies. New software may be previewed on the system, and classic computer games might be given new life when millions of new users see them for the first time, he notes.

"We feel many millions of people will be exposed to computers who right now don't know anything about them. And once they gain some familiarity through the painless procedure of playing games on The Games Network, they'll get interested in buying hardware and software," says Wise. "We feel it's going to actually speed up the whole computerization of America."

As the world becomes more computerized, it's certain that games will continue to hold a special fascination for millions

of computer owners. And software manufacturers are making it clear—by their new products and their plans for the future—that they're doing far more than just playing games. ☺

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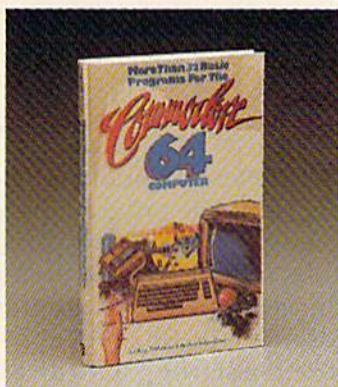
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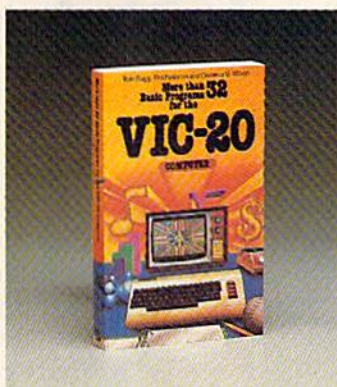
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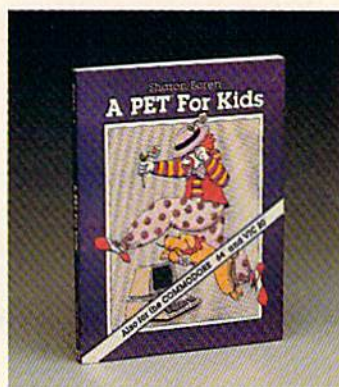
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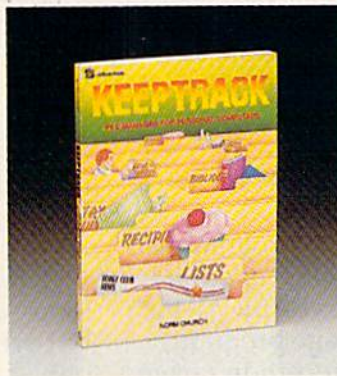


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TOM R. HALFHILL
FEATURES EDITOR

QA

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

Q. *I've been reading a little about machine language, and I'm confused about the difference between machine language and assembly language, and machine language monitors and assemblers. Can you explain?*

A. A thorough discussion would require much more space than we have here, but essentially machine language and assembly language are the same thing. The terms are used pretty much interchangeably these days, although we prefer to say "machine language."

The term *assembly language* comes from *assembler*. You can think of an assembler as a utility—a tool—for putting together (assembling) a machine language program. You don't need an assembler to write machine language, but it makes the job a lot easier.

The earliest computers could be programmed in machine language *only*. They lacked enough memory to hold a language such as BASIC (which itself is just a large machine language program). The first kit-built personal computers didn't even have keyboards. Instead, there were eight toggle switches on a front panel, one for each bit in a byte. To write a program, you had to toggle the switches in hundreds of different patterns. (If you think typing in a BASIC program listing is laborious and error-prone, you ought to try this.)

An assembler is a utility program which automates this process. You type in a three-letter abbreviation for a command, called a *mnemonic* or *opcode*, and the assembler sets the internal "switches" in the correct pattern for you.

A *monitor* (not to be confused with a display screen) also is a tool to make machine language programming easier. A monitor is like a window into the computer's memory. You can examine sections of memory, change their contents, move them around, and search for certain numbers.

Many monitors even include mini-assemblers.

Machine language programmers are divided into two camps: those who write their programs with monitors, and those who prefer assemblers. Beginning machine language programmers whose backgrounds are in BASIC probably would feel more comfortable starting with an assembler. But monitors are useful too, especially for debugging programs created with assemblers.

Q. *If I send a command to the disk drive and there is no disk in the drive, does this cause any damage?*

A. Absolutely not. The disk drive's red LED "busy light" will glow for a few seconds as the drive attempts to access the nonexistent disk, and then it will start blinking. A blinking busy light indicates an error condition. But the drive will not be damaged in any way. The LED will stop blinking the next time you access the drive, or when you read the error channel (see your user's manual).

In fact, there is no way you can physically damage your computer or any of its peripherals by entering any kind of command at the keyboard. At worst, you might issue a series of commands which could lock your printer into an "endless loop" and cause a paper jam or eventual burnout. But even this is highly unlikely, and would happen only if you left the printer running unattended for a while.

Occasionally an erroneous series of commands will trap the disk drive in an endless loop. This might occur if you're writing a program which accesses the disk drive and you forget to provide an escape from the loop. If left alone, the drive might continue spinning indefinitely and eventually overheat. But again, you'd have to be ignoring the situation for quite some time before this happened.

In any case, no matter how badly you goof up, you can always completely reset the computer system by turning everything off for a few seconds and then back on again. Any program or data stored in the computer's memory will be wiped out, of course, which is why it's important to save copies on disk or tape. ☐

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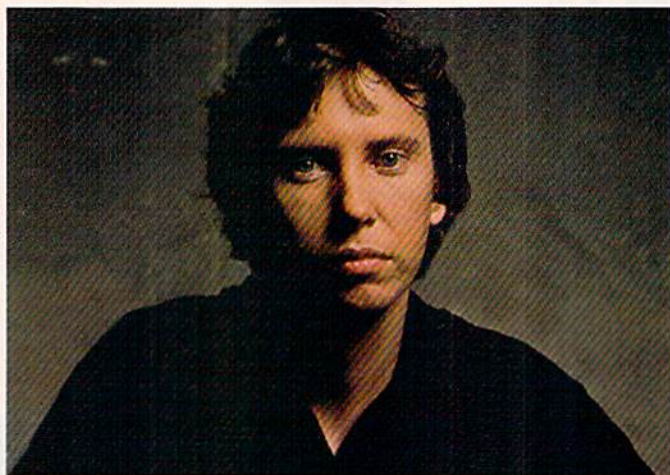
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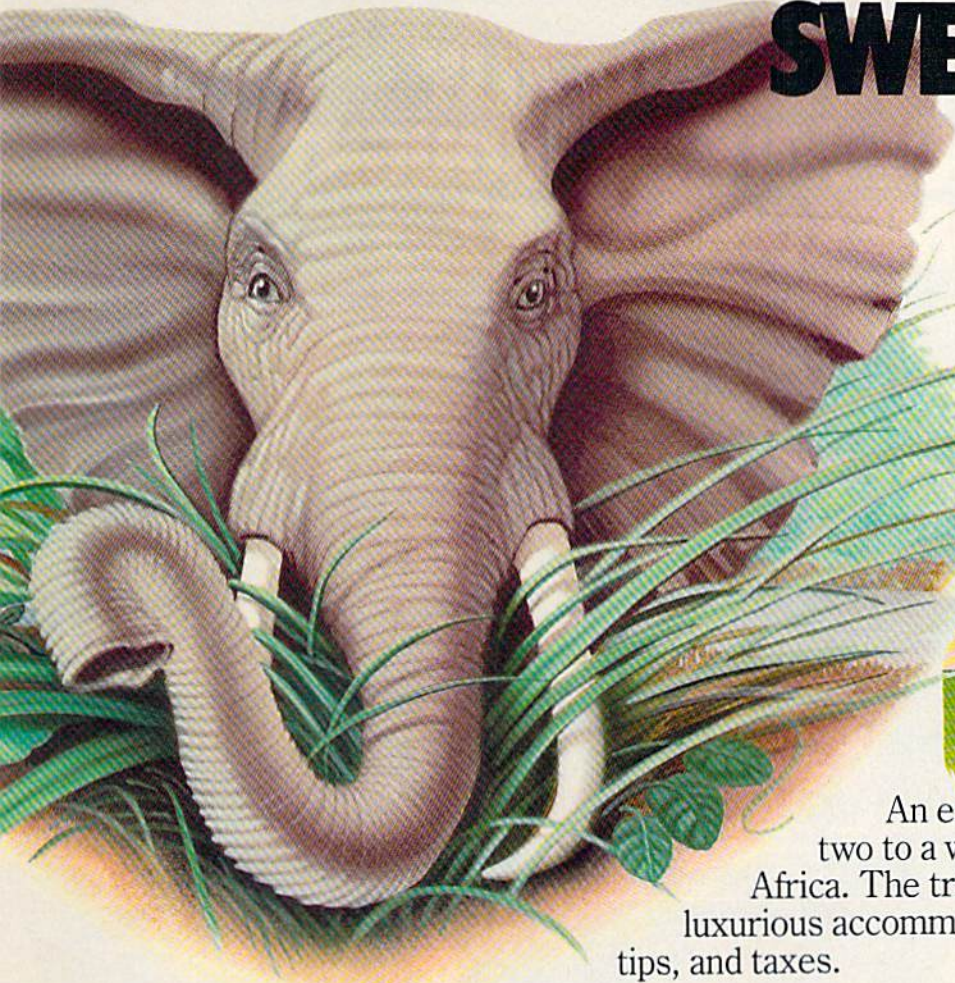
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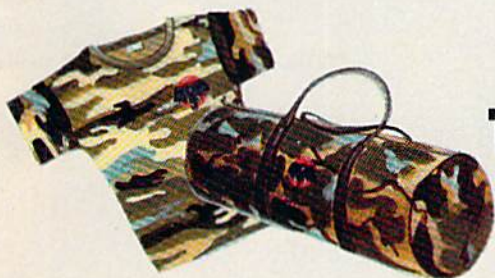
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The ship has just dropped you off on an unsettled planet, and won't be back for months. You have some money to buy supplies at the local store. You have the assistance of three companions. And you have a multiunit labor element—a combination robot/telephone/toaster/radio/best friend, affectionately referred to as M.U.L.E.—that tends to run away occasionally and break down eventually.

He's basically a good little guy. Maybe a tad klunky and weird-looking, especially as he lopes across the screen before the game begins, but he's got a tough job. Some consider him endearing.

Settling the planet isn't easy. Acid rainstorms may ruin your solar collectors. Insect swarms threaten your crops. A fire in the store could destroy all the supplies. A random meteorite provides more crystite—a valuable rock substance—but obliterates whatever was in its path. If you decide to mine ore, you risk losing everything to space pirates. Whatever you choose to cultivate—food, energy, crystite, or smithore—can make or break you, depending on the supply and demand, and on how daring you are during the game's 12 auctions.

And you can't do it alone. You need the help of your companions. You need nerve. You need your M.U.L.E.

Millions of miles from that imaginary planet, in a residential district in Little Rock, Arkansas, sits a house, rather homey and comfortable. Across the street is a park and a little lake.

This is the home of Management Systems Engineering, otherwise known as Ozark Softscape. Otherwise known as Dan Bunten, Bill Bunten, Jim Rushing, and Alan Watson, the designers of M.U.L.E.

Dan, head of the design team, has a background in industrial engineering, and has worked in a number of "traditional" careers, including a stint as an assistant city manager.

He wrote his first microcomputer program in 1979. Named *Wheeler Dealer*, it was a business simulation for the Apple. "It was really very primitive," says Bunten. "Looking at it now, I say to myself, 'Did people really do those kinds of things?' It contained a lot of real klutzy things that I wouldn't do anymore."

Wheeler Dealer was published by the now-defunct Speakeasy Software and cost \$50, which was an "outrageous price," according to Bunten. "I think it sold 150 copies," he says.

Though it may not have had appeal, Bunten's first program did have something that would later become an important element of M.U.L.E.: It had four players. "I had to design my own hardware device that allowed four different input lines," he says.

Next came *Cartels And Cutthroats*, another business simulator, and *Cytron Masters*, a "nonwar war game," according to Bunten. *Computer Quarterback*, which was converted from a mainframe, was his best seller (6000 copies) before M.U.L.E.

Cartels piqued the interest of Tripp Hawkins, president of Electronic Arts. "Tripp was a real *Cartels* fan," says Bunten. "Initially, he wanted my brother Bill and me to do another game like that, a business simulator. The problem was that it was a little too cerebral, not as playable as M.U.L.E. It did have the kind of depth that Electronic Arts was interested in, though."

About this time, Jim Rushing and Alan Watson got involved. "Alan had been a salesman at a computer store," says Bunten. "He had written an arcade game and sold the rights to it. He was looking for some way to be able to design games full-time, but didn't think it would be possible for another couple of years. He was glad to jump at it."

"Jim Rushing had finished his M.B.A. He was looking for jobs, but didn't find anything that really interested him. In the meantime, he was learning programming on his own. His cash flow needs were so reasonable that we were able to bring him on real quick."

Ozark Softscape also has some part-time help which includes Roy Glover, who wrote the delightful theme song for M.U.L.E.

M. U.L.E. was the result of Ozark Softscape's first effort to design a game as a team, though Bill and Dan had played and designed games together all their lives. When Dan was 12 and Bill 10, they drew a complete naval war game on their basement floor.

"Bill and I did the main design of M.U.L.E., though the initial brainstorming process involved



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everyone," says Bunten. "Bill doesn't program, so I translate the ideas into program design.

"Alan essentially takes care of the graphics and animation, how things are going to be presented. In *M.U.L.E.*, we wanted something that revolved around an auction, and some kind of pressure to get people to buy and sell to each other. We wanted some kind of creature that was going to be the mule, and creatures to represent the players. Alan took those ideas and made them into graphics and attractive screen design.

"Jim Rushing does the most serious chunks of programming. He'll take one big piece, like all of the auction dynamics in *M.U.L.E.* In his case, it's not so much design that's needed as very involved programming, a lot of effort, and flexibility."

Remember the first time you played Monopoly? It didn't take more than a few minutes to read the rules printed on the inside of the cover's box, but you probably had to keep referring to them in certain situations until you had played the game enough times to remember.

M.U.L.E. presents the same problem to many people. "It has a difficult learning curve," says Bunten. "That's a real dilemma. *M.U.L.E.* is aimed at a pretty critical audience.

"But we were a little surprised to find out that it's not as small a group as we were afraid it would be. It cuts across all kinds of boundaries that we wouldn't have expected. One of those that's quite pleasing is that quite a few women play *M.U.L.E.*

"I don't know why that is. I don't know what we did. I do know that we didn't include any overt violence, and we didn't make the game cutthroat to the point of hurting each other. There's competition, but it's within a framework of cooperation to ensure success. That's an appealing concept.

Appealing as *M.U.L.E.* may be, its designers feel that it could be more so. They're working on a Gold Edition. "You always wish you had another month to add some more depth to a game," says Bunten. "But it's a problem of diminishing returns. Each little piece of additional stuff adds a significant amount of time. The publisher has to take it away from you at some point. Electronic Arts calls it *creeping elegance.*"

In *M.U.L.E.*, Ozark Softscape allows you to step forward in time, to aid in the colonization of a planet. Their new game, *Seven Cities Of Gold*, takes you back to the sixteenth century, on an expedition to the New World.

"Ah ha!" you might think. "I know where the Incas are. I'll just go down there and take all the gold and head back to Europe."

It can't be done. "We want to convey the feeling that the Spaniards must have had, standing on the deck of a ship, not knowing anything about what was to the west," says Bunten. "Most of us know too much about geography to be able to experience that feeling. So our game is built on the sense of wonder and awe at the size of the world that the conquistadors were discovering."

To try to accomplish that ambitious goal, Rushing wrote a random world generator, which took about four months. "We tried to do some of the more difficult state-of-the-art graphics stuff," says Bunten. "I guess it will be up to the market to decide if we succeeded.

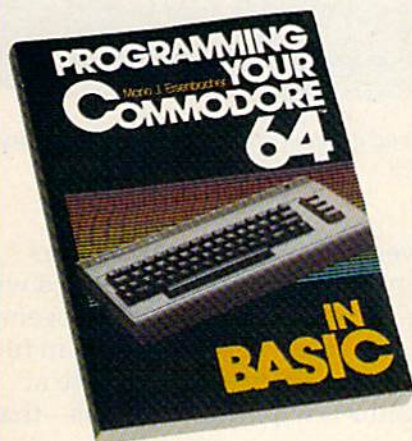
"A lot of strategy games are still keyboard-oriented. They leave it up to you to create an ambience. I don't think you should expect people to do that. I really think you must present them with as complete and visually appealing an environment as you can."

An important element of *Seven Cities* is interacting with the natives. That's done through a joystick for two reasons, says Bunten. "In the first place, it's easy to be nonverbal with a joystick. That's the design reason. The other is that the natives and the Spanish didn't share a language and pretty much had to live off what they perceived the other to be attempting."

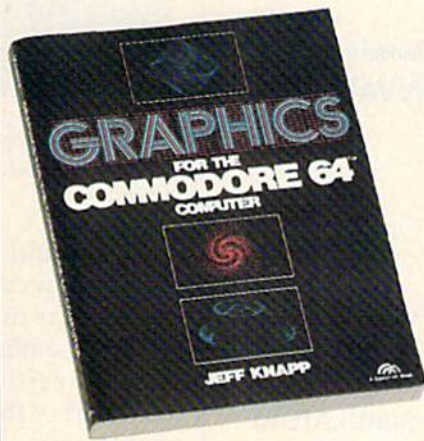
Bunten fears that *Seven Cities* may be offensive to some people's sensitivities. "Many of the conquistadors treated the natives horribly," he says. "Theirs was an arrogant and prideful approach to a society that had its own history and roots.

"But to be historically accurate required that we had to include violence. I don't like the idea of players hurting other things, but there's no alternative or you're forcing your own moral decisions on an audience that ought to have the choice themselves.

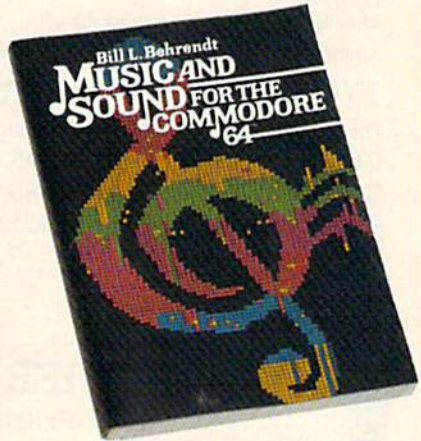
Prentice-Hall speaks a language other publishers have forgotten. English.*



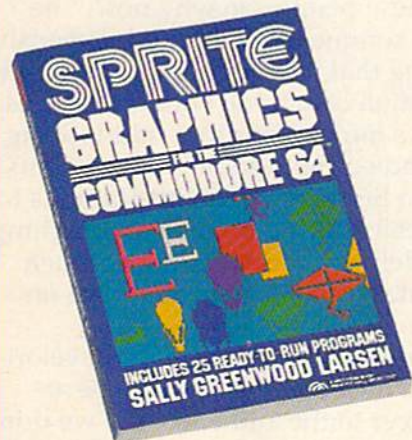
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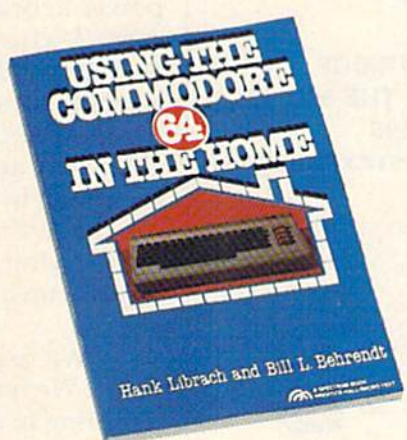
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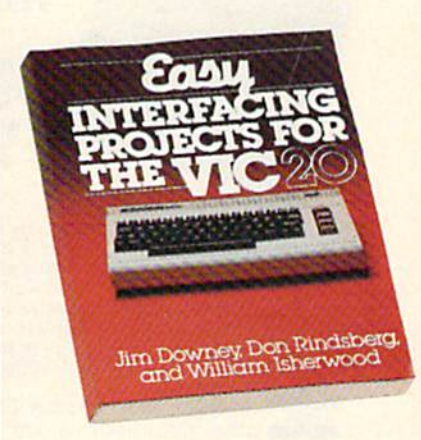
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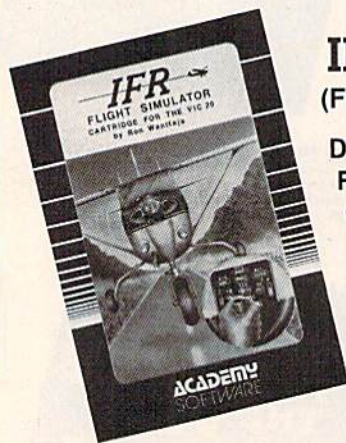
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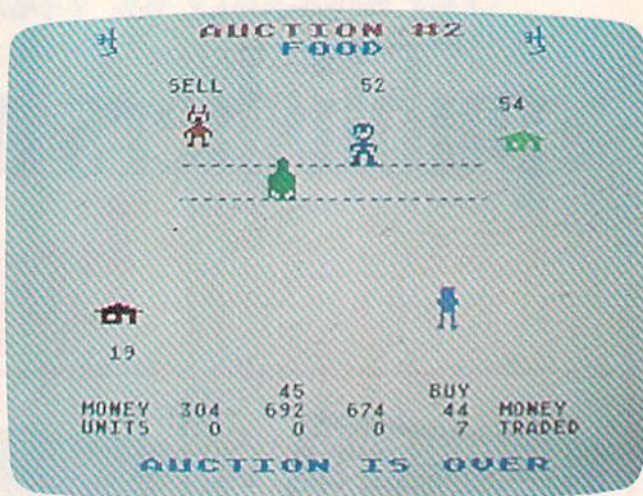
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"Bill and I were real Indian sympathizers when we were growing up. We always sided with the Indians instead of the cowboys. It just seems like such a neat, romantic culture to us, so in tune with the earth. Then to write a game where at least part of the game is wiping out Indians—that's problematic."

Bunten believes that players will face the same moral dilemma that they did designing the game. "The player will know that they have the power to beat these people, so why not?" he says. "Actually, conquest is efficient, inexpensive, and so tantalizing that it's tough to avoid it. But the optimal solution is to trade with the natives."

If *M.U.L.E.*'s mules and other odd-looking characters are endearing to some, they're gems in the rough to Dan Bunten. "It's a little fatuous to say that we're really hitting home with the things we're trying to deliver," he says. "How much impact can a klutzy cartoon character have on you?"

"We're in such primitive stages of development. We have a message that we may be attempting to deliver to the audience, but we don't yet have the mechanics of delivering it. We don't know the grammar yet."

"What we're trying to accomplish in any particular game is to create such an attractive vision or fantasy that people just get sucked into it. One of the neatest accomplishments is when people start taking metaphors from your games and applying them to situations in their own lives." ©

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Navigating The Networks

Of all the information utilities and data bases available to home computerists, four are best known to Commodore computer owners: Dow Jones News/Retrieval, Delphi, CompuServe Information Service, and the Commodore Information Network (accessed through CompuServe).

Commodore owners are usually introduced to these companies when they buy a modem and find that the package contains offers of free memberships or reduced membership fees for these networks.

With a modem and these bargain memberships, a user has access to an incredible array of information and services. Also, you only pay for what you get. There are no minimum use requirements, so if you need to be online for only 30 minutes a month, that's all you pay for. (There is a \$3 monthly charge if you choose direct billing instead of using a credit card.)

From Stocks To Poetry

Dow Jones is oriented almost exclusively to business and finance. With services such as *The Wall Street Journal* on-line, and current stock quotes, it is the leader in business services.

Delphi offers the fewest services because it's new (about a year old). But its newness has advantages. It's not crowded with established services, so there are plenty of opportunities for entrepreneurs to enter the home telecommunications market under its network umbrella. And, since newer services tend to be more experimental and innovative, the more adventurous computer users are likely to find something of interest and value on Delphi. For example, Delphi has a feature called *Writer's Corner*, where authors can publish their works and receive royalties when other users read them. Also, Delphi maintains a much more informal atmosphere, both in its menus and home computing services.

CompuServe offers the advantage of size, with the widest available range of business and home services. In addition, it has a whole library of documentation at reasonable prices. And

CompuServe sells *Vidtex* terminal software tailored for the special capabilities of most computers.

Special Interest Groups

CompuServe members can access Commodore's Information Network without extra charge. Operated by Commodore Business Machines, Inc., the network contains Special Interest Groups (SIGs) for the VIC-20, 64, PET, and Commodore's business computers. There's also a separate SIG for programmers.

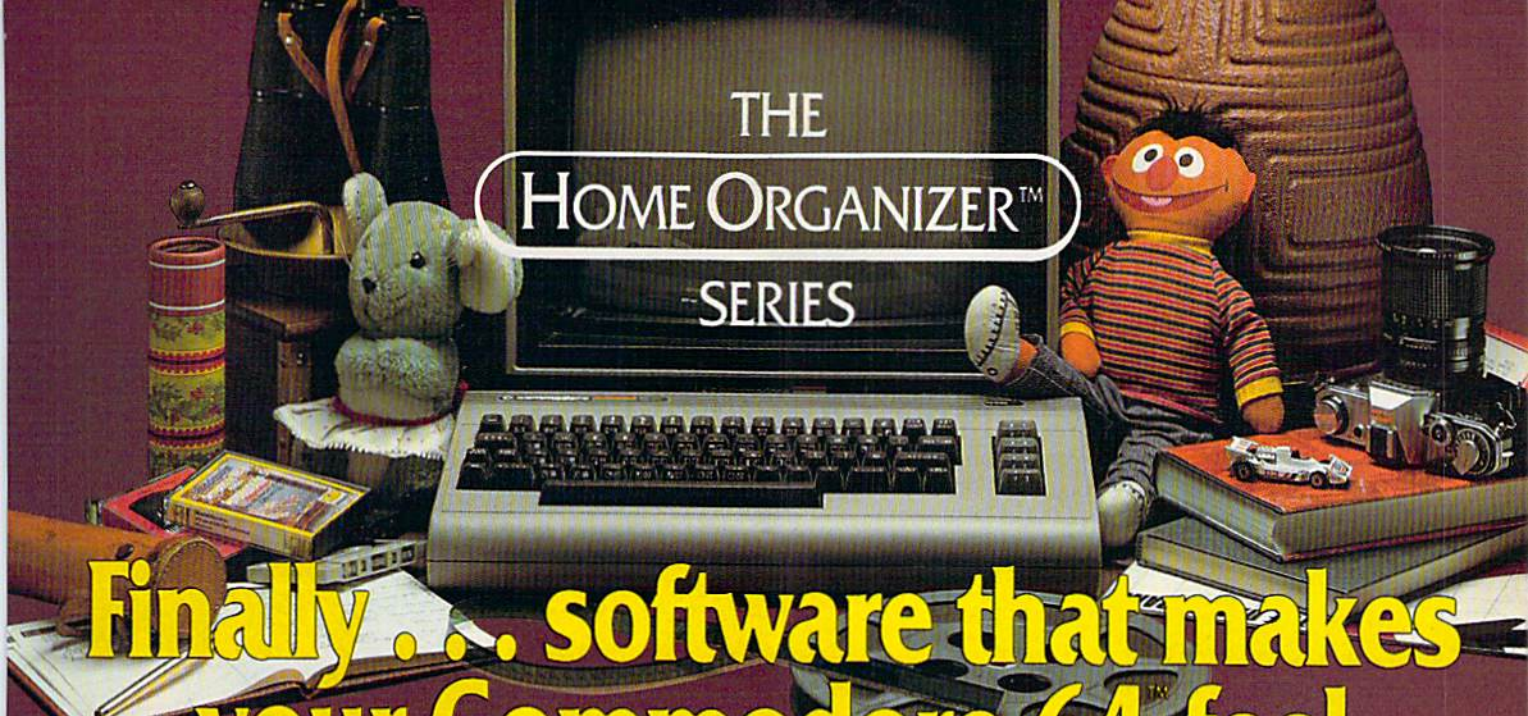
Each SIG comprises a bulletin board, conference lines, and several data base access areas in which you can upload and download public domain programs. Commodore operates an on-line Computer Club and user group which is separate from the other SIG services. There is a \$10 membership fee, for which you get a newsletter, a quarterly catalog for ordering computer supplies and software at a discount, and a club access area where you can upload and download special club programs.

Accessing The Networks

All the networks provide their subscribers with documentation on how to *log on* (connect to the network), with a toll-free 800 telephone number to call if users have problems making the connection. Access to Dow Jones and Delphi are provided through third-party *value-added carriers*. These companies maintain phone numbers in most metropolitan areas. Users call these local numbers and type in the special code sequence which the carrier uses to connect the caller to the network.

Dow Jones is accessed through the carriers Telenet, Tymnet, or Datapac (for Canadian subscribers). Delphi uses only Tymnet. To access CompuServe (and the Commodore network), you can use CompuServe's own telephone numbers, as well as Telenet, Tymnet, or Datapac.

Most networks include the carrier costs in their regular charges to users. However, if there is a CompuServe number available and you choose



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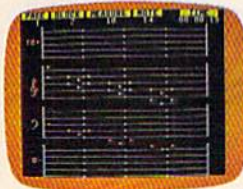
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to use Telenet or Tymnet, you may be assessed a surcharge for using the alternate carrier.

Each of these numbers is a local call, even if you're in California calling a computer complex in Massachusetts. (If you live outside a metro area and must call long distance to a carrier number in a nearby city, you are charged the long-distance rate to call that number.)

Facing The First Menu

All four networks are menu-driven and allow the user to choose the service he wants. Delphi, CompuServe, and Commodore also offer the option of verbose (complete) or brief menus. You can choose a menu with or without explanation of menu items and commands, or you can simply receive a prompt. Experienced users save time by switching to the abbreviated menus or prompts.

Dow Jones has a different procedure from the others in that it doesn't automatically send a menu when you log on. After your password is verified, you are prompted to ENTER QUERY. At this point you can go directly to any service, ask for an introductory menu, or go to the main menu. A new user would best benefit by typing //INTRO for the introductory menu. A welcome screen appears, then a menu like this:

PRESS FOR

- | | |
|---|---|
| 1 | Closing Dow Jones Averages retained |
| 2 | Weekly economic update revised on Fridays |
| 3 | News/Retrieval operating hours expanded |
| 4 | Customer Service Information |

Type 4 to get the basic information needed to use the network, change your password, and perform other recordkeeping chores. When that's completed, type //MENU to get the main menu:

TYPE FOR

- | | |
|-----------|---|
| //CQ | Current Quotes |
| //DJ NEWS | Dow Jones News |
| //HQ | Historical Quotes |
| //UPDATE | Economic Update |
| //WSJ | Wall Street Journal
Highlights on line |
| //DSCLO | Disclosure II |
| //EARN | Corporate Earnings Estimator |
| //FTS | Free Text Search of Dow Jones News |

FOR MORE CHOICES PRESS RETURN, FOR HELP, TYPE DATA BASE SYMBOL AND HELP. (EXAMPLE: //CQ HELP)

This is only the first page of the main menu; to see the rest, simply press RETURN.

To select a data base, type two slashes and the data base code.

Dow Jones provides a comprehensive manual (without extra charge) which contains all the information and sample menus required to use the network.

Delphi's Guided Tour

Delphi provides a free manual to each member, and also offers an on-line guided tour to give the subscriber necessary information. Printed documentation consists only of general information and a quick-reference card of network commands.

During the guided tour, instructions are given on how to change your password, how to use several control characters to move around Delphi, how to set screen length and width, and how to choose either the brief or verbose prompts. Then the main menu is presented.

Main Menu:

- | | |
|--------------------|----------------|
| Bulletin Boards | Library |
| Conference | Mail |
| Delphi-Oracle | News |
| Exit | Online Markets |
| Financial-Services | Profile |
| Games | Scheduler |
| Guided Tour | Travel |
| Help | Writers-Corner |
| Infomania | |

MAIN> What do you want to do?

To go to any Delphi service, type the name from the menu. The service you select will then offer other menus from which you choose particular sections of the service.

CompuServe Uses Numbers

CompuServe's menu system is more complex, with numbered menu items and system page numbers. After you log on, the main menu appears:

CompuServe Page CIS-1

CompuServe Information Service

- 1 Home Services
- 2 Business and Financial
- 3 Personal Computing
- 4 Services for Professionals
- 5 User Information
- 6 Index

Enter your selection number, or H for more information.

!

The exclamation mark at the bottom of the menu is a special prompt, called a command prompt. A GO command typed at a command prompt sends you directly to any area of the network, bypassing the usual path through several menus.

The Information Menu

New users should choose item 5, User Information. This menu appears:

CompuServe Page CIS-4

USER INFORMATION

- 1 What's New
- 2 Command Summary & Usage Tips
- 3 Feedback to CompuServe

The END of DINKETY-DINK-DINK.

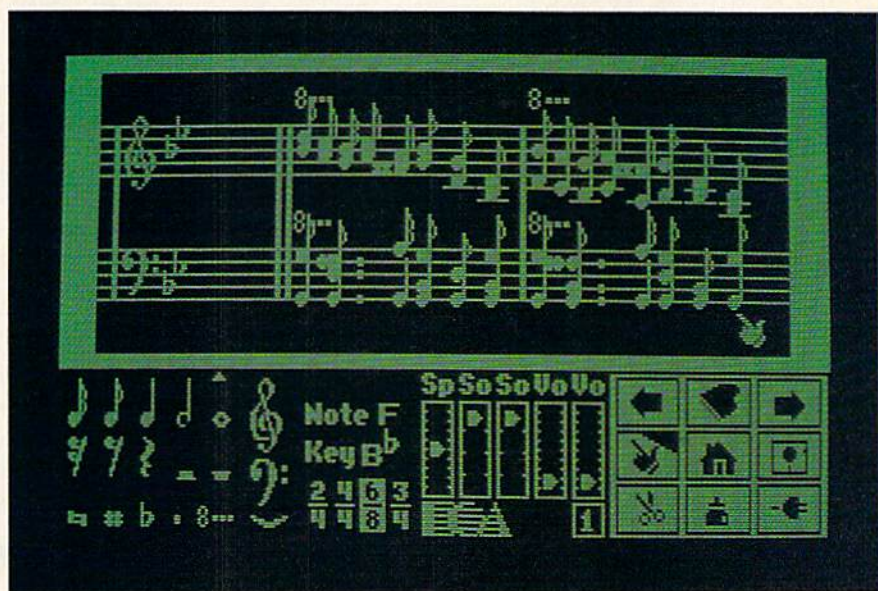
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Take a good look at this screen because it, you, and a joystick are the whole story here.

That's you at the right end of the staff of notes — the little hand. Move the joystick, and you move the hand. Use it to carry notes up to the staff. Lay in rests, signatures, clefs, then point



to the little piano in the lower right and listen, because you'll hear the whole thing played back.

Move those little scales in the middle up and down to vary the music's speed, sound quality, and volume. Use

the scissors to cut out whole measures, then use the glue pot to paste them in somewhere else. Got a printer? Great. Print the score out and show it off to your friends.

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- 4 Order Products, Guides, etc.
 - 5 Change Terminal Settings
 - 6 Change Your Password
 - 7 Billing: Your Charges, Rates
Options, Making Changes
 - 8 Logon Instructions & Numbers
 - 9 Electronic Bounce Back
- Last menu page. Key digit or M for previous menu.
!

If you're a new subscriber, you'll go to this menu often to refresh your memory about commands and prompts, to check on how much money you're spending, and to ask CompuServe questions about confusing aspects of network services.

Select item 5, Change Terminal Settings, to have CompuServe configure its output for your computer. For example, choose 22, 40, or 80 characters per screen line, or have the text displayed in all capitals or in upper- and lowercase.

Changing Your Password

Select item 6 to change your password. You should do this at least once a week. A password is like a credit card number. If other users find out what it is, they can use your account and you'll get the bill. So never type your password while on-line, except when logging on or changing it here.

Another important selection on this menu is item 4, used for ordering CompuServe's manuals.

The Commodore Network

After you've finished with these recordkeeping chores, you may want to visit the Commodore network. The simplest way to get there is from the main menu. Let's suppose you have finished changing your password from the User Information menu (Page CIS-4). At the ! prompt, type M to get back to the main menu (Page CIS-1). When you see the main menu ! prompt, select item 3, Personal Computing, then press RETURN.

You will receive the Personal Computing SIGs menu (Page PCS-50). At the prompt, type 15, the selection number for Commodore. You will receive the Commodore main menu, Page PCS-160. Use this menu to access any of the Commodore SIGs.

Another, more direct, route to the Commodore network is to type GO PCS-160 at any ! prompt. This goes directly to the main Commodore menu from anywhere in CompuServe. To go directly to the 64 SIG, enter GO PCS-156, and for the VIC SIG, GO PCS-155.

The Bulletin Board

The most popular services for beginners on the SIGs are the Bulletin Board and the Conference line. On the Bulletin Board are several hundred messages on a wide variety of subjects. Areas are set aside for general messages, messages from and to software and hardware vendors, and for Hotline questions to Commodore, which are then

answered on the Bulletin Board.

Commodore provides on-line instructions and a simple line editor for users who want to leave messages.

Control Characters

There are several control characters which are helpful for typing in messages and other text. Most are common to all telecommunications; a few are used differently by different systems. Control characters usually show on the screen as an up-arrow and a character. For example, CTRL-V, represented by ↑V, is sent by holding down the CTRL key and pressing V. The control characters cause the network software to interrupt what it's doing and take some other action. Some of the most frequently used:

- ↑A Tells the host computer to stop transmitting at the end of the current line.
- ↑O Aborts whatever is being transmitted and jumps to the next prompt. Used on Delphi, instead of CTRL-P.
- ↑P Aborts whatever is being transmitted and jumps to the next prompt. You can use this to jump past the introductory bulletins on CompuServe.
- ↑Q Tells the host computer to resume transmitting.
- ↑R Displays the line you are currently typing (Delphi).
- ↑S Tells the host computer to stop transmitting immediately.
- ↑U Deletes the line you are currently typing.
- ↑V Displays the current line you're typing (CompuServe).

The Conference Line

The Conference service (CO) is very popular, but it can be confusing until you learn the quirks and commands. Although formal conferences are held on CO, the name is misleading because most subscribers use CO as a kind of chat service, similar to a CB radio band.

When you select CO, you see a series of short bulletins on what's happening on CO in the near future. CO also offers some pointers on frequently used commands, and outlines the etiquette to be used on-line. It's good practice to download these bulletins and command descriptions, and keep them handy while you're on-line.

Next month we'll discuss downloading and uploading in detail. For now, let's look at two simple ways to download this information. If your terminal software has a feature that dumps the screen contents to the printer, you can wait until your screen is nearly full, then press CTRL-A. Next, press the proper key to print the screen. When the transfer is completed, press CTRL-Q to resume transmission, press CTRL-A again when the screen is nearly full, dump it to the printer, and continue this process until all the information is printed.

The second method is a simple matter of opening the buffer in your terminal software before accessing the CO. (Consult your terminal software



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* Popular Computing, November, 1982
† Apple Softalk, April, 1982

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documentation for the proper procedure.) Everything that appears on screen will also be stored in the buffer. When all the information has been transmitted, close the buffer. Depending on the capability of your software, save the information to disk while on-line or after logging off.

But before trying either of these methods, read your terminal software manual carefully. Any good program will include a feature that automatically sends the control characters, captures incoming data in a buffer, and stores it to disk.

Learning To Talk

After receiving this introductory CO information, you will find yourself on Conference Channel 30. If anyone else is on-line, messages like this will scroll up your screen:

```
(30,Blackfoot) I see what you mean. But can you use
the cassette recorder...
(30,Blackfoot) and the disk drive at the same time? ga
(30,SamR.) Yes, no problem. ga
(30,Blackfoot) Thanks. I'll try it. ga
```

In this conversation between two users, the information in parentheses is the conference channel number and the user's name. Users have a choice of using the name listed in their CompuServe account or of using a handle (pseudonym), as most CB radio operators do. This option is also useful when two or more people share an account on the network. Each person can use his or her own name while on-line. (To change your handle, type /HAN on a new line. At the prompt, type in your chosen name and hit RETURN.)

On-Line Etiquette

Blackfoot has typed ellipses (three periods) in her first line. This means she has more to say. At the end of her second line, she has typed GA (Go Ahead). These codes are simple but essential for other users to know whether it's OK to send their comments without interrupting the current "speaker."

When several users are on CO, it's common to see several conversations carried on at the same time. When that happens, users tend to start a remark with the name of the person they're talking to, like this:

```
(30,Blackfoot) Sam R. => I see what you mean.
But can you use a cassette...
```

Talking Back

The most confusing aspect of CO for beginners is in trying to type in their comments while other comments are scrolling up the screen. Whatever you type will appear mixed up with the incoming comments. For example, if you try to type:

```
Hello, my name is Clyde
```

your screen might look like this:

```
He(30,Blackfoot)llo,Sam R.my =>I
seenawhat me isyou mean.Clyde
```

All this gibberish is only on *your* screen; other users can't see what you're typing until you hit RETURN.

There is no real remedy for this jumble. The best solution is to avoid looking at the screen while you're typing. If you get lost and can't remember what you typed last, type CTRL-V to redisplay your line, free of the gibberish. If you get hopelessly confused, type CTRL-U to erase the incomplete line. When you finish typing your comment (less than 80 characters), press RETURN and your message will be transmitted to the other users.

It doesn't take long to get the hang of this unorthodox communication method, and the reward of instant communication with other users is well worth the initial confusion.

Conference Commands

Another tricky area for beginners is the use of commands in the CO section. There are three modes of communication on Commodore's CO. The default mode is open communication; everyone can see everyone else's comments. The second mode is /TALK, for private conversations between two users. The third mode is /SCRamble, in which several users can have a private conversation.

To use these commands while in CO, type them on a line alone, then press RETURN. If you put any character, even a space, in front of the slash, it won't work. (It will be sent as a comment rather than a command.) If you find this confusing, just type a CTRL-U before typing the command. This will delete anything you may have typed by mistake. Then type the command and RETURN, and you should get the desired result.

Conferencing modes on Delphi are different from CompuServe. The default mode is private. To join a conversation you must /PAGE one of the members of a group and get the group scramble code. Then you must /JOIN the group. There is no open conferencing on Delphi, and the commands are different, but the results are the same.

A Few Quirks

Besides the special conditions on individual services, the networks have a few general quirks which can be confusing if you're not expecting them. The strangest is a tendency for the characters on your screen to suddenly stop scrolling for no apparent reason, then start up again. This happens because thousands of people are using the system at once, and sometimes it gets a second or two behind. This occasionally happens on all the networks, but is most noticeable during peak evening hours on CompuServe.

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in a constant race with its users, trying to expand its capacity to keep up with the growing numbers who log on every evening.

When the network falls behind, you may experience a delay in moving from one service to another. Delays of up to five minutes are not uncommon.

No Dead Ends

Another problem for new users is the sense of wandering in a labyrinth. Many beginners worry needlessly about getting lost in the maze of menus, of wandering into a service that charges extra for access and running up a huge bill. Or, they worry about what happens if they accidentally hang up without properly logging off.

First, it's difficult, if not impossible, to get into an extra-charge area without knowing it. Many of the services require users to sign up separately from their network membership, and unauthorized access is not possible. There are services, such as the Academic American Encyclopedia (AAE), which can be accessed without prior arrangement. However, the AAE menu includes a notice that the service involves a \$2 per hour surcharge.

There are no dead ends on the networks. Even if the network software crashes (a very rare occurrence), or if a user gets nothing but garbage

scrolling up the screen, the option is always there to simply disconnect the modem from the phone line.

If a user disconnects from the network without properly logging off (either by mistake or if the connection is broken by a telephone line malfunction), CompuServe's software will wait for up to seven minutes, then log the user off. During very busy periods, this may take up to 20 minutes. The user is charged for this time.

If you have questions or ideas about subjects you'd like to see covered in this column, write to: Home Telecommunications, COMPUTE!'S GAZETTE, P.O. Box 5406, Greensboro, NC 27403. Or you can send me electronic mail. My CompuServe ID is 75005,1553. For Delphi, it's BOZART.

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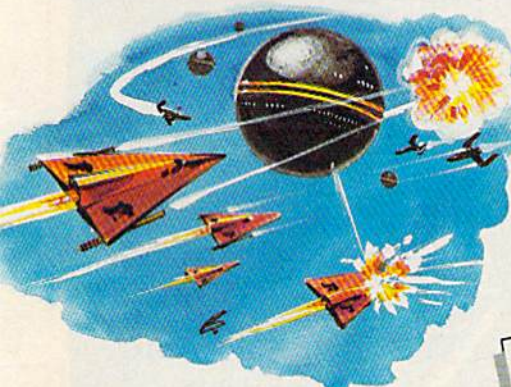
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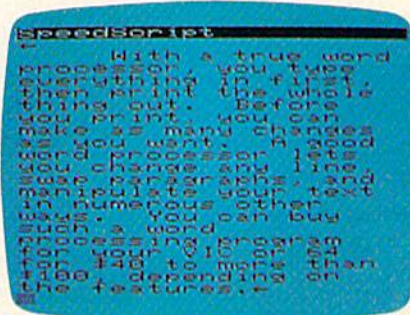
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3-D Tic-Tac-Toe

Mark Doyle

This two-player game for the Commodore 64 or VIC-20 with memory expansion (any amount) makes tic-tac-toe a real challenge. Joysticks are required.

Sound, color, and a three-dimensional playing board add new excitement to this old familiar game. After the title screen is displayed, both players enter their names and how many games they want to play. A multicolored three-dimensional tic-tac-toe board then appears on the screen.

The player with the joystick in port 1 (64 version) goes first. Since the VIC has only one joystick port, players must take turns with the joystick in the VIC version.

To move the cursor, at the top left corner of the board, push the joystick left or right. When you get to the desired location, push the fire button and your marker will appear under the cursor. If there is already a marker in the space, a low noise will be heard and you will have to go elsewhere.

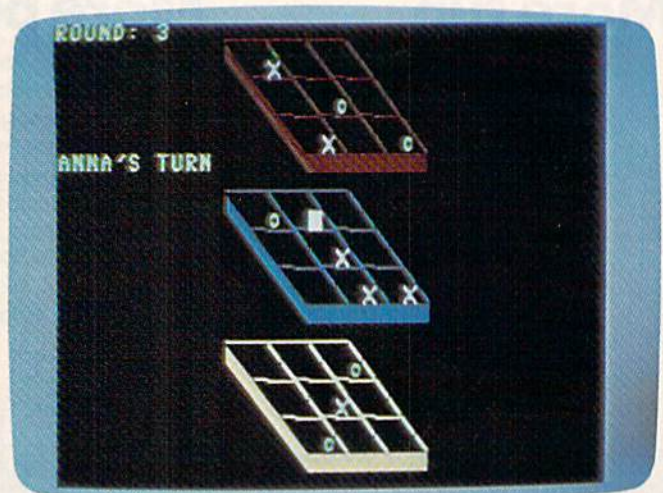
Winning Combinations

To win, you must get three of your markers in a straight line before your opponent does. They can be on one of the boards, or a combination of the three boards going diagonally or up and down.

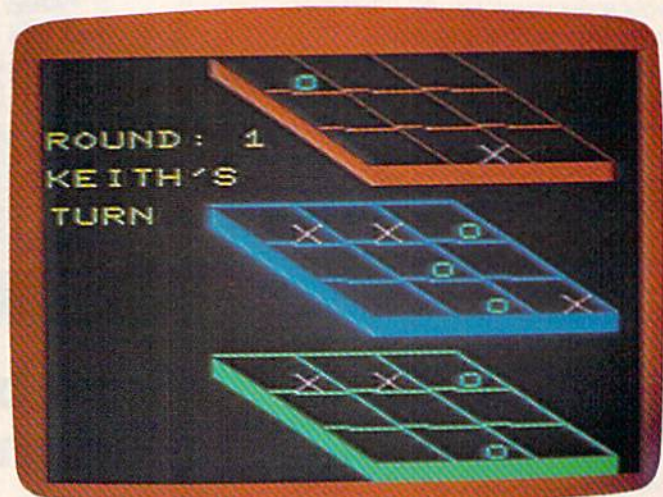
When you get a tic-tac-toe, your three pieces flash different colors and the winning sound is heard. The board is then cleared, and, if you specified more than one round in the beginning, you play again. If not, the score is displayed and the game is over.

If you don't want to type this program in, I'll be glad to make a copy (64 version only) for you. Send \$3, a blank cassette, and a self-addressed stamped mailer to:


Mark Doyle
3755 Lemire Lane
Sebastopol, CA 95472



Anna is about to win this round (64 version).



3-D Tic-Tac-Toe challenges you to think in three dimensions (VIC version).

See program listings on page 177. 

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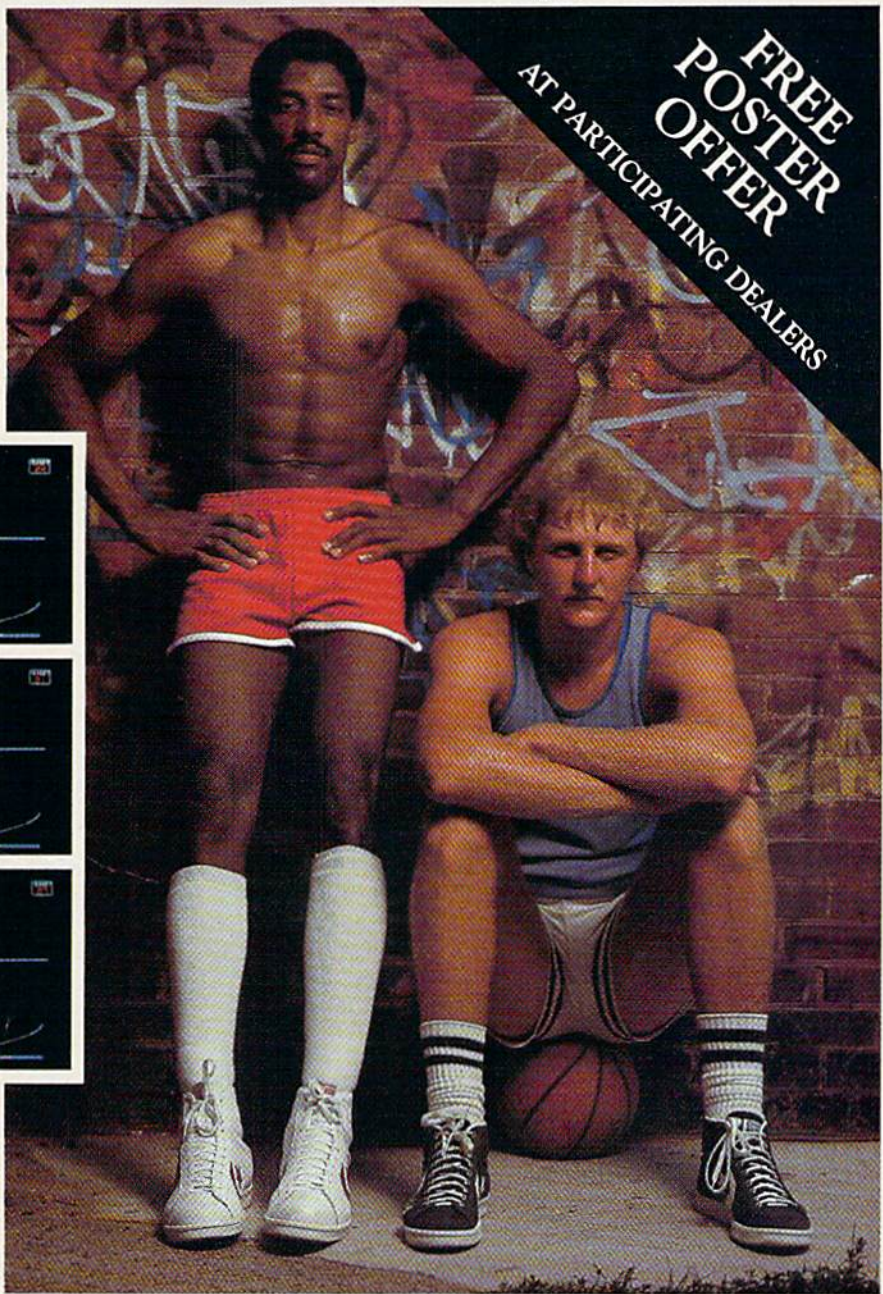
It wasn't easy. When they talked, we listened. When they criticized, we made big changes. When they gave suggestions, we took them.

And it shows. This thing is absolutely uncanny. You actually take on all the skills and characteristics of Bird or The Doctor — their own particular moves, shooting abilities, even strength and speed.

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Castle Dungeon

Dave and Casey Gardner

Bombs with short fuses and blind monsters add urgency and danger to this all-graphics adventure game for the unexpanded VIC and the Commodore 64. Joystick required.

Your quest is to find three bombs hidden in the rooms and corridors of the castle dungeon. They were placed by the evil wizard who is trying to destroy the castle.

He also put nine beasts in the rooms to guard the bombs. Luckily for you, the beasts are blind and will attack only if you bump into them. If you are carrying the enchanted sword when you fight the beasts, you can defeat them. You will also need the magic key to open the locked doors.

A Light And Levitation

On your search through the dungeon you will be carrying a light which is only bright enough for you to see the area immediately around you. If you move too fast, you might fall into a bottomless pit and be lost forever. By standing next to a pit and pressing the L key, you can invoke a levitation spell which will allow you to cross over the pit without falling in.

The fuses on the bombs will burn for only five minutes (three minutes for the 64 version). If you haven't found all three by that time, they will explode and the castle will be destroyed. Each time you play, the wizard will place the various objects in different locations.

To save memory, the VIC version of the program is in two parts. The first part (Program 1) displays the title page and instructions and defines the programmable characters used in the second part.

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One or more players; joystick controlled.



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A Special Filename

Type in Program 1 and SAVE it. If you are using a Datasette change ,8 in line 28 of Program 1 to ,1.) Then type in Program 2 and SAVE it as "D".

Here are outlines of the VIC programs:

Program 1 (VIC Loader)

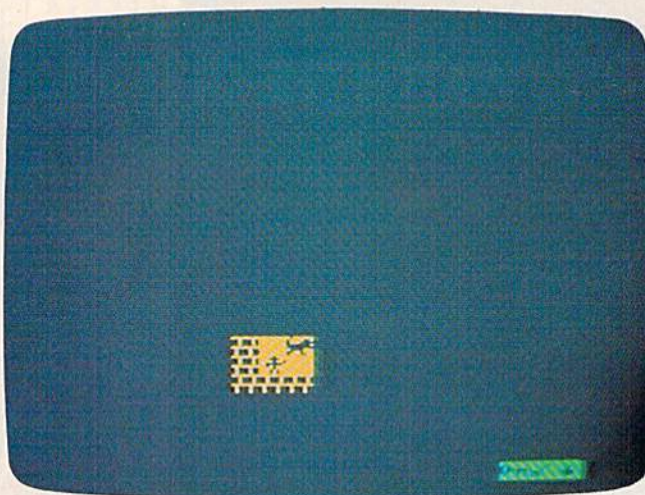
Line(s)

- 1 Clears the screen and lowers the top of memory
- 2 Defines variables for sounds and the screen
- 3-5 Display the title page
- 6-7 Play a tune
- 8-10 Complete the title page
- 11-22 Display instructions
- 23 Randomizes (so each game will start differently)
- 24-25 Store character information in high memory
- 26-29 Start LOADING Part two
- 30-43 Title page DATA
- 44-49 Character DATA

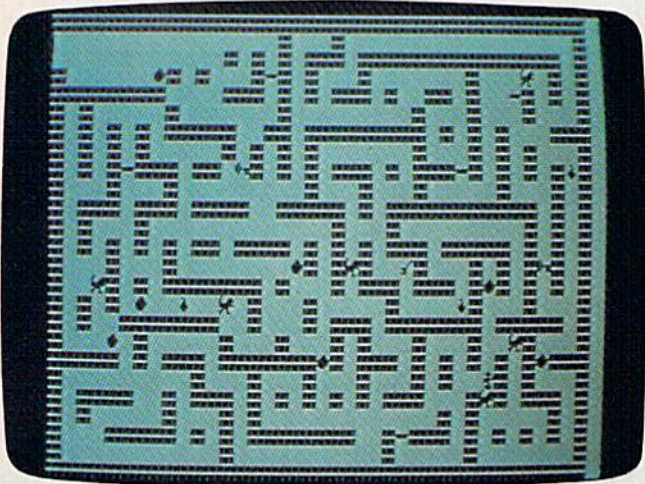
Program 2 (Main VIC Program)

Line(s)

- 1-2 Initialize variables
- 3 Fills the screen with black spaces
- 4-5 Place the maze
- 6 Places doors
- 7 Places room floors
- 8 Places bombs
- 9 Places beasts
- 10 Places key
- 11 Places sword
- 12 Places pits
- 13 Chooses starting point, sets the clock to zero
- 14 Reads joystick
- 15 Checks if time is up
- 16-20 Set direction
- 21 If wall in way—stop
- 22 Sword?
- 23 Beast?
- 24 Door and no key?
- 25 Key?
- 26 Levitation spell?
- 27 Pit and no spell?
- 28 Pit and spell?
- 29 Bomb?
- 30 If not moving jump ahead to Line 44
- 31-33 Light up area around player
- 34 If key or sword found—make sound
- 35 If player fell in pit—jump to ending sequence
- 36-37 If player levitated over pit—redraw pit
- 38 Cancels levitation spell
- 39 Makes player movement noise
- 40-43 Darken area just vacated
- 44 If third bomb found—jump to ending sequence
- 45 Do it again
- 46-47 Successful quest ending
- 48-55 Unsuccessful quest ending
- 56-62 Maze DATA
- 63 Door DATA
- 64-66 Room floor DATA
- 67-69 Subroutine for randomly placing objects
- 70-72 Sound subroutine for sword and key
- 73-74 Sound subroutine for locked door
- 75 Sound subroutine for bomb found
- 76-77 Sound and ending subroutine for falling in pit
- 78-81 Subroutine for fighting beast
- 82 Sound subroutine for levitation spell



The dungeon is dark and you've encountered a monster (VIC version).



If you lose, the maze is revealed (64 version).

We would like to thank Don Brunner and Todd Andrews of Rose City Computer Associates, Newark, New York, for their technical assistance in preparing this program.

The joystick reading routine is from "The Joystick Connection" by Paul Bupp and Stephen Drop (COMPUTE! magazine, May 1982).

If you would like to save the trouble of typing in and debugging the programs (VIC version only) send \$3, a blank tape, and a stamped, self-addressed mailer to:

Dave Gardner
2342 Barnes Road
Walworth, NY 14568

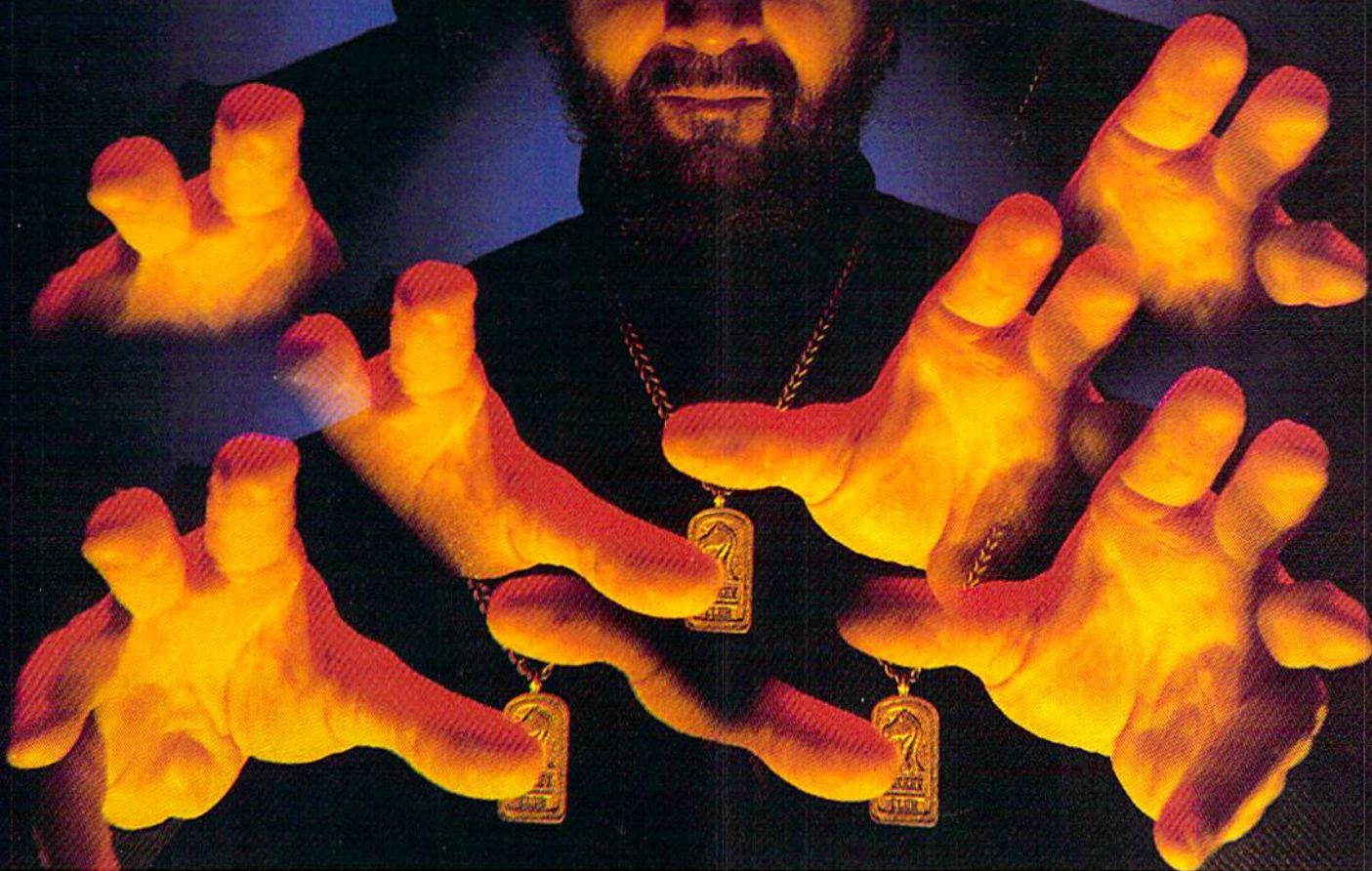
See program listings on page 157. ☺

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Revenge Of Cyon

Mike Reinman

Save Earth from the invading Cyon ships. Originally written for the VIC-20, we've added a version for the 64. A joystick is required.

"Revenge Of Cyon" is an action game for the VIC and 64 in which you try to save Earth from the invading Cyon Empire. Using the joystick, you must intercept the Cyon ships before they reach the ground. Do this by moving the cross hairs over each ship and pressing the fire button. You are given seven shots at each ship. When a ship is destroyed, the number of shots used and the number of seconds you took to get it will be displayed.

At first, the ships descend one at a time. But after the first six ships, the Cyons get smarter and send down two ships at one time. If you clear 11

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screens, Earth is saved and you win the game. If the ships reach the ground three times, Earth will be destroyed and you will be rated on your performance. Six difficulty levels are available, ranging from simple to impossible.

A point of interest to beginning programmers is that FOR-NEXT loops will execute much faster if you omit the variable in the NEXT command.

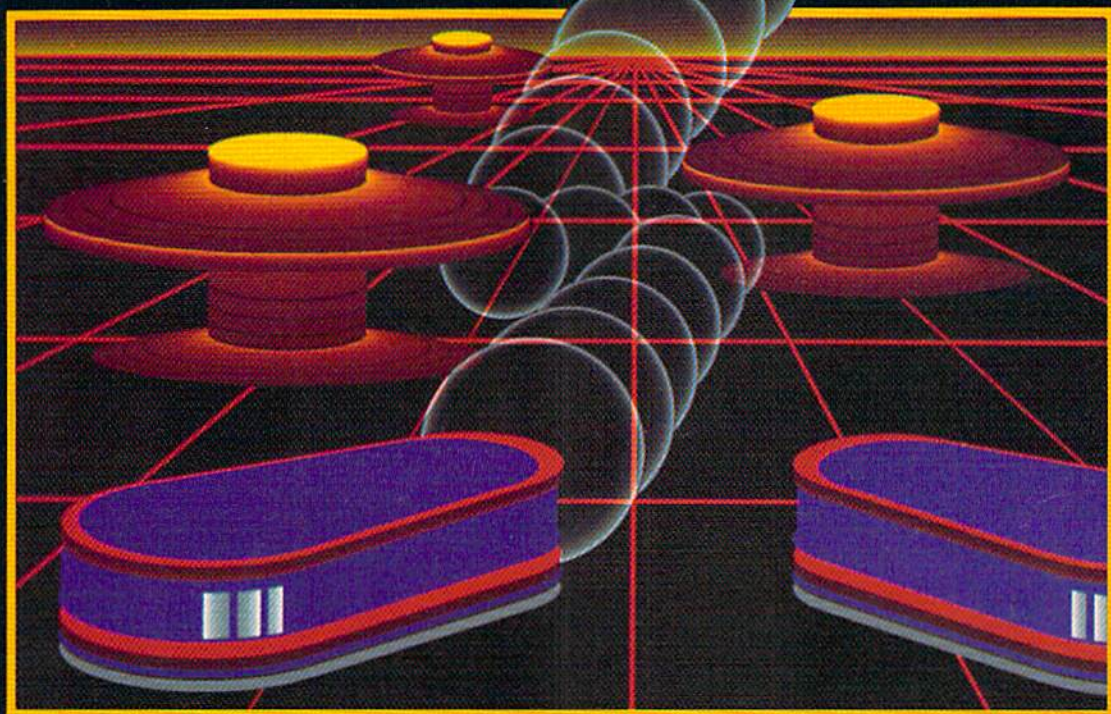
See program listings on page 161. ☺



It took two shots and four seconds for a direct hit in the VIC version of "Revenge of Cyon."

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The Frantic Fisherman

David Lacey

Idly floating in your boat, waiting for the fish to bite, is a fine way to relax. In this game, however, an angler's dream becomes a nightmare when sharks get the notion that you're the bait and thunderclouds threaten you with gargantuan raindrops. It's good you remembered to bring your shark swatter and an umbrella. For the VIC and 64.

The fish are biting, and you've managed to catch a few. But suddenly you notice the sky is clouding over, and to make things worse, ravenous sharks begin to circle your boat.

The object of "Frantic Fisherman" is to survive. You score points by clubbing the sharks with your bat and blocking raindrops with your umbrella. You start with three fishermen. Each time a shark or raindrop hits the boat, you lose the boat and one fisherman. However, a new fisherman is awarded for every 2,000 points.

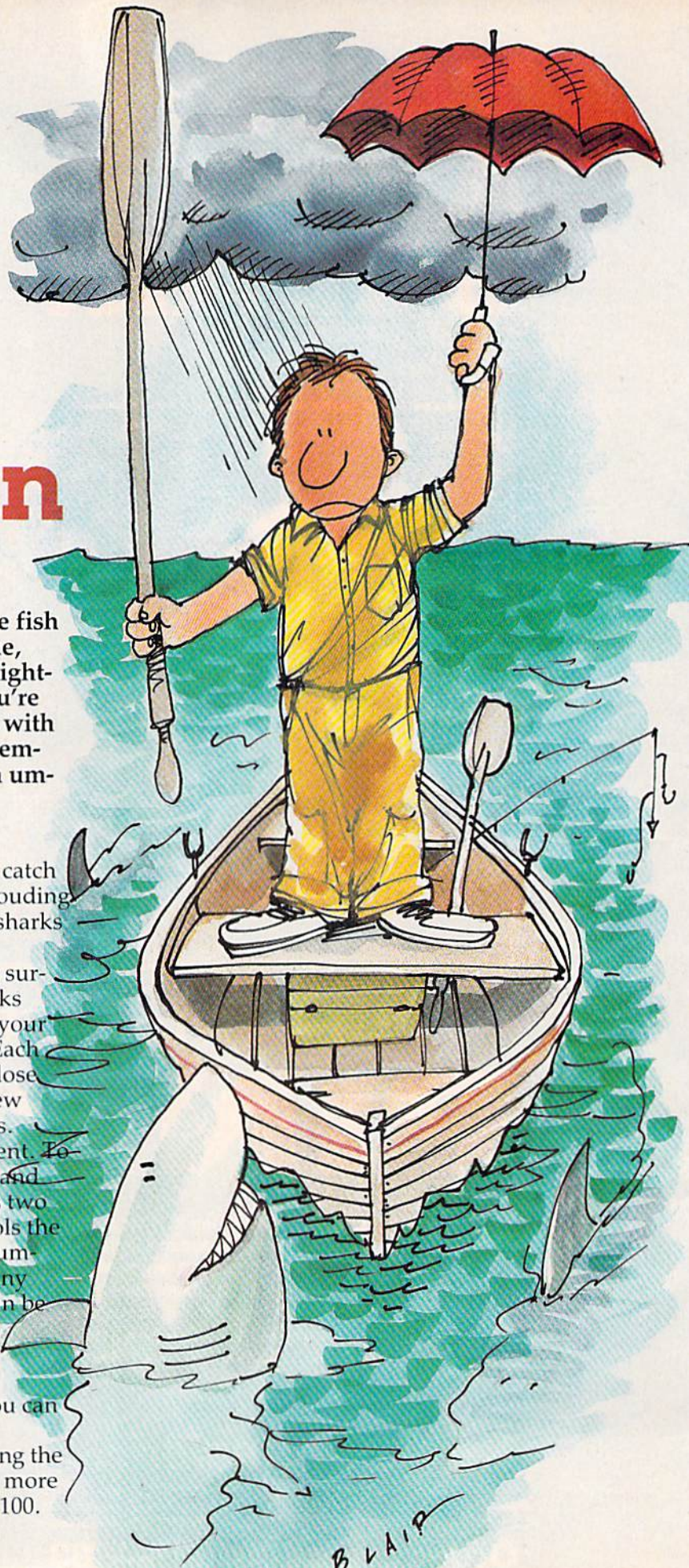
Three keys are used to control movement. To move back and forth, use the less than (<) and greater than (>) keys. The space bar serves two functions. When sharks approach, it controls the club. If a raindrop is falling, it controls the umbrella. You can use the shark swatter as many times as you like. The umbrella, though, can be lifted only three times for each raindrop.

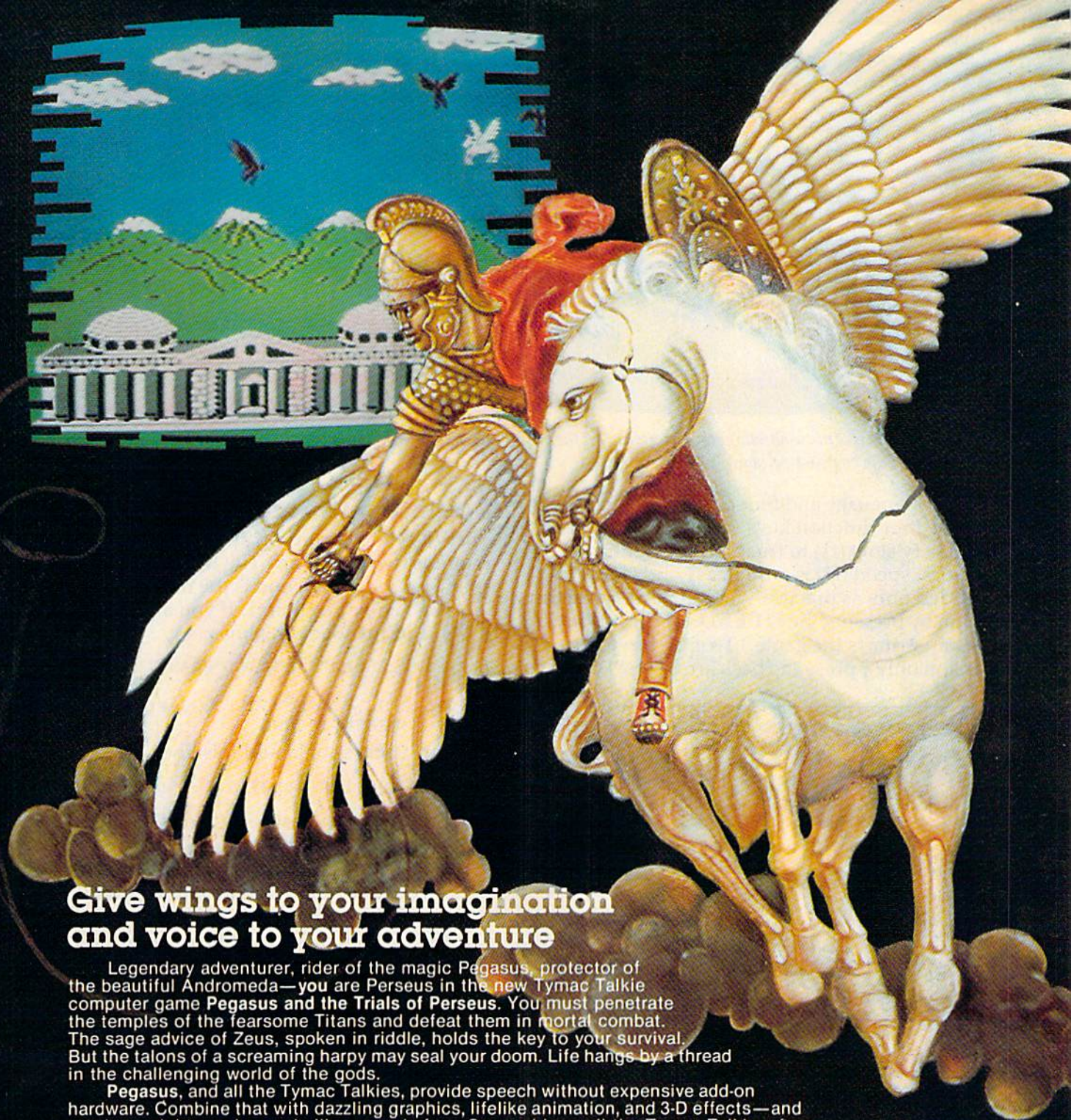
Controlling The Frenzy

If you think the game is too fast or slow, you can make the fisherman more (or less) frantic.

VIC users can alter the speed by changing the variable DE in line 30 of Program 2. To add more fishermen, increase the value of GL in line 100.

The bulk of the 64 version is written in





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Type Sniper



First Strike



Flyer Fox



Gandalf the Sorcerer



Codename: DEADZONE

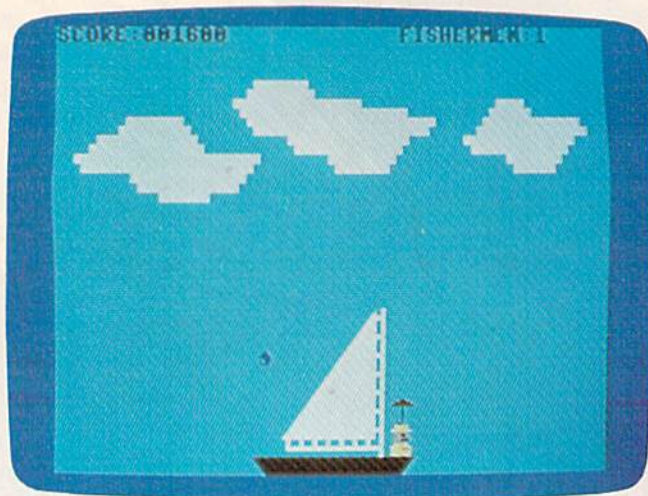


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The fisherman raises his umbrella, but is standing on the wrong side of the boat (64 version).

machine language and the speed controls are built-in. The four function keys give you four speeds, from very slow (f1) to frustratingly frantic (f7). The first speed (f1) is rather easy and is recommended only as practice. You can also pause the action by pressing the SHIFT/LOCK key. (Pressing it again restarts the game.) To end the game (64 version only), press the back arrow (←) key.



In the VIC version, a shark is about to be bopped.

Special VIC Instructions

The VIC version runs on an unexpanded VIC, but requires two programs. The first redefines the character set, the second is the main program.

First enter Program 1. If you are using a disk drive, add the following lines:

```
700 PRINT"LOAD"CHR$( 34 )"FRANTIC2"CHR$( 34 )
    ",8"
710 POKE198,4:FORT=631TO633:POKET,145:NEXT:POKE634,13:END
```


Cassette users should add this line:

```
700 POKE198,1:POKE531,131:END
```

Next, type in Program 2 and SAVE it as FRANTIC2. To play the game, LOAD and RUN Program 1 and it will LOAD and RUN Program 2.

If you don't want to type in the programs, send me \$3, a cassette, and a self-addressed stamped mailer, and I will make a copy (VIC version only).

David Lacey
3708 J Street
Lincoln, NE 68510

See program listings on page 182. 

STOP PLAYING GAMES


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Author: **Indescomp**
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Author: **M. Sudworth**
Explosions mushroom around you and the rear scanner shows following craft, you increase speed and fire at the ducts, dodging from side to side of the narrow corridor.

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Author: **Chartec**
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REVIEWS

Arcade-Style Games For The VIC-20: *Skramble!* And *Gridder*

Harvey B. Herman, Associate Editor

What makes a great computer game? I suppose it's like investing in the stock market. If the brokers had all the answers, they would be millionaires investing their own money rather than other people's. And if game designers knew all the secrets for producing great games, they would never make a false step.

Since no one can know *all* the secrets, some people consistently do better than average in the stock market, and so do some game designers in competition for our software dollars. I don't know what a good average might be, but in the opinion of my family, Microdigital is batting .500 on *Skramble!* and *Gridder*.

My youngest son almost immediately formed strong opinions on the quality of each game. Perhaps you can use his insight in your evaluations of other games. However, we don't have all the answers, or we would be writing games rather than reviewing them.

Skramble!

The game begins with instructions and a chorus of "Yankee Doodle." You are in command of a moving spaceship. Your only options are to bomb, shoot, or maneuver around enemy defenses. You have a limited amount of fuel, not enough to

complete the mission. You have to earn additional fuel by destroying enemy oil tanks. Points are scored by destroying their rockets and helicopters. You lose if you collide with anything or run out of fuel. Points and remaining fuel are displayed in a panel at the bottom of the screen.

There is plenty of variety—the game offers eight different challenges (screens) before you reach the Homing Slot. The first screen has varying terrain filled with storage tanks, rockets, and helicopters. With the joystick, you maneuver up and down, forward and back; and you bomb and shoot with the fire button. At first it seems easy, but then the rockets are launched and the subsequent screens become much tougher.

As far as my kids are concerned, this game is a real winner. The variety and level of difficulty keep their interest much longer than the average game. They keep coming back to it, but still haven't made it to the end. Perhaps therein lies the secret of a successful game.

However, I would not have predicted this from my first impressions. Although they may feel differently next year, they like it now and are still trying to reach the Homing Slot.

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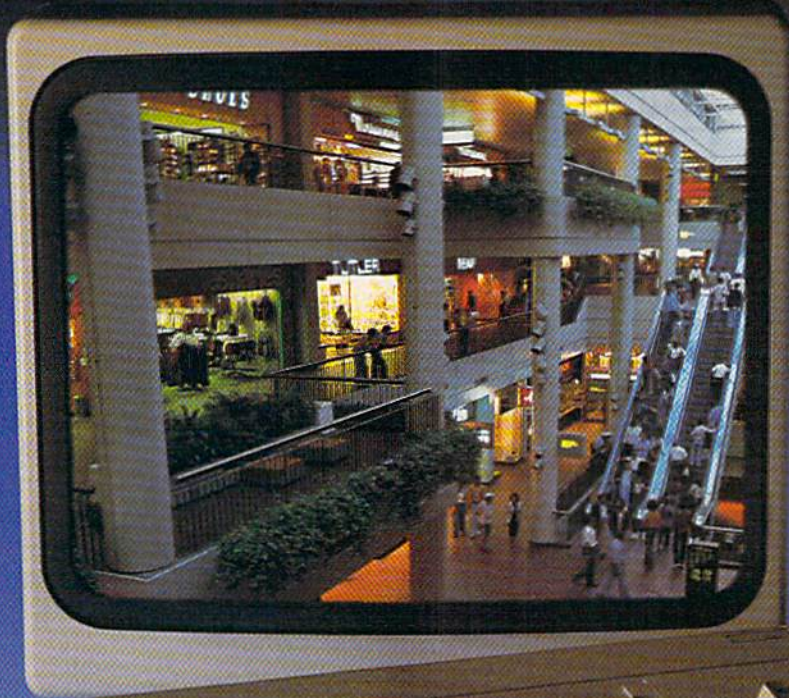
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Gridder

A painter, indicated by a happy face, is moved around a square grid. When he boxes a given square, it is painted (indicated by changing color). At the same time, lethal chasers are after the painter. The painter—controlled by your joystick—must paint all the squares on the screen without getting caught by a chaser.

The next grid appears when the previous one is painted; there are 256 different grids (screens) in all. The score, including current high, is shown at the screen bottom.

A few complications are offered. You may create holes in the grid which neither the painter nor the chaser can cross. This stops the chaser for only a short time, however. The chasers ordinarily cannot see through obstacles, but at higher screens the obstacles are transparent, which increases the challenge.

You get three extra painters in addition to the unused ones when a grid is completely painted. Up to nine painters are allowed at one time.

My youngest son reacted negatively to this game. He feels that there is not enough variety in spite of the 256 grids. In his words, "terminal boredom" set in long before the game became more difficult at the higher grids. Almost every other game was at least fun at first; not this one, he claims. Again, I would not have predicted this response from my first impression of the program.

For The Unexpanded VIC

Skramble and *Gridder* are offered on tape for the unexpanded VIC, and have the option of either

keyboard or joystick play. The front of each box has an artist's conception of the game (poetic license as usual), but the back has a small photograph of the actual screen. I applaud this last step and wish more software packaging was this honest.

The question remains: Why did my children like one program so much and not the other? *Skramble!* was fun for us and *Gridder* was not. Your experience may be different.

The common thread of good games is true variety and challenge. They must hold your interest by offering sufficiently different situations. At the same

time, they must challenge even the best players so winning will not be routine.

If a game meets the twin requirements of variety and challenge for you, by all means buy it. As always, I recommend that prospective buyers first try games at a local store.

Skramble!
Gridder
MICRODIGITAL
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Easy Script: Word Processor For The 64

Shelby Neely

Easy Script, from Commodore, contains all of the standard word processing features: the ability to relocate or duplicate paragraphs, store files on disk or tape, and move easily around the screen using the cursor control keys. You can also jump to the top or bottom of the screen or your text, to the bottom of the file, to the next or previous word, or to any line, and to the next screen. In addition, you can pan in any direction.

Easy Script allows you to directly insert text while the rest of your document wraps around and realigns itself automatically. Likewise, you can delete characters, words, lines, and paragraphs. You can also erase words, characters, lines, or all of your file. Erase differs from Delete in that it leaves space on the screen

in place of the erased text.

Easy Script boasts another useful feature that is found in many, but not all, word processors. With only a few keystrokes, you can search for every occurrence of a word or phrase throughout your document and replace it with a different word or phrase.

It can also search through any linked files on the disk. Linked files are files with a special marker that tells the computer to connect them when you view or print them. Since any computer's memory limits the number of pages you can hold in one file, you may have to divide your school paper or your year-end report or your first novel into many different files or chapters. The ability to link those files can be very useful.

Special Features

The table of contents in the manual is eight pages. Contained within are a very large number of features. The major ones are:

1. decimal tabs that automatically align your columns of numbers,
2. soft hyphenation which lets the computer decide whether to hyphenate a word or not,
3. margin release which lets you temporarily override the margin setting,
4. conditional forced page which lets the computer decide if the remaining number of lines is too few to print on the current page,
5. automatic page numbering,
6. headings and footings, and
7. tab settings that are easy to set, easy to use, and easy to view; and can also be saved and recalled.

You can also change the color combinations of the screen, text, and border, include comment lines in your text that will appear on the screen but will not be printed, and easily change uppercase letters to lowercase and vice versa. You can specify the number of blank lines in the text without the space appearing on the screen. (This saves memory.)

You Get What You See

Easy Script offers a convenient feature which allows you to see what the printed document will look like. While the program is not 80-column compatible, it lets you scroll horizontally up to 240 columns on the screen. In the special View Mode, what you see is what you get. If you specify double spacing, you'll see it, and if you want the right margin justified, you'll

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see that, too, along with centered headings.

Many word processors require that you purchase a separate mailing list program if you wish to send a form letter to many different people, but *Easy Script* includes a mail-merge program. You type a list of names and addresses, create your form letter, and then sit back while the computer merges the two and prints your letters.

If you have a need for standardized forms, *Easy Script* can accommodate that, too. You can save several standard paragraphs as separate files and then insert them into your form letters or merge them all to create one document.

Very Few Weaknesses

As with everything else, *Easy Script* isn't perfect. The manual is only fair. While it explains most features in detail and includes exercises and recaps at every step, it is sometimes difficult to understand, even for an experienced user. The only part of the manual that is really well organized is the Reference Section. You should read it first.

In addition, it is unfortunate that *Easy Script* does not include a Quick Reference Card. You can create your own, but many word processing programs supply them and they are quite useful. Since *Easy Script* is not menu-driven (another drawback), there are many commands to remember.

It is also disturbing to see words at the ends of lines cut in half in the Edit Mode. Most word processors wrap the entire word around to the next line if it will not fit. *Easy Script* does this in

the View Mode only. Unfortunately, the View Mode does not allow all the cursor movement and editing commands found in the Edit Mode. Preferably, these two modes should be combined. In the View Mode, you never know where you are, there is no page number indicator or even line or column indicator, and you have to learn a different set of cursor movement commands.

Worms? For The 64

Gregg Keizer, Assistant Book Editor

Worm training? The idea sounds ridiculous at first. Images of riding and roping worms momentarily cross your mind.

No, *Worms?* isn't really a game about training worms, but that's part of the process. Elements of connect-the-dots are hidden in the game, but *Worms?* isn't a children's game, nor an arcade game that moves at lightning speed. This game is hard to pin down, for it fits in no convenient category. It's not "just like *PacMan*" or "close to *Defender*." *Worms?* is different.

Mathematical Worms

David Maynard, game designer and programmer of *Worms?*, first came up with the idea after reading a Martin Gardner column in *Scientific American*. The column discussed the patterns of idealized mathematical worms and it gave Maynard ideas. The result is *Worms?*

A one- to four-player game, *Worms?* moves slowly at first, picking up momentum as each worm becomes better trained. The colors, graphics, and sounds

In spite of these weaknesses, *Easy Script* still rates near the top of the list of word processors for the Commodore 64. It's powerful, professional, and easy to use. And the price is reasonable.

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are up to the usual high standards of Electronic Arts. But all this is secondary to the delight you find in just experiencing the game.

You're On Your Own

When you open the game package, you see a disk, a four-page instruction booklet, and a warning not to read the directions. That advice is well-taken.

After a rather long delay in waiting for the game to load, the screen shows the playing field, worm selections, and instructions on how to change the worm types. You have four worms and five worm types to choose from. Press the f5 key to select one of the four worms, the f3 key to change the worm type.

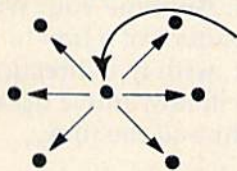
The four worms are color-coded as green, red, blue, and purple. The worm types are:

- NEW. This is the worm type you'll normally select when you play. It's untrained, and you're the trainer.
- AUTO. Similar to the NEW worm, this one is trained by the computer to make intelligent moves.

- **WILD.** Another computer-trained worm, it's programmed randomly before the game begins. Not as smart as the AUTO worm, it's easier to beat.
- **SAME.** The worm that played this color during the last game is used again. It's already trained.
- **-----.** The worm is dormant and doesn't play. Use this worm type to play with less than four players when you don't want the computer interfering.

The playing field, before you begin the game, is a screenful of dots. Each dot lies in the middle of its own territory, which extends to the six dots surrounding it.

Figure 1. Territories

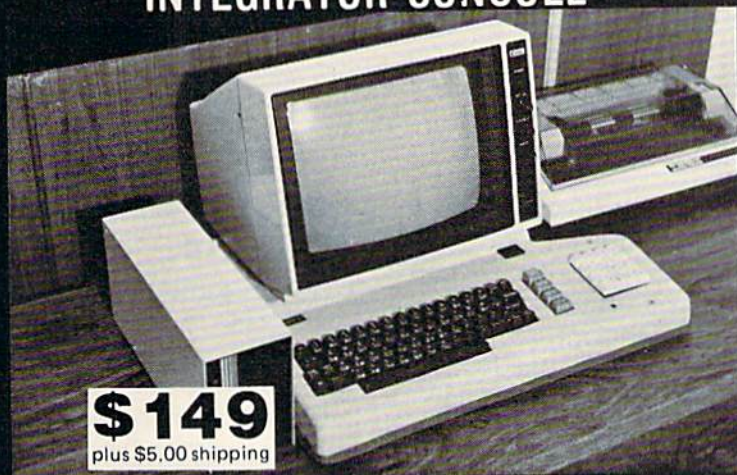


The object of the game is to capture as many territories as possible by drawing worm trails from dot to dot. You capture a territory and receive one point when you draw the last trail in the territory. To win, accumulate more points than anyone else. It sounds terribly simple when you first read it, but it's not as easy as it sounds. Your worm may draw five of the six possible lines to a dot, and then another player's worm may come along and claim the territory. Or your worm may be laying trails in a perfect pattern, only to run into another worm.

Worm Trainer

As you play, train your worm to make specific moves in specific situations. It leaves a trail of light behind as it moves, drawing the

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lines from dot to dot. If you create a pattern that quickly draws lines and claims territories, you get points fast. If your worm's pattern is inefficient, it doesn't claim territories as quickly, and the other player's worms may capitalize on your work.

The space bar lets you choose the direction your worm moves in. Sometimes the directions are restricted because paths have already been filled in by your worm or other worms. When you're satisfied with the new direction, press any key to set the worm in motion and lay its trail.

The worm moves automatically once it recognizes a pattern in your training. It continues to move until it runs into an unknown situation. The worm then flashes and you are able to give it a new command. This process continues throughout the game. As you give more commands to the worm, you train it. It remembers all your previous directions and moves in that way as long as it recognizes the pattern. Training is a cumulative process. Eventually, your worm recognizes every situation, and you don't have to do anything but watch it move around the screen.

There are dangers to your worm, however. If two or more worms try to move to the same dot at the same time, they collide and die. You hear a nasty sound and see a small flash as your worm expires. Your worm dies if it cannot move from its present dot as well. This usually happens only near the end of the game when the screen is filled with trails and your worm's trapped.

Patterns And More Patterns

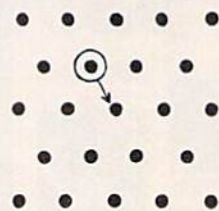
Creating a good pattern is one of the keys to the game. You'll find yourself training your worm to make all kinds of patterns, from girderlike constructions to zig-zags to complex hexagon clusters. Many times, you'd like to duplicate a pattern you used in a previous game, but you can't because another worm is in the way. Each game is different from the last. You have to adapt to the situation.

It can be frustrating, especially when other players interfere with your worm's training, but that's part of the joy of *Worms?*. It's not all skill, however. Luck plays a part in the game. Imagining what your worm will do is almost impossible at times. Sometimes the only thing you can do is train your worm and see how it all works out. If you're lucky and the other player's worms happen to create patterns that yours can exploit, so much the better.

It's difficult to visualize how a worm is trained, and how patterns are created by just reading about it. Seeing is everything here.

You're starting to train your worm, and want to create a pattern. How do you do it?

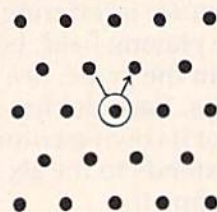
Figure 2. First Move



Your worm has six directions

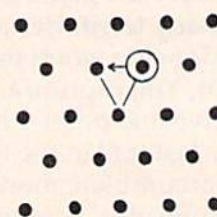
to choose from. You decide to move it southeast and press the space bar until that direction is indicated. The worm moves to the dot below and to the right. Now it wants another command, for it doesn't recognize the pattern of a trail leading from the northwest.

Figure 3. Second Move



You tell the worm to move northeast. Anytime your worm sees the pattern of a trail to the southeast, with five directions open, it will now move up and to the right—all the time.

Figure 4. Third Move



Now your worm moves west, closing in the triangle. You still haven't earned any points, however, since there is no dot with all six trails drawn to it. From now on, when your worm starts out on a dot which has one trail to the southwest (created in the second move), it will want to move to the west.

Your pattern is just beginning. As you continue to train your worm, the pattern will emerge. If you've trained your worm well, it will continue the

same pattern, over and over, until it either fills the screen or cannot move further, in which case it dies. Of course, playing with only one worm on the screen is considerably different than when there are four complex patterns developing from four worms.

Other Options

There are several interesting options also included in *Worms?*. You can freeze the game's action at any time, turn off the grid's dots, flash claimed territories throughout the game, and even save and load previously trained worms. Changing saved worms is also easy to do. These options are useful if you want to analyze a particular worm's pattern to see how to improve it, or to stop in the middle of a game and resume it later.

Unique And Interesting

Worms? is one of the most fascinating games I've played in a long time. It's so different from anything else that it quickly captivated me. *Worms?* tournaments became popular among the staff of COMPUTE!. We soon had our favorite patterns and worms, from girders to vast encircling patterns that became apparent only after half the screen was filled.

The game is hard to master. It's easy to play, but seems almost impossible to play well time after time. There are just too many factors over which you have no control such as the other player's worms and peculiar patterns you may have inadvertently created. You can't really become an expert



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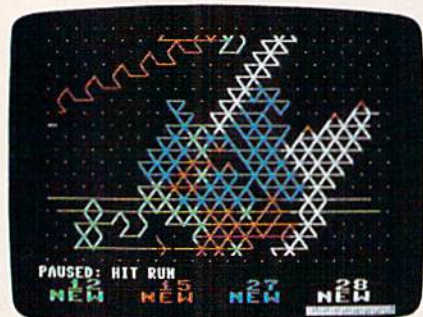
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Train your worms well and you will capture more territory.

at this game in the same sense as you can with arcade games like *PacMan* or *Robotron*, where you practice the same system of movement and fire over and over. That's not to say this detracts from *Worms?*. Instead, I think it's one of the reasons we play the game so frequently. A novice can play and have an excellent chance of winning, even with only the briefest explanation of how the game works. Each game is different from the last, so even the most experienced players enjoy playing game after game.

Worms? is as much fun to watch as it is to play, and when your worm dies, you may stay in front of the screen just to see how it all turns out. At game's end, when the different patterns are revealed, along with the point totals, there will be oohs and ahs at the geometric precision or random inefficiencies of each worm.

Worms? is a strange game in a lot of ways. Even though it consists of lines and dots, you can be easily drawn into the game's world. Some arcade games do this with cute characters and elaborate animation. Neither of these is used in *Worms?*. Yet you *do* fall into the worm's mentality quickly, thinking about how to train your worm faster, or in better pat-

terns. Sometimes the planning, such as it is, pays off; other times it doesn't because another player's worm interferes or crashes into yours.

Don't read the directions that come with the game. You probably won't understand them anyway. It's not a matter of clarity, but one of visualization. *Worms?* is almost impossible to imagine without seeing it on the

screen and experiencing the game. Even when you've played the game for a time, reading the directions doesn't seem to help. There are just too many possibilities to explore. But you'll have fun trying.

Worms?

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IFR (Flight Simulator) For The VIC-20

David Florence, Programming Assistant

You are on the runway ready for takeoff. Throttle full, you begin to accelerate. Airspeed is rising—20, 30, 45, 53. You pull back on the stick and begin your ascent. You retract your landing gear. Heading 000-north, you are on your way. Now you are Charles Lindberg or Amelia Earhart.

You have entered the world of flight—a domain of mountain ranges, high and low altitude forests, canyon passes, and thin landing strips.

Academy Software's *IFR (Flight Simulator)*, written by Ron Wanttaja, joins a long list of other flight simulators for various computers. But, it stands apart in several ways.

First, it is written for the VIC-20. (A Commodore 64 version is also available.) Second, the instrument panel displays readings in digital form. This makes it easier to understand the status of your flight. Third, you can choose from ten levels of skill and turbulence. This adds to the challenge and enjoyment of test flights.

Getting Airborne

When you begin, you are prompted for a choice of skill level and air turbulence factor. It may be wise to set these at zero until you earn your wings.

The program contains a useful editor with which you can set your flight conditions. When you are prompted to press T for takeoff, you can press E instead, for the editor. Should you choose this, you can customize the flight conditions of altitude, north and west coordinates, airspeed, throttle, fuel, and heading.

Use the map to determine where you would like to be, and remember to set your airspeed above the stall speed or your flight will be a short one. The editor is more useful as you learn to control the aircraft.

To take your first flight, you need to increase throttle, (labeled T on the lower left of the screen) to full by pressing the f1 key until the indicator is fully lit. When your airspeed reaches about 50, gently pull back on the joystick to start your climb.

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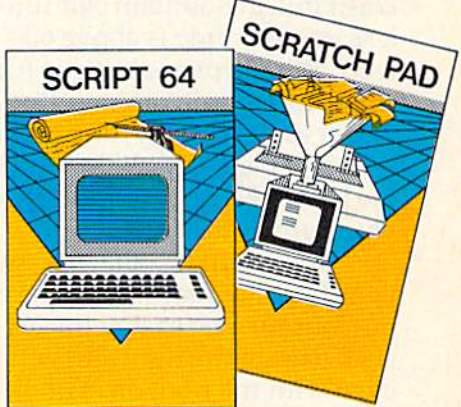
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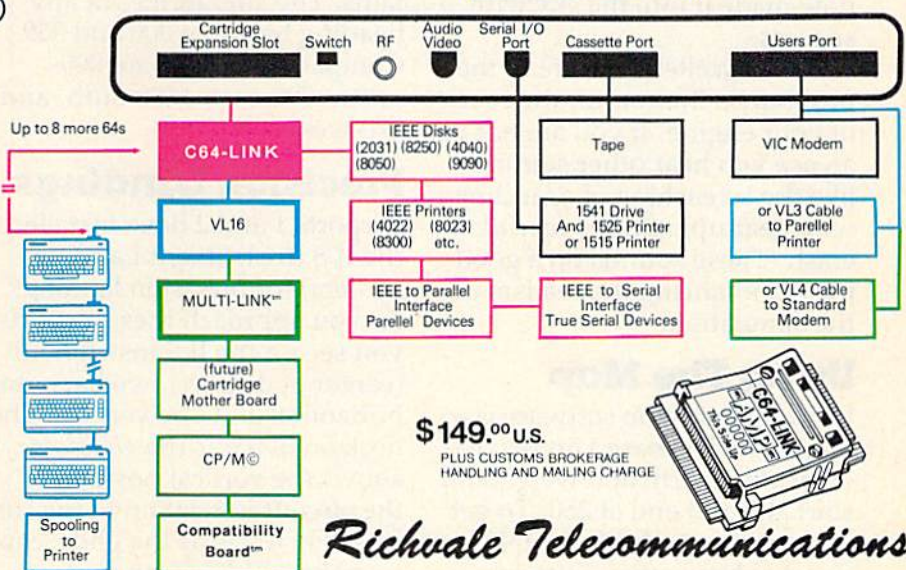


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When your altitude is above 80, you can pull up your landing gear by pressing G.

As the airspeed reaches about 105, pull back on the joystick a little more to level your speed. Your altitude starts to increase at a faster rate, and your north coordinates are increasing rapidly while your west coordinates are relatively stable.

Begin a turn to the west, heading 270 (the compass is in the top center of the display), by moving the joystick to the left. Make the turn before your north coordinates reach 75, or you will crash into a mountain cliff (unless your altitude is above 600 feet). When you make your turn, the artificial horizon (middle center of the display) and your turn and bank coordinator (middle left of the display) reflect your turn to the west.

Don't turn too sharply. As your heading reaches 270, level off your turn by easing the joystick back to the right and getting even with the horizon. You have now made it into the sky with success.

An excellent feature of the program is the sound, the roar of your engine. If you are not yet an ace you hear other sounds like the screeching of a landing with gear up, and the fearful crash. These sounds do a good job of enhancing the realism of the simulation.

Using The Map

Included with the software is a map, which is based on two coordinates, north and west. Both start at 0 and end at 250. To get your position, check the INS (Inertial Navigation System) readout at the bottom of the dis-



Flying through the mountain pass in IFR Flight Simulator.

play panel. Trace up the map's vertical axis until you reach the north value, then trace horizontally until you reach your west value. Where the two meet is your location on the map. Each unit on the INS readout is the equivalent of one-tenth of a mile.

There are four airports, only two of which have fuel and repair. There are different altitudes and terrains, a mountain range and forests, as well as high and low passes through the mountains. The aircraft flies at any heading between 000 and 359. Compass headings are 000-north, 090-east, 180-south, and 270-west.

Precision Landings

Airports 1 and 2 have installed the ILS (Instrument Landing System) for precision landings. As you approach these airports, you see on the ILS instrument (center of display) two bars, one horizontal and one vertical. The horizontal bar is the *glidescope*. It shows the vertical position of the aircraft in relation to the runway. Fly towards the glidescope to make precision landings.

The vertical bar is the

localizer. It shows the position of the aircraft relative to the center of the runway. There are front course and back course localizers. Fly towards the bar on the front course and away from the bar on the back course. Below the ILS instrument there are three indicators labeled O, M, and I, for outer, middle, and inner markers. They light at miles 3, 2, and 1 from the airports, respectively. These enable you to make very precise landings.

Helpful Hints

There are some things, not immediately apparent, that will help you make successful flights.

When taking off, be sure to keep your airspeed above the stall speed. Stall speed with flaps up is about 56 mph. If you hear a tone shortly after takeoff, it means that you are going up too fast for your airspeed, so bring the nose down a bit by pushing forward on the joystick.

Your landing gear is delicately balanced so it may not function normally if you are rapidly losing airspeed or altitude. Be sure to get the gear up and down while your indicators are relatively constant. A good time for gear up is just after leaving the ground, and a good time for gear down is just after making your turn towards the runway.

Fly the aircraft so that one of your coordinates is constant. This is difficult to do. You'll find that "crabbing," or flying a little to the left or right of your desired heading, helps immeasurably.

When flying at high altitudes, be sure to remember that a lot of fuel was burned to get that high. You may make it to the desired altitude, but you

could run out of fuel before you are able to get back down.

On the other hand, the aircraft needs limited fuel to make a descent, so if you have used a lot getting up, cut back the throttle to 0 or "dead stick" for your descent.

Should you run out of fuel, remember that it is still possible to land the aircraft. Also, if you are low on fuel, you may find it preferable to make a safe landing somewhere in the fields rather than waste what little fuel you have trying in vain to reach an airport. Fueled landings are more easily made than dead stick landings.

Land from the east and make a swift turn to the south after takeoff at Airport 4.

Use the nosewheel steering to get back on the runways should you run off. You won't need very much speed to taxi, so keep it slow, around 6 or 7 mph.

Your brakes work better if your throttle is at 0.

IFR (*Flight Simulator*) has a quality of realism which sets it apart from others of its kind, even those I have tested at a flight school. The controls in this program respond very much like actual aircraft controls. They are not overly sensitive, but give you what you ask for, even if it is flying right into a cliff.

This program does not serve as a substitute for real training, but it does familiarize you with some basic flight terminology and theory, and it's tremendous fun.

IFR (*Flight Simulator*)

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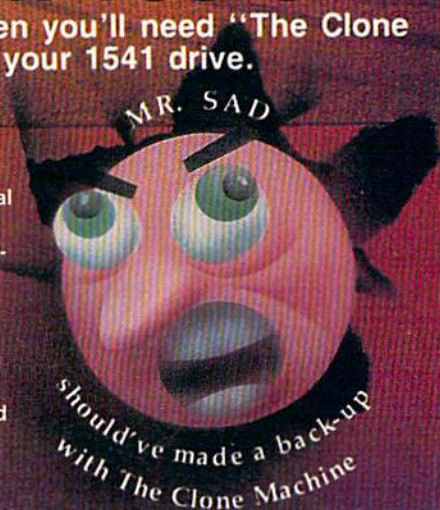


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COMPUTING for families

New Standards In Home Learning Part 2

Fred D'Ignazio, Associate Editor

Now that computers are going into the schools in record numbers, we are finally realizing that we have gone about things all wrong.

Before computers arrived in the schools, we should have laid some groundwork.

Parents need to be briefed. Teachers need to be trained. Schools need some way to purchase software, course materials, books, and magazines. Teachers need some guidelines for purchasing new computers, new software, new computer equipment and materials. Standards and procedures for product review and evaluation need to be agreed on.

Children need to be consulted.

Parent Training

The situation at home is even worse.

Computers are popping up by the millions at home. Parents who don't know anything about computers are running out and buying software, materials, and equipment based on dealer recommendations, the pictures on the software packages, and occasional reviews and recommendations they see in magazines and on television.

I think most parents are anxious and bewildered about computers. But they are also incredibly curious about what can be done. "How can my kids use this computer?" they are asking. "How can my kids use this computer to be happy and successful?" "What can my kids learn on this computer?" "How can my kids learn?" "How can this computer help my kids at home?" "How can it help them in their schoolwork, and prepare them for growing up?"

In school, people are finally realizing that teachers need in-service training in order to integrate computers fully into the schools.

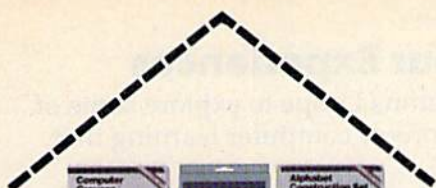
And if teachers are getting training, why not parents?

Courses should be set up for parents to attend. The courses should be jointly created by teachers, computer vendors, parents, and children. The courses should concentrate on training parents on how to use computers as home-learning tools.

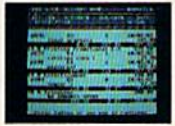
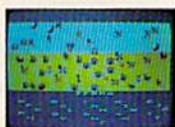
Learning at *home* should be emphasized. Parents should not be taught to copy what teachers are doing at school. The situation is different at home. Parents should be given the information and skills they need to cope with the problems they face at home.

A parent-training curriculum might include the following areas:

- Which computers best lend themselves to home learning?
- What are the best home-learning programs?
- Which new kinds of computer equipment can help home learning—like touch pads, light pens, speech synthesizers, and keyboard overlays?
- What materials should come with software to help guide parents and to supplement computer learning?
- What are some basic guidelines to help parents evaluate home-learning software and materials?



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- Which publications, catalogs, etc., bring the best new equipment, software, and materials to parents' attention?
- What techniques should parents use to actually *shop* for and *purchase* home-learning materials?
- What are the best local stores—in terms of service, hand holding, training, and dealer support? What are the stores with the nicest, gentlest salespeople—people who like and understand children and who know how to talk in English?
- How can parents set up "user groups" of fellow parents who are interested in teaching preschoolers, elementary-age children, or secondary-age children, or handicapped or learning-disabled children, or children who need help in science, social studies, language arts, math, reading, or writing, or kids who are talented or gifted?

Learning By Surprise

Thanks to the computer, learning at home will soon be as important as learning at school. But it can't replace school. Nor should it try.

Computer learning at home should reinforce, complement, and supplement classroom-based education. Parents and teachers should work closely together to make sure that the mix of home and school learning is the most efficient mix possible and in the best interest of their children. Coordination is crucial.

The debate on home learning using computers has just begun. Most of the important subjects haven't even been covered—or discovered.

Education at school can receive important, surprising boosts from home computers. For example, let's say a child is having trouble with social studies at school. The child has the aptitude for the subject but is utterly bored by the material. Boredom and lack of interest are reflected in the child's grades and behavior in the classroom.

The parents could strap the child to a desk every night and require doing extra lessons and more time studying the boring textbook. Or they could purchase some of the new "social studies simulations" software. The software might turn the child into a cartographer to map out a newly discovered continent, or a population planner, or an advisor to President Lincoln during the Civil War.

The most important thing the software could do for the child is *bring the subject to life*. It could awaken the child's interest and bring an excitement to the subject which could transform the child's whole attitude and performance in the classroom.

Sharing Your Experiences

In upcoming columns I hope to explore some of the new dimensions of computer learning that *take us by surprise*.

Also, I'd like to hear from you. If you or your children have learned from the computer in some novel, unexpected way, please share your experience with me. Write:

Fred D'Ignazio
2117 Carter Road, SW
Roanoke, VA 24015

To demonstrate that there are new, unexplored dimensions of computer learning, I am gathering stories and experiences for future publication in my various columns. I would love to hear from you!

Learning As Entertainment

Before you write me, I'd like you to think about something else, too. Then maybe you'll share your thoughts with me.

I think that computer learning at home may soon cease to be called "learning." Instead, we might end up putting it under the category of *entertainment*.

Think about it. The words *education* and *learning*, for many adults and children, have a negative connotation. For them, the experience of learning is associated with pain, embarrassment, tedium, and boredom.

Computer learning often isn't any different. But it can be.

Computer learning can be made so pleasurable, so joyous, and so rewarding that it may slip unnoticed into the category of "entertainment." It may become a new form of entertainment that feels good to a person at the same time it benefits and changes him or her in a substantial way.

If home-learning programs are designed with enough imagination, subtlety, and respect for people, they may soon become more popular than videogames were in their heyday. Families will gather around the computer, like an "electronic hearth." Instead of watching TV, they will spend many active, enjoyable hours together every evening learning new things on their computer.

And they won't think of it as work, learning, or education. They will think of it as entertainment.

Learning As Expression

In one of my recent columns ("The New King Of The Mountain" in the February GAZETTE) I showed examples of how computers can boost a person's abilities in art. The person in my article was my four-year-old son Eric, and I wrote about the amazing things he was able to do using the *KoalaPainter* art program and the KoalaPad touch tablet.

Computers can open new doors into areas of

self-expression we never knew existed.

New programs like *Music Construction Set*, *Micro Illustrator*, *MusiCalc*, *Delta Music*, *Fun Writer*, and *Word Vision*, allow us to express ourselves in colors, shapes, and designs, in words, and in music.

And we can start creating the moment we sit down at the computer!

Gone are the hours of manual-reading just to learn how to use the computer. Gone are the additional hours needed to master the technical complexities of drawing, sight-reading musical scores, composing, or typing on a standard typewriter.

With the right software, the computer can act as a booster and an amplifier for our skills and can enable us to directly tap our imagination and produce new creations in various media.

Most of us, by the time we become adults, walk around with a little "editor" inside our heads. Whenever we do anything the editor reminds us that we are either good or bad at that thing. It tells us whether we are knowledgeable or ignorant, skilled or unskilled. It assesses our past efforts and predicts whether our performance will be graceful or awkward, and whether the results will be elegant or ugly.

We pay close attention to our editor. Listening to the editor keeps us from making fools of ourselves in new situations. For example, by the time we are adults, if we haven't become accomplished musicians, writers, or artists, we shy away from these areas. We do not casually sit down with guitars, typewriters, or paintbrushes. We know how bad we'd look, and the kind of trash we'd produce. We know because our editor tells us.

But now we have a way of disabling that editor and, simultaneously, of being able to produce works of art that are beautiful and *personally satisfying*. We can do all this by using new kinds of computer tools.

Just The Beginning

But expressing ourselves is just the beginning. These programs should also act as a stimulus to get people learning more about the discipline of music, the discipline of art, and the discipline of writing.

New programs should pick up where these programs leave off. They should be more than "builder kits" and "construction sets." They should challenge us to a higher level of achievement in each of these disciplines, while rewarding us with beautiful creations along the way.

And why do we have to have construction sets for the arts?

Why don't we see mathematics construction sets, physics construction sets, chemistry construction sets, and biology construction sets?

How would you like to build a budding rose,

design a working star, or construct an erupting volcano? How would you like to create a *working* model of the human heart? Or construct a gene, a DNA molecule, a bacterium, or a one-celled amoeba then bring it to life?

The delight and thrill you'd feel wouldn't come just from the intellectual experience of building a computer model of a heart, an amoeba, or a volcano. It would come from creating a beautiful, emotionally satisfying work of *art*—like creating a pretty picture or a moving piece of music.

The computer's greatest value as a learning tool comes when it mixes process and product, when it blends the technical and scientific with the artistic, and when it frees us of inhibitions and taps our imagination, yet still challenges us to acquire more skill and do better.

Learning by surprise, learning through entertainment, and learning by expression are some of the ways computers can help people learn. They are ingredients for profound and permanent learning. These ingredients and many more, as yet undiscovered, should be present when we use computers to learn at home. They should be included in new standards for computer-based home learning.

My thanks to the many industry watchers who, through discussions during the recent Consumer Electronics Show, helped contribute to the ideas in this article. ☺

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Therapy



Steven Rubio

It'll never replace Freud, but "Therapy" may just cure your blues. For the expanded VIC-20 and Commodore 64.

"Eliza," the computer psychotherapist, is probably the most famous of all programs dealing with artificial intelligence. Written in LISP by Joseph Weizenbaum in 1966, Eliza has run on computers of all sizes and types, including home computers programmed in BASIC, in the ensuing years.

There is something fascinating about carrying on a seemingly reasonable conversation with a machine. I still remember the thrill when I first learned my VIC could ask me a question (what is your name?) and remember the answer. This thrill is what prompted me to write "Therapy."

A Smarter Therapist

Why another version of Eliza? Mainly because when written in BASIC, Eliza is extremely slow, taking as much as ten seconds to respond to your comments. It seemed to me that for a therapist,

Eliza was a bit stand-offish; and rather dumb, besides.

The problem in BASIC is that Eliza tries for too much. Searches of fifty keywords and a hundred responses slow Eliza down; and in its attempt to give meaningful comments to *all* the user's statements, it consumes a lot of time for only occasional, if spectacular, success. The off-the-wall pronouncements of Eliza often elicit laughter and vexation.

This is all right, since Weizenbaum never intended the program to substitute for actual therapy. But when showing off your computer to friends at your next get-together, it might be fun to have a program to demonstrate your machine's "intelligence."

Program 1 is Therapy for the 64. Program 2 is the VIC version, which requires memory expansion. Any amount of expansion (3K, 8K, etc.) will work.

I would be glad to hear from any of you regarding this program, or any similar ones you may have written. I can be reached on CompuServe, user ID #74105,1477.

See program listings on page 163. ☺

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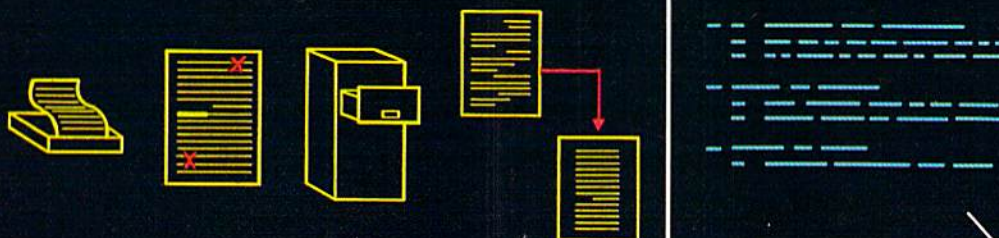
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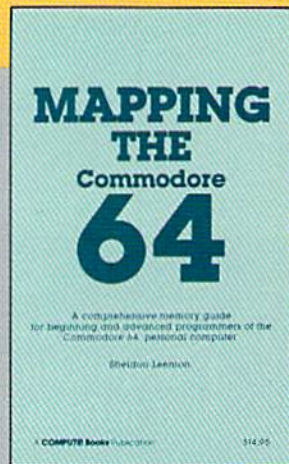
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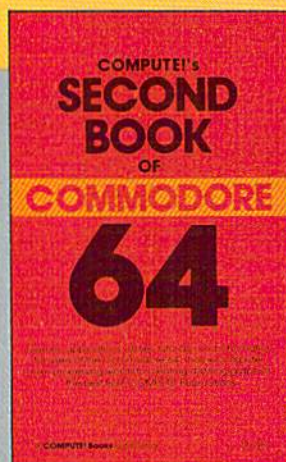
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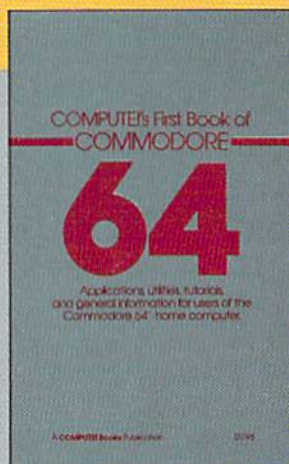
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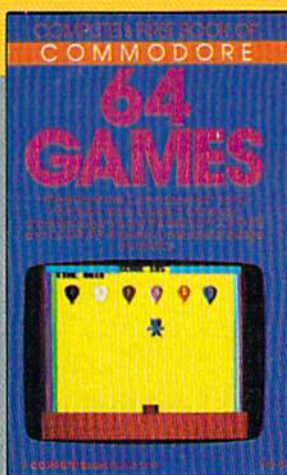
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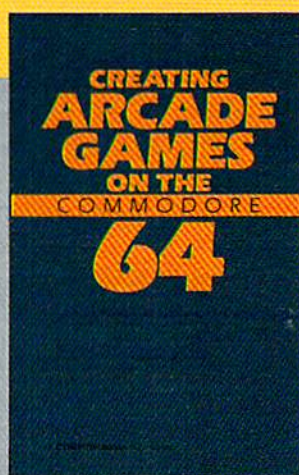
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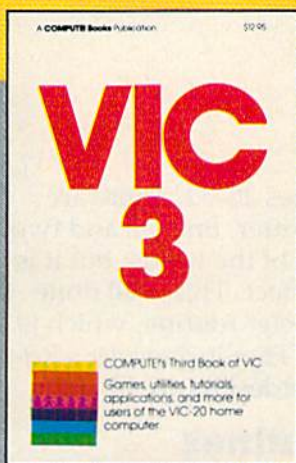
This book develops and explains the principles of game design; includes general programs for using the screen, custom characters, animation, sprites, sound and music, and other features of the 64. Also includes five games. Just the book for programmers who want to learn how to write fast, exciting arcade games.

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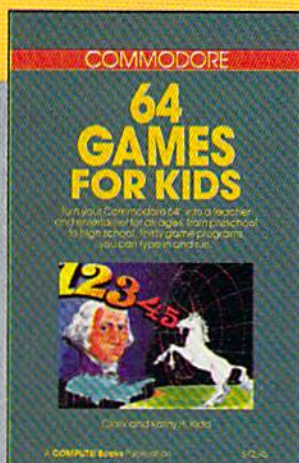
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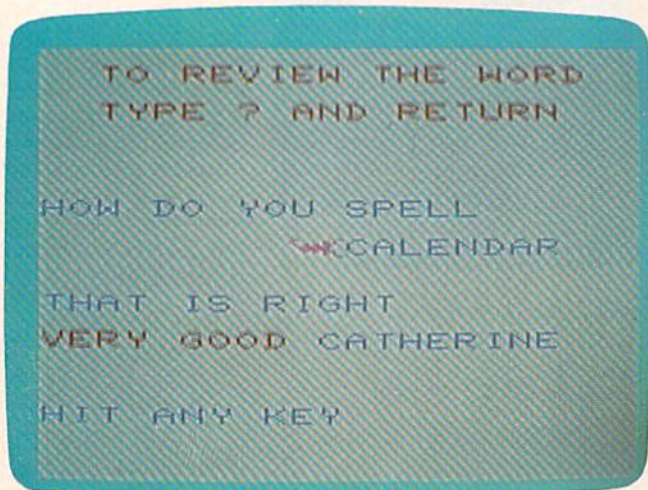
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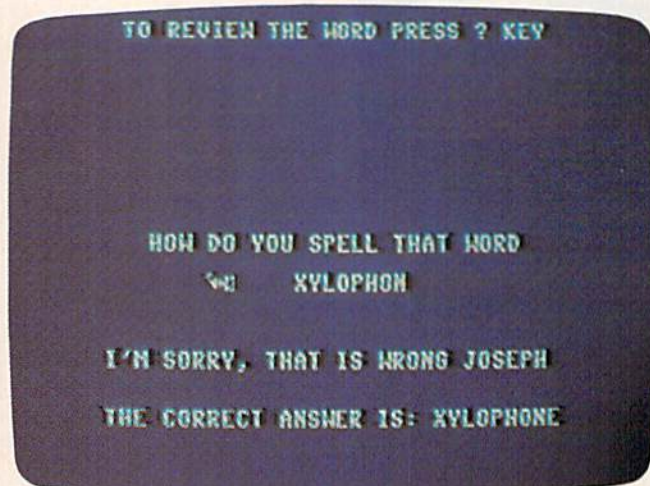
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Spelling Critter

Bob Nickel



The "critter" does his thing when the word is spelled correctly (VIC version).



In this 64 version, a correct spelling is given.

This spelling program lets your child choose the words in the quiz, and features an animated critter which keeps track of right and wrong answers. For the VIC-20 and Commodore 64.

One of the great uses for the home computer is education, and a wide variety of educational programs are available for the VIC-20 and Commodore 64. The only exception is spelling programs. If you have ever tried to put your kids' spelling list into someone else's program, then you know what I mean.

This is the magic of "Spelling Critter." The program actually asks you what words are to be used. This way the kids will be more likely to use it on their own.

There are three main parts to the program. Line 50 sets up an array to store the words. Lines 5000-5300 input the words with a FOR-NEXT loop. Lines 100-120 get the words back, one at a time, with another loop.

A Random Quiz

If you want the words to come up in a random pattern, the following changes should be made. All the words may not be displayed, however.

```
100 B=INT(RND(1)*N)+1
110 Z=Z+1
470 IFZ=N THEN 500
480 GOTO100
```

The critter is built in lines 20-32. There are actually three parts to the critter, one tail and two heads. You will not see one of the heads, but it is needed for the chomping effect. This is all done with a programmable character routine, which is extremely easy on the VIC. The *Programmer's Reference Guide* goes into this in depth (pp. 82-88).

Animation Subroutines

There are two subroutines for the animation. Lines 7000-7080 move the critter for a correct answer while lines 8000-8080 are the animation for a wrong answer. Lines 100-160 display for one second, which is enough time to read the word, but not long enough to memorize it.

The rest of the program should be self-explanatory. The program will accept up to 50 words. Each word can be up to ten letters long without exhausting the memory of the unexpanded VIC.

Try the critter on your kids. It fills an important spot in educational programming and can be downright fun.

See program listings on page 167. ☺

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Shape Match

Michael Reich

Do you have a preschooler who demands time on the computer, but can't handle complicated software? "Shape Match" teaches pattern recognition, and it's easy to use. For the 64 and expanded (8K+) VIC.

In Shape Match, a child has to match the shape on the screen with one of four other shapes. It's a good idea for an adult to sit with the child while the game is running, to provide suggestions (and praise when the answer is right).

A simple idea can lead to complications, however.

A young child is not capable of handling a joystick or moving a cursor around the screen with keyboard controls. And yet there must be a way for the child to indicate his or her choice.

The answer is to have the program point to the different answers. The child presses a key to make a guess. Lines 600-687 move the colored box from answer to answer and periodically go to the subroutine at 700 to see if a key has been pressed.

Another difficulty is how to figure out whether the child is right or wrong. Of the four possible answers, only one is correct. How does

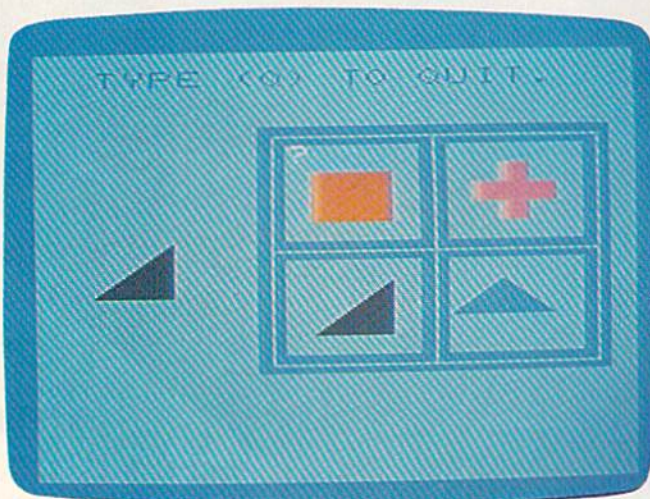
the computer know which one was picked? The solution is an array (lines 60 and 70). The computer checks which box is lit, compares it to the array, and decides if it is the right answer.

Shape Match was written for the Commodore 64, although it will run on a VIC-20 with 8K or more of memory expansion.

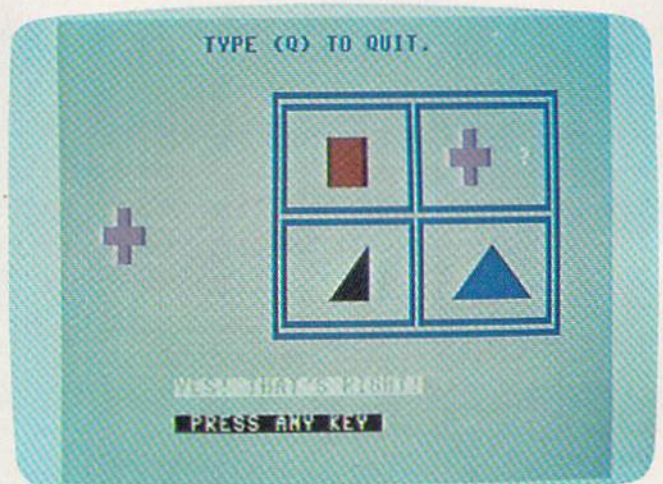
For those who might want to add music or other features, here is a breakdown of the program:

Lines	
50-57	Determine if the program is being run on a VIC or 64, DIMension array CL, select screen & border colors
60-70	Initialize array
200	Prints four boxes
340-375	Print a shape in each box
380-385	Use random variable K (from line 310) to pick a shape for the match. Variable KK holds the last K value to prevent consecutive repeats.
600-687	Move cursor through each box
700-880	Check for response and evaluate answer
1000-1095	Print board with jump from line 200
1170	Subroutine to locate correct screen location for all printing
2000-2330	Print statements for four shapes
3000-3200	Instructions

See program listing on page 180.



The program cycles through the patterns waiting for the child's guess (VIC version).



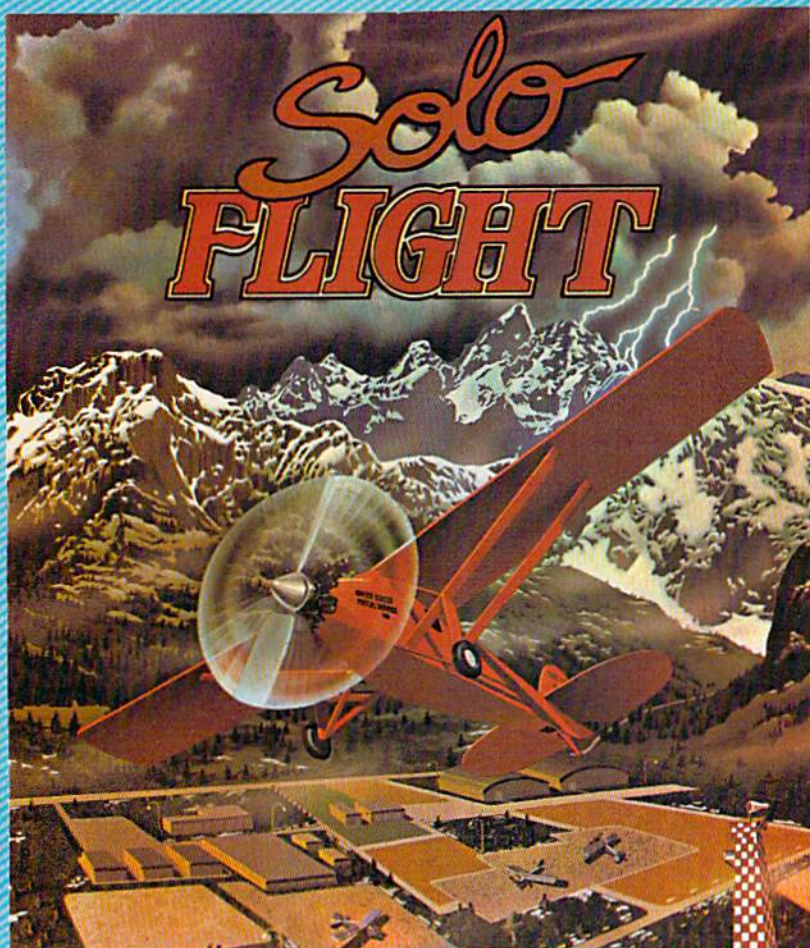
A correct answer is given in the 64 version.

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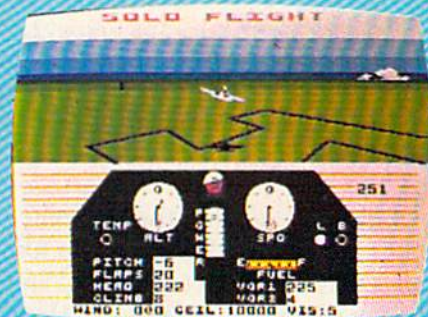
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Word Scramble

Mike Salman

Match wits with an opponent in this game as you play against time. For two or more players, VIC and 64 versions are included.

"Word Scramble" is written for two players, but you can make up teams and enter the names of the team captains as the two players. The computer first asks you for the names of the players. It then instructs player one to enter a common word (maximum ten letters).


A Three-Minute Puzzle

When the word has been scrambled, player two presses the space bar to see the scrambled letters. The player has three minutes to discover the word.

At the top of the screen, a display of the elapsed time appears, followed by the scrambled word. Below the scrambled word, a bar appears, on which you type the first letter of the word. If you type the wrong letter you hear a buzz. Type the right one and you hear a beep; the letter then appears on the screen.

A Ten-Point Penalty

If you find the word within the allotted time and have made no wrong guesses, you are awarded fifty points. For every wrong guess that you make, you lose ten points. A scoreboard is displayed every second turn so you'll know when both players have played an equal number of rounds.

See program listings on page 170. 

Look at these Features

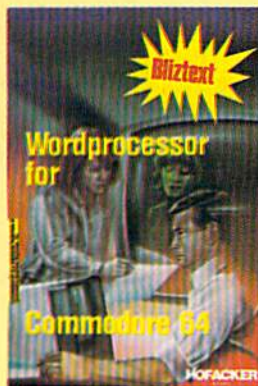
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THE BEGINNER'S CORNER

C. REGENA

Planning A Game Program

This month, let's explore a step by step procedure to write a game. To keep it simple, yet worthwhile, we'll create "Tic-Tac-Toe." It's easy to understand, and everyone knows the game, but programming it involves graphics, logic, and strategy.

I started out with the graphics. Tic-Tac-Toe is graphically simple, an X marker, an O marker, and four straight lines. On the Commodore 64, I let the X and O markers each take up a pattern 5 characters x 5 characters, so the basic game grid needed spaces 7 x 7. On the VIC, we have larger characters and fewer characters per line, so I chose X and O markers 4 x 4, and the grid needed 6 x 6 spaces.

Creating The Grid

The grid lines are made up of solid blocks one character wide (the reverse space). You can either PRINT the grid or use a series of POKES to place the colored squares on the screen. I chose to use the POKE method. First the screen is cleared and a random color chosen for the grid, in line 790 of the 64 version (line 38 in the VIC version). The random color on the 64 can be one of 14 colors, but not black or white. (You couldn't see a white grid, and I didn't like black.) On the VIC there can be six colors, but not black or white.

The grid is drawn in lines 800-870 (39-40 in the VIC version). In the 64 version, the variable A is previously defined as 160, the screen code for a reverse space, or a solid block of color. To draw on the screen, you need to POKE a screen location with 160, then POKE the corresponding color location with the color. The variable C relates the screen memory location to the color memory location. Lines 880-890 (VIC line 41) place numbers in the positions to be chosen as plays are made.

The X and O markers are drawn in subroutines at the beginning of the program, lines 120-280 (VIC 2-7). The nine coordinate positions for the markers to be drawn are READ in as S(I) in lines 590-610 (VIC 28-29). The graphics are now complete.

Next I programmed the player moves. The squares are numbered so the player just presses a number from 1 to 9. I like to avoid INPUT if at all possible. In this case only one key press is necessary, so we can use GET. You could also use PEEK, but

GET is easier to understand. GET E\$ gets the key pressed, and we need to make sure the key is one of the numbers from 1 to 9. All other keys are ignored.

Plotting The Move

VAL converts the string E\$ to a VALue, the number E. P(E) is the value in that position on the grid—3 for an X, 1 for an O, and 0 if there is no marker in that position. If there is already a marker on the position chosen, the player must choose again. If the square is available, P(E) is set to 3 or 1, S(E) is the coordinate of the position, and the appropriate marker is drawn. This process is in lines 980-1000 (VIC 47-49).

Next it's the computer's move. For the beginner level I just let the computer randomly choose any one of the available spots, lines 930-950 (VIC 44-45).

Since the value of N or X changes between moves and can be either 1 or 3, the relative formula is $N = \text{ABS}(N-4)$, line 540 (VIC 27).

Is The Game Over?

After each marker is placed, the computer checks to see if the game is over. First the rows are checked to see if there are three X's or O's in a row, lines 360-400 (VIC 12-16). Next the columns are checked to see if there are three the same in a column, lines 410-450 (VIC 17-21). Next, diagonal wins are checked, lines 460-480 (VIC 22-24). If there isn't a win, all spaces are checked. If all spaces are filled, it is a tie game. If there are empty spots, the game continues, lines 490-530 (VIC 25-27).

If there is a winner, the program branches to lines 1540-1700 (VIC 89-97), to congratulate the winner and play a tune made up of random notes. The program then offers the option to try again and branches appropriately. Lines 570 and 640 (line 31 of the VIC version) set variables for playing the music and the prompter beep, and the sub-routine in lines 290-330 (VIC 8-9) plays the tone and delays.

The game could be complete now, but it wouldn't be very challenging because the com-

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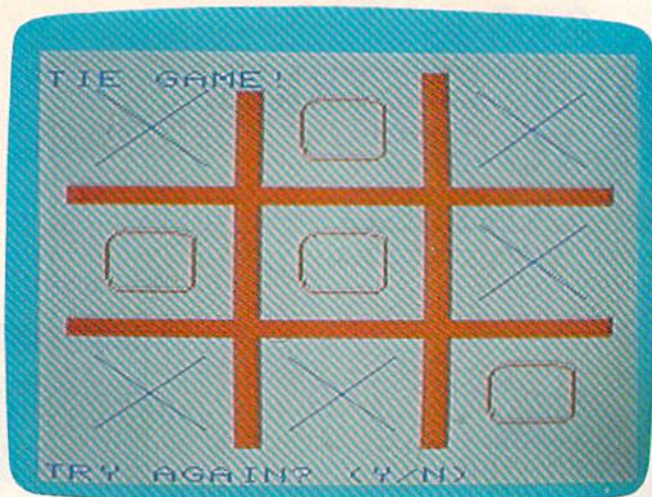
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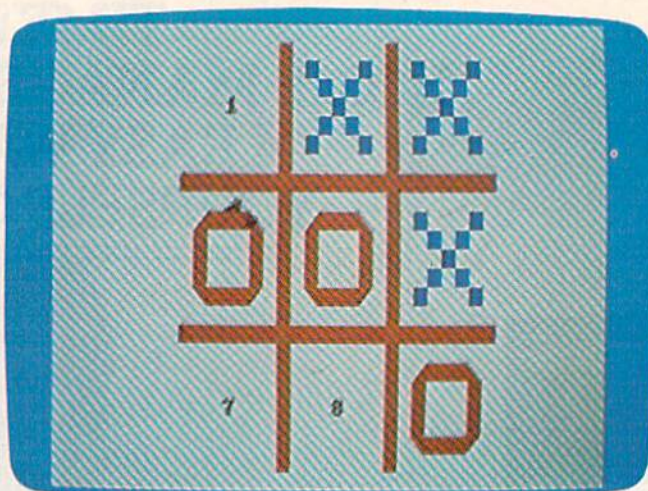


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A tie game offers another round (VIC version).



Standard characters make a clear display (64 version).

puter's moves are chosen randomly—no strategy involved. Now we need to add an intermediate level of play and some method of choosing the computer's moves. I'm calling this an intermediate level so you can add your own advanced level and perhaps a more sophisticated way of winning.

The Computer Gets Smarter

The computer's intermediate level of play is in lines 1030–1530 (VIC 51–88). The strategy I used was first to get the center spot if it is available, line 1060 (VIC 52). On later turns, if the computer has the center spot, it checks for possibly winning by filling the two diagonals.

The columns are checked in lines 1130–1200 (VIC 58–63). If an opposing marker is in the column, the column is ignored. If there isn't an opposing marker, there is a check to see if two of the computer's markers are in the column. If so, a marker is placed in the remaining spot to win. The rows are checked similarly in lines 1210–1280 (VIC 64–69).

If the computer doesn't spot a winning possibility, it will then check to prevent the opponent's winning. If there are two of the opponent's markers in any column, row, or diagonal, the computer will block the win, lines 1290–1490 (VIC 70–87).

If the computer does not spot a column, row, or diagonal with two like markers in it, the computer just chooses a place at random.

You can probably follow the logic in the 64 version, but I had to take out the REMarks to save memory in the VIC version. In the IF-THEN statements, P(K) will contain the value of the marker in a particular position, number K, where K is one of the nine positions. P(K) can be 0 if no marker is there, or 3 or 1 if a marker is there. After THEN you can set E to the position chosen, then GOTO a different line.

CLR Or Crash

I used the command CLR if the option to play again is chosen. This command clears the memory of all variables and unsatisfied FOR-NEXT loops and GOSUB-RETURNS. Without CLR, after several games I would get an OUT OF MEMORY message, which can be caused by too many nested FOR-NEXT loops or too many GOSUBs in effect. Notice that the IF statements transfer control out of FOR-NEXT loops and out of subroutines.

The last step of programming was to add the title and instructions at the beginning of the game. I usually PRINT the title and instructions as I am defining variables for the program. The title and instructions are in lines 560–690 (VIC 28–31). The options of markers and level of game are in lines 700–780 (VIC 32–37).


The program isn't complete until you test it. Game programs usually involve quite a bit of testing. You need to check all types of player input—right choices, wrong choices, other keys. In this particular game I had to check the player choosing first move or second move and beginner level or intermediate level (all combinations). I also checked the player winning, the computer winning, and a tie game. The supreme test is to have someone else try the game for you.

If you are typing in the VIC version of this game, be sure to leave out all unnecessary spaces. Notice that the lines are numbered by ones to conserve memory.

If you wish to save typing effort, you may obtain a copy of Tic-Tac-Toe by sending \$3, a blank cassette or disk, and a stamped, self-addressed mailer to:

C. Regena
P.O. Box 1502
Cedar City, UT 84720

Be sure to specify the title and which computer version you need.

See program listings on page 171. 

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Let's start out this month with a look at a great game: *Blue Max*.

Maybe you've played *Zaxxon*. Your ship scrolls through a 3-D playfield as you bomb planes, silos, and enemy aircraft. You can move up or down in space as well. And to help you gauge your perspective, your ship even has a little shadow.

Blue Max has a similar concept, but instead of a spaceship, you're flying a World War I biplane. As you fly over scrolling enemy territory, you can bomb, strafe, shoot down enemy planes, even land and take off from a runway. *Blue Max* has far more depth than *Zaxxon*. It's one of those few good games that have successfully combined strategy with arcade play.

Takeoff

When you start the game, you taxi your plane to the end of the runway. When your speed reaches 100 mph, push up on the joystick to take off. If you haven't gained enough speed, though, your plane will stall and crash.

You can control your plane in two ways. In one mode, you push up on the stick to go up and pull back to go down. This is opposite of actual airplane joystick controls. (Yes, "joystick" is an aviation term, too.) There is another mode that behaves in a standard way—pull back to climb, push forward to descend. You can also choose various skill levels, and whether or not to obey the law of gravity. If you turn on the gravity, your plane will gradually descend if you let go of the joystick. With no gravity, your plane more or less hovers as it flies.

There's a lot of detail here. The scrolling playfield is colorful and full of targets like buildings, bridges, cars, boats, tanks, guns, runways, even the enemy city. To bomb, you pull back on your stick while you press the fire button. To strafe, you go to a low altitude (the command window turns red) and press fire.

There are many status indicators to keep an eye on, just as in real flying: speed, fuel, altitude, and damage. The status window at the bottom of the screen keeps you informed. It normally has a black background color, but will turn red if you fly low, yellow if you're too low (impending crash) and blue if you're at the same altitude as an enemy plane (ripe for the picking).

Periodically, a big letter P announces that an enemy plane is in the area. You align yourself with it and press fire as you try to hit it with your guns. Be careful not to crash into the plane or the game's over. You only get one "life." W tells you that a strong wind is blowing, and L signals a friendly runway. Smaller letters also light up to warn you of damage to the guns, bombs, your maneuverability, or the fuel tank. If you have damaged something, it will work intermittently, if at all. The only way to make repairs is to land at a friendly runway.

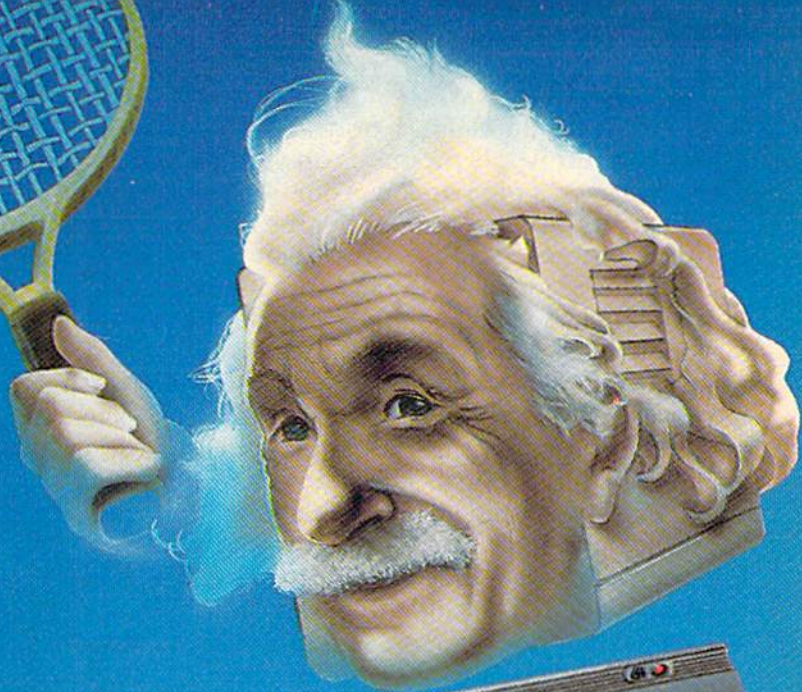
When L shows up, begin your approach. Landing is quite difficult—you'll probably crash the first time you try it. Come in low and try to land at the start of the runway. Your speed will drop radically, then you will roll to a stop. Fuel tanks are filled and any damage is repaired. You then make another takeoff.

Be sure to give yourself plenty of runway, though, or you'll crash into the trees. And if you run out of fuel, you'll have to glide until you crash (most likely) or luck onto a runway.

The point of the game, besides the fun of being airborne, is to shoot enough targets so that you can advance to the enemy city. At the city, you have to bomb a statue. If you can do this, you'll be awarded the Blue Max medal. Otherwise, you'll have to be satisfied with rankings like "Runway Sweeper, Class One."

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Apple Emulator For The 64?

We've heard the claims before about a device that lets you run Apple programs on your 64, but it's always been a pipe dream. Your 64 can easily match any Apple graphics, but the screen storage, ROM routines, graphics calls, beep sound, disk format, and joystick interfaces are totally incompatible. The goal of an Apple emulator is to let you just insert an Apple disk, turn the power on, and begin to use the software, whether it is a word processor, arcade game, or an accounting package.

The only way this is possible is to actually have an Apple. Sorry. The second best thing is to plug an Apple into your 64. That's right. A whole Apple on a single cartridge that would plug into your 64. You see, that's the only way to get true compatibility. You could make an Atari VCS, or even an old shoe run Apple programs with enough hardware. And whether you plug it into your 64 or a pair of penny loafers, it's still an Apple. And it can't be very cheap.

Given that it's theoretically possible, it should be available, right? Well, you can buy an Apple emulator. It's called the AP Modular Pak, and it's made by a Canadian company called Pioneer Software. You get an expansion box, with eight Apple expansion slots and four 64 expansion ports. A CPU card plugs into the box. It's the magic one—it makes the Apple software work on the 64. You also need an AP DOS card, which actually converts your 1541 drive into an Apple-compatible one (quite a feat!) The whole system is \$525. If we're able to obtain a review unit, we'll give you the details on how it works, and how well.

The price tag is a bit steep—let's face it, it's three times as much as most of you paid for your 64. But it does let you use your existing equipment and disk drive as a second computer. Even if you buy the AP Modular Pak, is there really some Apple software you want to run on your 64? 64 games are far superior to Apple games (sorry, Apple fans—maybe you can plug a 64 Pak into your computer one day). There's a great deal of software for the 64 that was engineered especially for your computer. All the major Apple programs are available in versions for the 64 anyway. But if you want to own both worlds, maybe the Pak's for you.

PCjr Vs. Commodore 64

Recently, I've been working with IBM's new PCjr, and have had a chance to compare it with other computers, including the 64. Both of them are home computers. Which is best? I knew you'd like that question. Of course, no one computer is "best," but some are more suitable than others for certain applications. (For games, the 64 wins hands down, though.) I really like both com-

puters. First, let's compare them on equal terms:

Commodore 64 with 64K, 1541 disk drive
PCjr Entry Model, 64K, disk drive

Commodore 64 system price: about \$450
PCjr system price: \$1149

Other comparisons:

Graphics

64: 320 x 200 (high resolution), 160 x 200 (medium resolution). 16 colors simultaneously in text mode. Upper- and lowercase, or a complete graphics character set. Sprites.

PCjr: 320 x 200 in as much as 16 colors simultaneously. 640 x 200 high resolution. 40 columns in text mode with 255 possible character attributes including independent foreground and background colors. 80-column capability (optional). Some graphics characters. Beautiful, sharp RGB color capability (but expensive). No sprites. Repeat: no sprites.

Sound

64: The one and only SID chip with three voices, 16-bit resolution, waveforms, ring modulation, synchronization, filtering, and more.

PCjr: A TI sound chip, just like the one in the TI-99/4A. IBM calls it a sound synthesizer. Ahem. Three voices with independent volume control with a 12-bit range. White noise.

Keyboard

64: 66 keys, typewriter style. Full travel, full size. Four function keys with eight states. Soft reset key. Cursor and editing keys.

PCjr: 62 keys. Some call them chiclets, but they're not that bad. The smaller than normal keys have full travel, and can accept overlays that can fully redefine the keyboard, so there's no lettering on the keycaps. Cursor and editing keys. Cold reset available from the keyboard. IBM calls its keyboard the Freeboard. There's a cordless infrared link between the keyboard and the system unit. No dedicated function keys, but ten keys can act as function keys. Can generate all IBM key codes.

Input/Output

64: Proprietary serial bus for disk drive, printers, and other Commodore devices. Expansion port with all bus signals (also acts as cartridge slot). Parallel user port with RS-232 capability. Two digital joystick ports which can also accept a light pen or four paddles. Audio/video port and built-in RF modulator for TV. Cassette port for Commodore tape drive. Up to four 1541 disk drives with 170K storage each, single-sided. CP/M capability.

PCjr: Built in ports provide TV output (modulator extra), color monitor output, RGB output, two 64K cartridge slots, RS-232 serial, light pen, two analog joystick ports, cassette port for an audio

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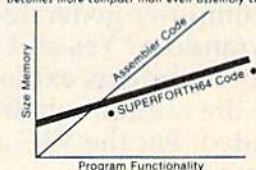
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Inside Random Numbers

Dan Carmichael, Assistant Editor

Are computer-generated random numbers truly random? Yes and no. This inside look at random numbers explores ways you can determine the random quality. A test program is included. For the VIC and 64.

Computers, if nothing else, are logical. But in certain programs, especially games, you'll want your computer to generate a random number. The RND command does this.

How random are those numbers? How can a computer pick a number out of thin air?

The VIC and 64 produce random numbers by taking a *seed* number, multiplying it by another number, adding yet another number, and scrambling the bytes. The result is not a truly random number, but it suffices for most applications.

The seed (and the random number) are stored in *floating point* format. In Commodore BASIC, five bytes are needed for each floating point number, even if the number is a single digit, like 1 or 2.

The BASIC RND command can generate random numbers in both the VIC-20 and the 64. In its simplest form the RND command generates a random number between zero and one (not including zero or one). To see how this is done, enter the following BASIC program:

```
10 PRINT RND(1): GOTO10
```

A Choice Of Arguments

Whenever you use RND, you must include a number in parentheses immediately after it. This number is called the *argument*. The number in the argument determines the seed value which is scrambled to create the random number. There are three ways of seeding the RND function—using a positive number, a negative number, or zero.

Using a positive number as the argument is by far the most common method of generating random numbers because it is the most reliable. When you use RND (1), the computer looks at memory locations 139-143 and uses the values there for the random seed. When it has finished, it puts new values into those slots. Any positive number can be used. The value does not matter, only the fact that the number is positive.

A negative argument will give you a predetermined result—a nonrandom number. To test this, try substituting RND(-1) or RND (-900) in the program above. The same number comes up every time. Because the results are predictable, negative numbers are used not to generate random numbers, but to put a certain value into the seed bytes at 139-143. If you use RND (-N) to set up the seed and then use RND(1), the series of numbers will always fall in the same order. This can be useful in debugging a program.

RND(0) checks the value in the system time clock and uses it for the seed. There are some problems with using it regularly, especially on the 64, but if you use it once at the beginning of a program, it can be a good way to (almost) randomly seed the random seed. Another method of randomizing, RND(-TI), is discussed later.

By adding a few options to the command, you can produce numbers of almost any size and range. Enter the following BASIC program.

```
10 PRINT INT((RND(1)*6)+1): GOTO10
```

In this example we've produced random numbers between 1 and 6. This might be useful in a program that simulates the throwing of dice. We've also added something new—the INTeger command. Remove the three letters INT from the above example, and run the program again. As you can see, without the INTeger command you get numbers with up to nine significant decimal places.

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The INTeger command converts decimal numbers to whole numbers by dropping anything after the decimal point. Type this line and press RETURN:

```
PRINT INT(1.1)
```

The result is 1. This is the INTeger value of 1.1. One important fact to note about the INT command is that it does not round off. Type and enter:

```
PRINT INT(1.9)
```

As you can see, the INT value of 1.9 is also 1, not 2 as you might expect.

Always use INT with RND when you want whole numbers. This will be the case in most applications. After all, if you were writing a dice game, you wouldn't want to throw a 6.38340299.

The RND command is certainly not limited to a range of six numbers as in the above example. As a matter of fact, the range of possibilities is almost limitless. The most common RND format is this:

```
INT(RND(1)*range+base)
```

where *range* is how many numbers you wish to generate, and *base* is the lowest number of that range. For example, if you wanted to generate a range of numbers between 1 and 52 (for use in a card game), the command syntax would look like this:

```
INT(RND(1)*52+1)
```

INT(RND(1)*11+10) would generate random numbers between 10 and 20.

Randomizing Random Seeds

As mentioned above, the random seed is the origin of numbers produced when the BASIC RND command is used with a positive argument. The random numbers you use in your programs are extracted from the five seed bytes.

A common problem when working with random numbers is repeating patterns. Turn your computer off and then on, and enter this line:

```
FORA = 139TO143:PRINTA,PEEK(A):NEXT
```

This shows you the contents of the five random seeds. If you continue turning the computer off/on and entering this line a number of times, you'll notice something interesting. The random seed bytes always contain the same values after power up. As a matter of fact, the values you're probably getting are 128, 79, 199, 82, and 88.

The fact that the random seed is always initialized with the same values creates the possibility of repeated random number patterns. For example, turning on your computer, loading the same game, and playing it in the same sequence is likely to produce the same results. This isn't

much fun in a game based on the luck of the draw.

The answer is to randomize your program. This can be done with one BASIC line. If you want your computer to produce truly random numbers without repeating patterns each time you play a game, start with a different random seed each time it is run. This is done by initializing the random seed with the use of the system (computer) clock. Turn your computer off and on, and enter the following line:

```
X = RND(-TI):FORA = 139TO143:PRINTA;PEEK(A):  
NEXT
```

The command `X = RND(-TI)` is the key to producing a random seed that is varied each time the program is run. In effect, this BASIC statement gets values from the jiffy clock (TI), and POKes them into the random seed. Because the clock changes every sixtieth of a second, the odds against repeating a random seed are great. Adding this line to the beginning of your BASIC program (before the RND statement is used) will create a different seed each time the program is run.

Testing Random Numbers

"Random Number Test" checks the RND command or the random seed, charts the results, and supplies a capsule analysis. It will show you what results to expect when using the RND command in a BASIC program or the random seed to generate random numbers within a machine language program.

For BASIC programmers, the program will test any range of numbers between 0 and 255. And machine language programmers have the option of testing any one of the five random seed bytes.

Carefully enter the Random Number Test program. The DATA statements in lines 885 through 941 are for a machine language program, so they must be entered accurately. After entering and SAVEing the program to tape or disk, type RUN.

The first prompt asks if you want the seed randomized (seeded with the clock). Press R to randomize; otherwise, press RETURN. The next prompt asks what type of computer you have. If you have a VIC-20, enter V. Press RETURN for the 64.

The third prompt asks you to press either the f1 key to test the random seeds, or the f3 key to test the BASIC RND command.

If you choose f1 (test the random seeds), the next prompt asks which random seed byte you wish to test. The five keys (1-5) correspond to the five random seed bytes (139-143).

If you choose f3 (testing the BASIC RND command), the next prompt requests two numbers between 0 and 255. This is the range of random

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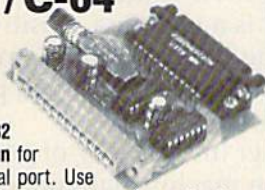
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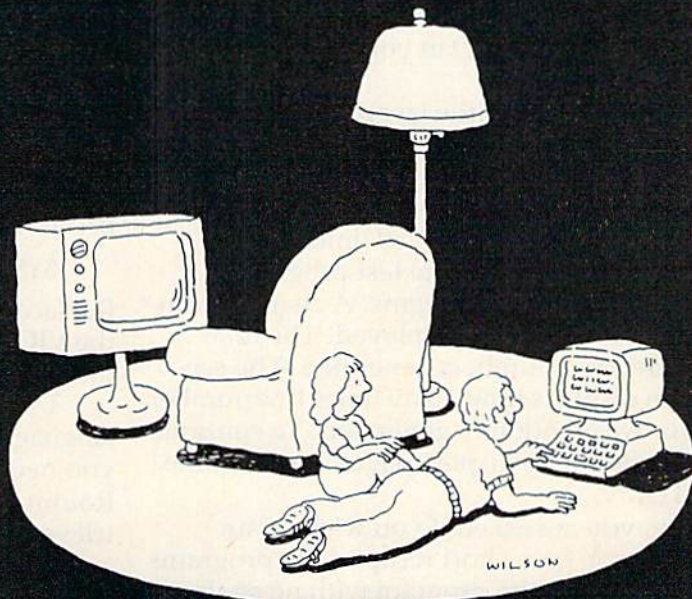
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numbers you want to test. Enter the two numbers separated by a comma, then press RETURN. For example, if you want to test the numbers between 1 and 6, enter 1,6 then press RETURN. The test range must include two or more numbers. Entering 1,1 or 123,123 would test only one number and is not a legal entry.

The program generates random numbers in the range you specify while in BASIC, then branches to the machine language program that does the tallying. Testing the RND command in this way demonstrates the randomness you can expect when you use RND in your BASIC programs.

After responding to the last prompt, the program begins running. The first stage of the program can be ended by pressing the f1 key. The program will also end if any one number is generated, or occurs more than 65,280 times.

After the first stage of the test program has ended, the analysis phase begins. A chart of numbers between 0 and 255 is displayed. The first column shows the numbers generated. The second column displays how many times this number occurred or was randomly generated. To continue stepping through the display pages one at a time, press RETURN.

Finally, you are asked if you wish for an analysis. Press Y for a short recap of the programs run. Press N to end the program with no analysis.

Here's a description of the totals displayed on the analysis page:

Total Numbers Hit — how many numbers received at least one hit. For example, this total would be 5 if you were testing the RND command with a range of 1-5, and all 5 numbers were hit.

Total Count — the total number of hits, all numbers included. In the above example, if all numbers 1 through 5 were hit 5 times each, this total would be 25. This also reflects the total number of passes the program made.

Average Count — the average hits per number. For example, if we were testing the range of 100-101 and 100 was hit 2 times, and 101 was hit 4, the average would be 3. Use this total to determine the randomness of the test run. For example, if you tested the whole range of numbers (0-255), and the average count read 10,123, but the number 2 was hit only 3 times, you'd know of this disparity.

Lowest Count — indicates the lowest number of hits any one number received. In the above example (0-255) the *lowest count* would be 3 because the number 2 was hit only 3 times.

Highest Count — indicates the highest number of hits received by any one number.

Total Zeroes — indicates how many random numbers received no hits.

Although the recap analysis is brief, it is helpful in illustrating how well the random function is behaving.

RND And Machine Language Programming

What about generating random numbers for machine language applications? Of course, you could always RTS (branch back to BASIC), generate a random number with the RND command, and return to machine language. But this would reduce the speed of the machine language program.

The answer can be found at address \$E097 (decimal 57495) in the 64, and \$E094 (decimal 57492) in the VIC-20. These addresses are the start of the routine in the Kernal that places random values into the random seed bytes. Type and enter this BASIC line to demonstrate how it works:

```
SYSxxxx:FORA = 139TO143:PRINTA,PEEK(A):NEXT
```

Replace xxxx with 57495 for the 64, and 57492 for the VIC. As you can see, each time this BASIC statement is run, the values in the random seed change.

Using these Kernal routines in your machine language program is fairly straightforward. When you need a random number, JSR (Jump to Sub-Routine) to the Kernal routine. You can then retrieve one or more of the values in the random seed bytes, and away you go. Of course, processing the values is up to you.

However, there is one important point to remember when generating random numbers in machine language. As mentioned earlier, seeding the RND command with a negative, positive, or zero value will produce different results. When you use the Kernal RND routine, one of the first things it checks for is a negative, positive, or zero value in the Floating Point Accumulator. Make sure the FPA contains values that will produce the results you desire.

There is another unique way of generating random numbers in machine language, using the I/O block in your computer. The I/O block is an area of memory (starting around 56320 in the 64, and 37000 in the VIC) that is constantly changing, doing such things as updating the screen, and manipulating data direction registers and timers. First, find two bytes that have constantly changing values. Load the accumulator with the value in one byte, and either the X or Y register with the other. You can then rotate (ROR or ROL) the accumulator with the X or Y register.

Does RND Generate Random Numbers?

Our results from Random Number Test are interesting. First is the way the random seed bytes behaved.

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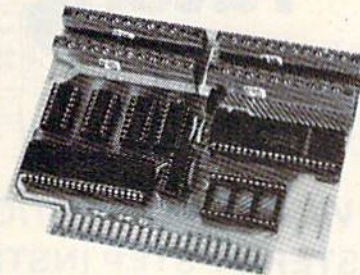
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F.C.M. (D)	MasterType (D or R)	\$25	1, 2 or 3 (T or D)	\$17
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CREATIVE SOFTWARE	SEGA		(T or D)	\$19
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I Am The C64 (D)	Congo Bongo (R)	\$25	Starbattle (T or D)	\$19
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World's Greatest	Hey Diddle Diddle (D)	\$18	Any Commodore Cover	\$6
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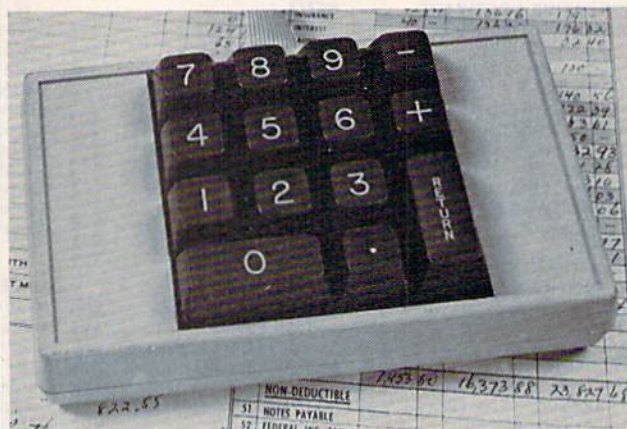
The most interesting of the five bytes (139-143) was 139. After 129,873 passes, the results were very lopsided. Although the whole range of possibilities (0-255) was tested, only 15 numbers received hits, the numbers between 114 and 128. And each number received approximately twice as many hits as the previous number. The number 127 received 32,287 hits and 128 was about double that amount with 65280. This is because of the way base ten numbers are translated into floating point format. This byte would not be very usable for generating random numbers because of the poor dispersion pattern.

Also of interest were the test results of random seed 143. The pattern here, although it did display a few glitches, was usable. The majority of numbers (236) received a relatively random number of hits. A few numbers received zero hits.

Finally, the biggest surprise was the testing of the BASIC RND command. The range tested was 1 to 6, and the surprise was the results. The activity was evenly distributed over the entire range with the number 3 receiving 38,593 hits (the lowest), and the highest number 4 with 39,418 hits. The average was 39,061. These test results seem to indicate that the BASIC RND command is effectively random. All tests were run after the random seed was initialized with the clock.

See program listing on page 174.

The Simpler, the Better



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11:15:26

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I put auto-dial to work right away. I auto-dialed CompuServe, but couldn't get through, so I had VIP Terminal redial 'til it got through - it dialed five minutes straight! Then I auto-logged on with one of my 20 programmed keys, and downloaded some graphics screens, and stock quotes for dad. I printed it and saved it to disk as it came on the screen. Wow! And now I can send you my programs automatically. I got yours and they worked right off.

Those icons, - you know, like the Apple Lisa - are a lot of fun. I also like the menus, function keys, highlights, help tables - great for a newcomer like me. And with the many options there isn't a computer I can't talk to.

What's really neat is that Softlaw has a whole VIP Library of interactive programs, including a word processor, spreadsheet and database, which will be out soon. Sis promised me the whole set for my birthday.

I see by the built-in "old clock" on the screen that long-distance rates are down. Got to call that L.A. B B S. Yep, there goes the alarm. Later.

- Lore

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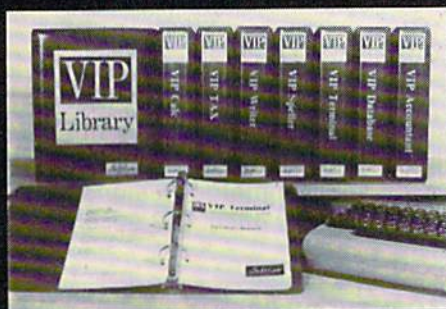
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Virtual Memory

VIP Library programs are not limited by the size of your computer's memory. All programs use virtual memory techniques to allow creation and use of files larger than your computer's available work area. You're only limited by the space on your disk!

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Icons Make Learning Easy

Hi-res technology and sprites allow VIP Library programs to bring you task Icons, made famous by the Apple Lisa™ and the Xerox Star™. With these advanced sprite representations of the task options open to the user, even the total novice can, at a glance, perform every task with ease. Just look at the icon and press a key! No programs are easier or more fun to learn and use!

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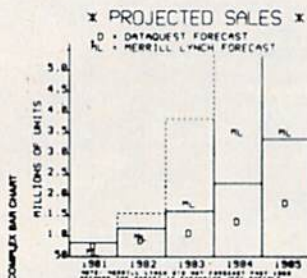
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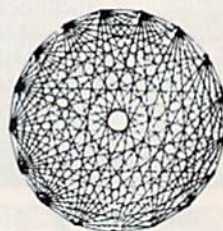
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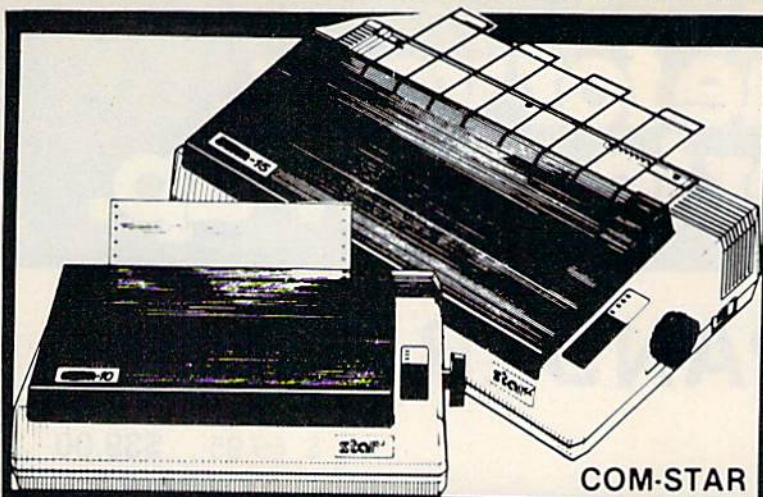
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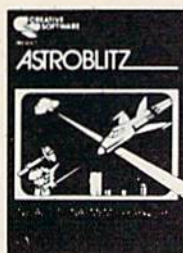


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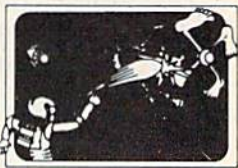


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Mark Niggemann

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The less time spent typing, the more time you have for programming. "One-Touch Keywords" lets you use any of the letter keys in combination with either the SHIFT or Commodore key to instantly print a BASIC keyword on the screen. For example, instead of typing GOSUB, you can hold down SHIFT and press G, and GOSUB will appear as if you had typed the whole statement. See the table for a list of all the keywords available.

Which Computer?

This utility works on both the VIC and 64. It initially detects which computer is being used and then modifies itself as necessary. These modifications are POKEd right after the relocation adjustments.

To detect which machine the program is running on, PEEK 65532, a ROM address. If this location contains a value of 34, the program is being run on a VIC. Otherwise, it's on a 64. This is an easy way to detect which machine you are working with and can be used in any program designed to work on both the VIC and 64.

A final checksum routine (lines 710-750) is included to aid in finding any errors in the machine language data. After you run the program once, type RUN 700 and the program will check your typing. Recheck the DATA statements if you get an error message. This final checksum is added insurance to the line-by-line checksum provided by the "Automatic Proofreader."

Activating The Keywords

The program is a BASIC loader which moves the

machine language from DATA statements into the upper part of free memory. It also protects the machine language from interference by BASIC.

To activate the machine language, you must type SYS followed by the number given as the on/off address, then press RETURN. The one-touch keywords will remain enabled even after the RESTORE key has been pressed. To disable the keywords, SYS the on/off address again.

See program listing on page 175.

Keywords

Key	SHIFT	Commodore
A	PRINT	PRINT#
B	AND	OR
C	CHRS	ASC
D	READ	DATA
E	GET	END
F	FOR	NEXT
G	GOSUB	RETURN
H	TO	STEP
I	INPUT	INPUT#
J	GOTO	ON
K	DIM	RESTORE
L	LOAD	SAVE
M	MIDS	LEN
N	INT	RND
O	OPEN	CLOSE
P	POKE	PEEK
Q	TAB(SPC(
R	RIGHT\$	LEFT\$
S	STR\$	VAL
T	IF	THEN
U	TAN	SQR
V	VERIFY	CMD
W	DEF	FN
X	LIST	FRE
Y	SIN	COS
Z	RUN	SYS

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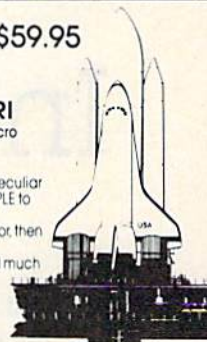
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MACHINE LANGUAGE FOR BEGINNERS

RICHARD MANSFIELD, SENIOR EDITOR

Indirect Addressing

This month we'll take time out to answer a question which came in the mail:

Q: I hope you'll go over indirect indexing again. Why is it important? I found it hard to absorb at first.

A: Everyone does. It's one of those things which—once you know how to do it—is easy to use and even obvious. But everyone I've ever known who learned machine language has had to puzzle this one out. It's an *addressing mode*, a way of sending a byte from one place in the computer to another.

There are various ways to send these bytes, various addressing modes you can choose from. Like BASIC's POKE 1024,65, machine language (ML) can also send the number 65 to the first RAM memory cell of the screen on a Commodore 64. ML could do it in this fashion:

```
LDA #65 (load the accumulator with 65)
STA 1024 (store the accumulator at address 1024)
```

That's the Absolute addressing mode. It's straightforward. Load it, store it.

Making A Bank Shot

Yet there are other ways, other addressing modes, which send a byte from the accumulator to a target address. What's often called Indirect Indexed addressing (I like to call it Indirect Y) is not as straightforward as Absolute addressing. You load it, and *bounce* it off a *zero page pointer*. This idea does take a few minutes to learn, but it's a fundamental and very powerful ML programming technique. You should study it, play with it until you master it. It's like a bank shot in basketball: you make a basket by bouncing the ball off the backboard. In other words, it's an *indirect* shot:

```
LDA #65
```

```
LDY #0
```

```
STA (253),Y (253 is a zero page backboard off which
the 65 bounces. Such two-byte, zero page locations
are called pointers.)
```

The confusing part is how 253, even enclosed in parentheses, sends that 65 up to 1024. The parentheses and the ,Y are just symbols that alert an assembler program to use the Indirect Y addressing mode. An assembler is to machine language what BASIC is to BASIC programs: it interprets and creates a series of instructions that the computer can follow.

But why 253? What's special about this zero page address that causes bytes to go to 1024 instead of 5000 or 8992? The answer is that Indirect Y addressing is a two-step process: First you must put the target address (1024 in our example) into whatever two bytes in zero page that you plan to use as a pointer. In other words, you put the 1024 into addresses 253 and 254 *yourself* before you can STA (253),Y and have bytes bounce up to 1024.

Position Matters

So far, so good. But how do you set up an address pointer? The 6502 chip expects all such addresses to be stored into *two consecutive bytes* and it wants the *higher byte in memory* of this pair to hold a number that is to be multiplied by 256. The lower byte in memory will hold any remainder left over after the multiplication. Thus, in our example above, the number in cell 253 will be the remainder and the number in 254 will be what's multiplied by 256. The position of the two numbers in the pointer is important. How would you set up a pointer to hold the address 15? It would be: 15 0. Nothing is multiplied by 256. How about storing the number 1024?

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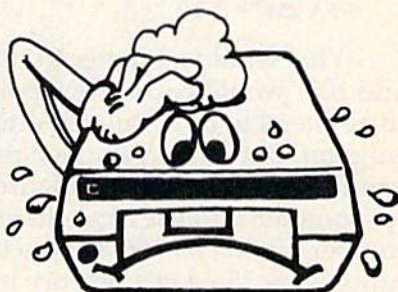
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Preparing The Pointer

To set up any address pointer, you first divide the number by 256 to get the higher byte (usually called the "most significant byte," or "MSB"). $1024/256 = 4$. So 1024 would be stored: 04. There is no remainder in this case. That is, address 253 above would contain a 0 and address 254 would contain a 4. Using an assembler, you would set up this pointer by:

```
LDA #0 (Load A with the LSB, the least significant
byte)
STA 253
LDA #4 (the MSB)
STA 254
```

What would a pointer to 1025 look like? 14. And 1027 would be 34. Such pointers, fortunately, do not need to be calculated often in a normal ML program. But when you need them, they're quite useful. The easiest way to figure out how to set up a pointer is to use a calculator. Put in the number, divide by 256, subtract the integer, and multiply by 256. Let's practice it:

Enter 1027 and then divide it by 256. You get 4.01171875. The *integer*, the whole number to the left of the decimal point, the 4, is our MSB. Jot it down. Then subtract it from the answer to leave the fractional part, .01171875. Now to get the LSB, just multiply this fraction by 256. There's the 3.

On most calculators, you'll need to enter $1027 \div 256 = 4 = X 256 =$.

By now, all this bother seems hardly worth it. Why not just LDA 65:STA 1024? If that one load and store is all you're doing, Absolute addressing is the easier and faster way. On the other hand, loops and such greatly benefit from the Indirect Y addressing mode. What if you wanted to check the first 256 screen RAM cells for the letter A? It would be swift and effective to store 0 and 4 into 253 and 254 and then:

```
1000 LDY #0
1002 LDA (253),Y
1005 CMP #65 (is it the letter A?)
1007 BEQ 1020 (if so, go do something in response)
1009 INY (otherwise, raise the index and look at the
next cell)
1010 BNE 1002 (branch back to the start of the loop
unless Y resets to zero.)
1013 do something here which shows that no A was
found.
...
1020 do something here which shows that we did find
an A.
```

Notice the INY. It's the secret of the power of Indirect Y addressing. The value of Y is added to the pointer. Therefore, you can address any cell within a 256-byte range by just changing the value of Y. 1024 becomes 1025, 1026, 1027...quickly, with each INY. DEY would work in the opposite direction.

200 LDAs

Imagine using Absolute addressing to accomplish this same task:

```
1000 LDA 1024
1003 CMP #65
1005 BEQ 990 found it, so branch.
1007 LDA 1025 didn't find it, so keep on looking.
1010 CMP #65
1012 BEQ 990
1014 LDA 1026...and so on, 198 more times!
```

One final note: You can't use just any zero page pair of memory cells to store your pointers. You have to share this first 256 bytes with your 64 or VIC's BASIC and with its operating system. They put their pointers into zero page for the same reason that you will.

If you don't use a tape drive, locations 165-177 are safe to use. Even if you do use tape, you can store things there if you don't load or store anything to or from tape while the ML program is *running*. Most of the ML you'll write won't involve loading or storing during the execution of a program anyway, so 165-177 are normally available. And addresses 251-254 are always safe.

If you have any questions or topics you'd like to see covered in this column, please write to: Machine Language For Beginners, P.O. Box 5406, Greensboro, NC 27403.

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